Airport Layout Plan Narrative Report

Redwood Falls Municipal Airport (RWF)

Redwood Falls, Minnesota

DRAFT REPORT

April 2013

REDWOOD FALLS minnesota

Consultant:
Bolton & Menk, Inc.
12224 Nicollet Avenue
Burnsville, MN 55337
P: 952-890-0509

Airport Sponsor:
City of Redwood Falls
333 South Washington Street
P.O. Box 526
Redwood Falls, MN 56283
P: 507-637-5755

DISCLAIMER STATEMENT

The preparation of this document may have been supported, in part, with financial assistance through the Airport Improvement Program from the Federal Aviation Administration (Project Number AIP 3-27-0083-12-12 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 nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

TABLE OF CONTENTS

APPENDIX

LIST OF EXHIBITS

EXECUTIVE SUMMARY

The City of Redwood Falls, Minnesota has conducted an Airport Master Plan study to update the Airport Layout Plan (ALP) for the Redwood Falls Municipal Airport (RWF). The project was funded 90 percent by the Federal Aviation Administration (FAA) under AIP grant number 3-27-0083-12-12, and 10 percent by the City of Redwood Falls with the assistance of funds generated from the Airport. The City of Redwood Falls, as the Airport Sponsor, must keep the ALP document current by depicting the location of existing and planned future airport infrastructure. An Airport Master Plan completed in 2010 provided much of the background for this update of the ALP. A simple re-evaluation of the current and future airport needs was necessary as a part of this update. New planning considerations have been taken into account. A narrative report summarizing the findings is required as part of this FAA grant.

The existing airport facility includes a 4,000-foot long and 100-foot wide concrete Runway 12/30, and a 2,081-foot long and 200-foot wide turf crosswind Runway 5/23. Other airfield infrastructure includes a partial parallel taxiway, aircraft parking apron, a public hangar/terminal building, a public hangar building, and two (2) public 8-unit T-hangar buildings for aircraft storage.

Aircraft operations (takeoffs and landings) are forecasted to grow from approximately 9,800 annually in 2012 to approximately 14,100 annually by year 2032. Based aircraft are forecasted to grow from 18 presently to 21 within the next 20 years. The existing airport is designed and constructed to accommodate FAA Runway Design Code (RDC) B-II critical aircraft type, which generally includes twin engine turboprop and business jet aircraft. The future critical aircraft type planned will include aircraft greater than 12,500 pounds including business jet aircraft weighing less than 17,000 pounds with an FAA RDC of B-II. These aircraft are not anticipated to substantially use RWF with more than 500 operations annually (250 takeoffs and 250 landings).

This operational growth warrants planning for additional facility requirements. The City desires to maximize the primary runway length and accommodate non-precision instrument approaches within the existing airport environs. A 4,400-foot runway length is recommended to accommodate the regular runway length needs of twin engine turboprop aircraft. The maximum Runway 12/30 length reasonably accommodated is 4,400 feet. This is consistent with the Airport Master Plan. Obstructions to crosswind Runway 5/23 must be removed to maximize available current runway length. Future improvements recommend extension to a length of 2,300 feet to more safely accommodate regular operations. The terminal area plan was re-designed from the Airport Master Plan. Additional "build ready" private hangar sites are needed to accommodate current demand, along with a plan to maximize current infrastructure. Development alternatives were evaluated in this ALP update effort.

Short-term recommendations include land acquisition for land use and airspace control, obstruction removal to all runway ends, and rehabilitation of existing pavements, construction of a parallel taxiway, and drainage improvement implementation.

Beyond the short-term, further development recommendations are to document aircraft operations to justify a 400-foot runway extension to Runway 12/30. Only when the project is justified by FAA can the process begin to obtain environmental clearance, acquire land, complete engineering design, and finally construct this project. Other recommended improvements include replacing airfield lighting, constructing a private hangar site area, replacing a T-hangar building, demolishing and constructing a new T-hangar building, and extending Runway 5/23. Total short-term (0 to 5 years) capital improvement needs total $5,775,000, mid-term (6 to 10 years) capital improvement needs total $1,166,000, and long-term (11 to 20+ years) capital improvement project needs are $6,729,000. A full Implementation plan has been developed in this ALP update.

Environmental considerations for development include ensuring compatible land use through community land use planning and implementing an updated airport safety zoning ordinance, minimizing impacts to wetlands, and limiting socioeconomic impacts with proposed airport development. Any improvements funded with Federal grant dollars must undergo the appropriate environmental review following National Environmental Policy Act (NEPA) requirements.

INTRODUCTION

The City of Redwood Falls is required by the Federal Aviation Administration (FAA) to keep their Airport Layout Plan (ALP) current, reflecting current conditions, and growth and expandability of the facility. The City authorized Bolton & Menk, Inc. to prepare an ALP update in line with the Master Plan completed in 2010. This ALP Update has been authorized by the FAA and thus is eligible for Federal Grant Funding. An ALP drawing set provides the Airport Sponsor with recommended airport development in the short-term (0-5 years), mid-term (6 to 10 years) and long-term (11 to 20+ years). Keeping the ALP current is a grant assurance requirement for airports receiving Federal funding assistance. The work conducted as a part of this ALP update will depict the existing and proposed modifications to the airport facility including significant off-airport development. The Master Plan and ALP for the Redwood Falls Municipal Airport will guide the City of Redwood Falls in their airport development.

This narrative report provides an outline of the research and analysis that makes up the framework for the ALP document and its related changes. Per FAA Advisory Circular (AC) 150/5070-6B *Airport Master Plans*, the accompanying ALP narrative report should contain at least the following elements:

- Basic aeronautical forecasts.
- Basis for the proposed elements of development.
- Rationale for unusual design features and/or modifications to FAA Airport Design Standards.
- Summary of the various stages of airport development and layout sketches of the major elements of development in each stage.
- An environmental overview to document environmental conditions that should be considered in the identification and analysis of airport development alternatives and proposed projects.

The current ALP document for Redwood Falls was completed in 2007 and approved by the FAA in February 2009. The ALP was completed prior to the Master Plan study. The Master Plan recommended an alternative runway configuration than what is depicted in the Airport Layout Plan. An ALP Update is needed to modify the document to reflect the recommendations in the Master Plan. Additionally, the Redwood Falls Airport Commission desires to include an update to the aviation forecasts to evaluate current and projected aircraft usage at the airport. Other reasons for an update of the ALP include the need to confirm the long-term plans for the runways, confirm or modify terminal hangar area plans, update obstruction data, and update the airport property map.

Completion of this ALP document has been coordinated with the City of Redwood Falls and the Redwood Falls Airport Commission. It is recommended that the City coordinate with Redwood/Renville Counties, and their respective Regional Development Commissions to make them aware of the airport's plans.

EXISTING AIRPORT FACILITY

BACKGROUND

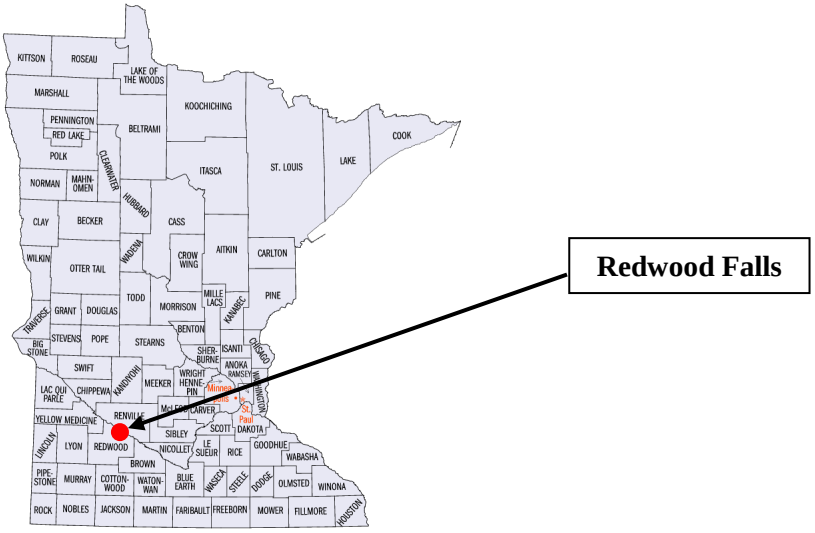
The existing airport is analyzed to evaluate information about the airport facility and its surrounding environment. Data was collected through the Federal Aviation Administration (FAA) and Minnesota Department of Transportation (MNDOT) Office of Aeronautics, previous studies, the Airport User Survey (2012), the Airport Master Plan, airport site inspections, and FAA aeronautical survey. Previous studies include but were not limited to the 2006 Minnesota State Aviation System Plan (SASP), FAA-approved Airport Layout Plan (2009), 2012 Environmental Assessment, 2009 Pavement Management Report, and 2010 FAA Terminal Area Forecast.

Exhibit 1-1, Aerial Photo

Source: FSA Photography (2012)

The City of Redwood Falls, (pop. 5,254; 2010 census) is located primarily in Redwood County and partially within Renville County. The City is located approximately 22 driving miles from Olivia (pop. 2,484); 28 driving miles from Sleepy Eye (pop. 3,599); 36 driving miles from Marshall (pop. 13,680); 42 driving miles from New Ulm (pop. 13,522); 72 driving miles from Mankato, a designated Metropolitan Statistical Area; and approximately 62 driving miles from edge of the 11-County Minneapolis-St. Paul-Bloomington, MN-WI Metropolitan Statistical Area (pop. 3,279,833). The airport service area is considered to include at least a portion of Redwood, Renville, Yellow Medicine, Brown, Nicollet and Lyon counties.

Exhibit 1-2, State of Minnesota Location Map



Source: State of Minnesota

The Redwood Falls Municipal Airport (FAA ID: RWF) is located in southwest Minnesota. The airport is northeast of the central business district of the City of Redwood Falls along Airport Road, north of U.S. Highway 71 and within city limits. An airport landing field has been present in the Redwood Falls area since 1931; in 1942 the City purchased land at the current site and established the Redwood Falls Municipal Airport. The airport serves as the based home to twelve (12) single-engine aircraft, three (3) multi-engine aircraft, one (1) helicopter, and one (1) ultralight aircraft. The primary runway length at RWF is published at 4,000 feet. The airport is identified on the Minnesota State Aviation System Plan (2006) as an Intermediate airport, and a part of the FAA National Integrated Airport System Plan (NPIAS). Intermediate airports have paved and lighted primary runways that are less than 5,000 feet long and can accommodate all single engine aircraft, some multi-engine aircraft and most corporate jets.

The exhibit below lists the surrounding airports within about 40 miles of RWF.

Exhibit 1-3, Surrounding Airports

Airport (FAA Code)	Driving Distance from RWF (miles)	Primary Runway Length	Annual Operations*	Based Aircraft
Redwood Falls Municipal (RWF)	**-**	**4,000'**	**9,800**	**17**
Oliva (OVL)	22.0	3,498'	4,700	12
Springfield (D42)	24.0	3,400'	2,420	4
Hector (1D6)	35.3	2,776'	7,000	30
Granite Falls (GDB)	37.6	4,357'	7,000	15
Marshall (MML)	40.8	7,220'	22,848	28

Notes: Annual Operations and Based Aircraft derived from Total Operations listed in FAA 5010 Report
Source: Airnav.com from FAA 5010 Reports

AIRSIDE FACILITIES

The airside facilities include the primary airport infrastructure to accommodate airport operations including the runway, taxiway, and apron facilities. The Redwood Falls Municipal Airport (RWF) was activated as a public facility in 1942. Major airfield improvements were made in 1961, 1962, 1974, 1981, 1996 and 2009.

RUNWAYS

The airport's primary runway, Runway 12/30, is 4,000 feet in length and 100 feet in width. The runway is oriented at 127.55°/307.55° true north. Assuming a magnetic variation of 2.12° east (2012), the magnetic bearing is 125.43°/305.43°. The runway is designed to serve up to FAA runway reference code B-II which includes aircraft with wingspans as large as 79 feet and approach speeds up to 121 knots. This includes aircraft as large as twin-engine turboprop aircraft and small business jets.

Runway 12/30 was paved in 1961 (2,500' x 75'), extended in 1974 (4,000' x 75'), and shifted/widened in 1997 (4,000' x 100'). Subdrains were installed in 1997 with the runway widening. At that time the airport was developed to position itself for larger aircraft from on-demand charter flights.

In 2009, a mill and overlay project was completed on Runway 12/30 that removed ½" of bituminous pavement and resurfaced by applying 2" of bituminous pavement. The runway markings are non-precision in type, and are in good condition.

Runway 12/30 consists of the following typical sections; measured using established stationing at centerline (STA 100+00 represents Runway 30 end, STA 140+00 represents Runway 12 end):

- STA 98+00 to STA 100+00 (unusable runway pavement), Runway 12 turnaround
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 1" bituminous overlay (1997)
  - 1.5" bituminous (1974)
  - 5.5" bituminous base (1974)
- STA 100+00 to STA 113+00
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 1" bituminous overlay (1997)
  - 7" bituminous (1974)
- STA 100+00 to STA 113+00 (25' widening)
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 4" bituminous (1997)
  - 6" Class 5 aggregate base (1997)
  - Select granular material
- STA 113+00 to STA 131+00
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 4" bituminous (1997)
  - 6" Class 5 aggregate base (1997)
  - 12" select granular material (1997)
- STA 113+00 to STA 131+00 (25' widening)
  - 2.5" bituminous overlay (2009)

- 0.5" bituminous mill (2009)
- 4" bituminous (1997)
- 6" Class 5 aggregate base (1997)

The pavement strength of Runway 12/30 is rated for single and dual wheel landing gear configurations. The landing gear type and configuration that an aircraft is equipped with dictates how that aircraft's weight is distributed to the pavement and also determines pavement responses to landing. Aircraft with maximum gross takeoff weight (MTOW) greater than 20,000 pounds typically have dual-wheel gear configuration, with small aircraft having single-wheel gear configurations. The weight bearing capacity of the pavement at RWF, based on the Airport 5010 *Master Record*, is estimated to be 23,000 lbs. single-wheel and 42,000 lbs. dual wheel.

Exhibit 1-4, Runway 12/30

Source: Bolton & Menk Inventory (October 2009)

The airport's secondary "crosswind" runway, Runway 5/23, is 2,081-feet in length and 200-feet in width with a turf surface. The runway is oriented at 053.39°/233.39° true north and has a magnetic bearing is 051.27°/231.27°. The runway serves small aircraft with an A-I runway reference code which includes aircraft with wingspans as large as 49 feet and approach speeds up to 91 knots. The runway has yellow cones to identify the runway edges, ends and displaced threshold areas.

Exhibit 1-5, Runway 5/23

Source: Bolton & Menk Inventory (June 2011)

TAXIWAYS

The taxiway connects the runway infrastructure to the aircraft apron and parking areas. A taxiway system ideally consists of connecting taxiways and a parallel taxiway connecting runway ends, thus minimizing aircraft occupancy time on runways and creating a safer airport environment. It eliminates the need for aircraft to "back-taxi" on an active runway and thus decreases runway occupancy time. Runway 12 at RWF is served by a 30-foot wide turf taxiway. Runway 30 includes a paved taxiway to the terminal area. Other than at runway ends, two taxiway turnoffs connect the main runway to the taxiway approximately 800 feet and 2,600 feet from Runway 30 end.

Exhibit 1-6, Taxiway

Source: Bolton & Menk Inventory (June 2011)

Improvements to the taxiway pavement have been completed in 2009, 1997, 1974, and 1996. The bituminous taxiway consists of the following sections:

- Taxiway A (Runway 12/30 mid-field)
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 4" bituminous (1997)
  - 6" Class 5 aggregate base (1997)
  - 12" select granular material (1997)
- Taxiway A2
  - 2.5" bituminous overlay (2009)
  - 0.5" bituminous mill (2009)
  - 4" bituminous (1997)
  - 6" Class 5 aggregate base (1997)
  - 24" select granular material (1997)

APRON & TAXILANES

The apron at RWF is approximately 11,600 square yards and bituminous surface. The apron is used for surface parking aircraft, aircraft maneuvering, access to fueling facilities, and access to the hangars. There are six (6) aircraft tie-downs in the apron area. The apron is located to the north of the hangars and east of the Arrival/Departure (A/D) building. The apron area pavement was last rehabilitated in 1997 with 1.5" bituminous overlay. A small portion of pavement to the southeast was added by the City over time.

Major rehabilitation to the apron pavement was completed in 1997 and 1961. The apron pavement consists of the following typical sections:

- Main Apron
  - 1.5" bituminous overlay (1997)
  - 1" bituminous overlay (1997)
  - 1" bituminous overlay (1974)
  - 1.5" bituminous (1961)
  - 7" gravel base (1961)

Exhibit 1-7, Aircraft Apron & Taxilanes

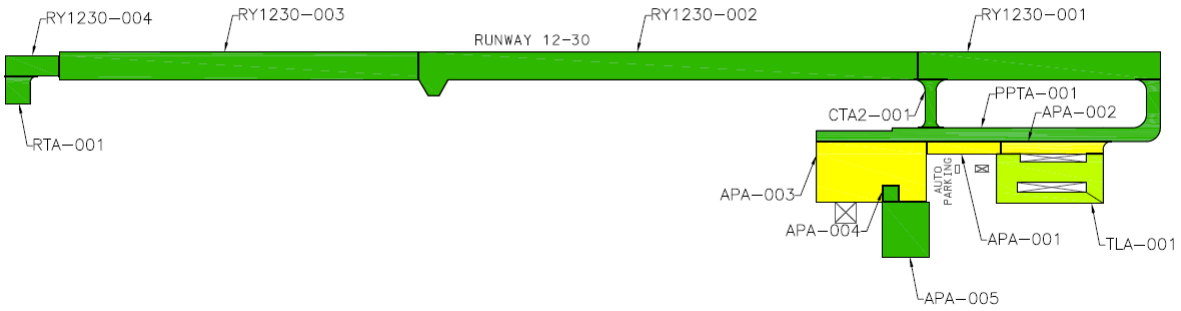
Source: Bolton & Menk Inventory (June 2010)

A taxilane is a designated area for maneuvering of aircraft between aircraft and buildings. The existing bituminous taxilanes are located surrounding the T-hangar buildings at the airport. Last major pavement work for the T-Hangar and taxilane areas on record was completed in 1964, however this area has been crack sealed annually to maintain its integrity.

PAVEMENT CONDITION

MNDOT Aeronautics completes a Pavement Evaluation Report for each of the State's public airports every three (3) years. The report is the conclusion of a pavement inspection that identifies pavement distresses and rates the condition of pavement. Under this system the pavement is rated on a scale of 0 to 100 based on its condition and level of deterioration. This scale is called the Pavement Condition Index (PCI). Exhibit 1-8 depicts the pavement condition ratings for RWF based on the latest report completed 2009.

Exhibit 1-8, Pavement Evaluation Results



	FAILED	VERY POOR	POOR	FAIR	GOOD	VERY GOOD	EXCELLENT	PCI INDEX
NS	0–10	11–25	26–40	41–55	56–70	71–85	86–100	

Section	Surface Type	LCD	PCI (2009)
Apron A (Section ID 001)	AC	1996	59
Apron A (Section ID 002)	AC	1996	59
Apron A (Section ID 003)	AC	1996	65
Apron A (Section ID 004)	PCC	2007	100
Apron A (Section ID 005)	AC	2005	93
Connecting Taxiway A2	AC	2009	100
Partial Parallel Taxiway A	AC	2009	100
Runway Turnaround	AC	2009	100
Runway 12-30 (Section ID 001)	AC	2009	100
Runway 12-30 (Section ID 002)	AC	2009	100
Runway 12-30 (Section ID 003)	AC	2009	100
Runway 12-30 (Section ID 004)	AC	2009	100
Taxilane Area A	AC	1976	77

LCD = Last Construction Date
AC = Asphalt Concrete
Source: Redwood Falls Municipal Airport Pavement Management Report, Prepared by Applied Pavement Technology, Inc., Inspected August 2009

The MNDOT Aeronautics Pavement Evaluation Report was last completed in 2009. Pavement improvement projects have since been undertaken. Actual pavement conditions have been improved since the last PCI report has been completed at the airport. With the exception of the primary apron, outer taxiway, and the taxilane/hangar area, pavement conditions are in very good to excellent condition. The report recommends that the Airport continue to utilize preventative pavement maintenance measures to maintain pavement condition.

Exhibit 1-9, Runway Facility Summary

Criteria	Runway 12/30	Runway 5/23
Runway Length	4,000’	2,081’
Runway Width	100’	200’
Surface Type	Bituminous	Turf
Pavement Markings	Non-Precision	N/A
Base Course	Varies*	-
Pavement Condition Index	100 (avg.)	-
FAA Airport Design Code	B-II	A-I/Small
Pavement Weight Bearing	23.0 (SW), 42.0 (DW)	N/A

Source: Airport 5010 Report, Bolton & Menk Analysis from Construction Plans
*See Runway discussion.

LANDSIDE/SUPPORT FACILITIES

Landside facilities are considered those facilities at the Airport that complement the airside facilities. Landside facilities include navigational aids, A/D building, aircraft hangars, fuel storage facilities, airport access roads, automobile parking. Support facilities are needed for maintenance of the airport facility. Common support facilities include snow removal equipment and airport maintenance buildings.

TERMINAL BUILDING

The existing airport terminal (arrival/departure) building provides services for pilots, passengers, and airport staff. The building was constructed in 2002. The facility serves as a dual-use FBO hangar, airport equipment storage, commercial office space, public meeting space and public pilot facilities. Facilities include a pilot’s briefing area, restrooms, and lounge space for local and transient pilots. The building also includes meeting space used for Airport Commission meetings. The terminal building and public space is contained within a 45’ x 110’ building with two floors of space. The building is located south of the apron and west of the public T-Hangar buildings.

Exhibit 1-10, Terminal Building

Source: Bolton & Menk Inventory (June 2010)

PUBLIC HANGARS

The terminal building is dual-use building used also for public aircraft storage and fixed-based-operator (FBO) facilities. Fuhr Flying Service serves as the current FBO at the airport providing aircraft storage, aircraft maintenance, and line services.

Airborne Data Systems, Inc. also operates from RWF out of the public FBO hangar. Airborne Data Systems are manufacturers of airborne remote sensing and surveillance equipment and rents office space within the A/D building.

Exhibit 1-11, Public FBO Hangar

Source: Bolton & Menk Inventory (May 2011)

Another public 70’ x 80’ hangar currently occupied by North Memorial Air Care is located near the airport apron. North Memorial Air Care provides critical care helicopter transport for the region. They staff pilots, nurses, and Emergency Medical Technicians (EMTs).

Exhibit 1-12, Public Hangar

Source: Bolton & Menk Inventory (May 2011)

Additional public hangar buildings are located east of the terminal building adjacent to Taxiway A. These buildings are partitioned into T-units for aircraft storage. The buildings were constructed in 1964. Each T-Hangar is 10,100 square feet and is able to house 8 aircraft along with a garage unit. The airport collects rental income from these buildings. Of the 16 available units, all were occupied as of 2012.

Exhibit 1-13, Public T-Hangars

Source: Bolton & Menk Inventory (May 2011)

PRIVATE/COMMERCIAL HANGARS

Currently, there are no private or commercial hangars constructed at RWF.

Below is a summary of the aircraft storage facilities at RWF.

Exhibit 1-14, RWF Aircraft Storage Facilities

Type	Aircraft Storage
Public FBO Hangar	4
Public Hangar	2
Public T-Hangar Units	16
Aircraft Tie-Downs	6

Source: Bolton & Menk Analysis

GROUND VEHICLE ACCESS

Ground vehicle access to the Redwood Falls Municipal Airport is obtained via Airport Road located north of US Highway 71. The airport parking lot has an asphalt surface, generally has a capacity for 40 vehicles, and is located to the south of the terminal building.

FUELING FACILITIES

Aircraft fueling facilities are located to the north of the terminal building along the southwest side of the aircraft apron. The City of Redwood Falls owns and maintains the fueling facilities to include two (2) above ground storage tanks 12,000 gallons in size. The fuel facility provides 100-LL (low lead) and Jet-A aviation fuel. Fuels are dispensed through fueling pumps located on the west edge of the apron. A credit card reader was installed to allow for 24-hour self fueling operations.

Exhibit 1-15, Fuel Facility

Source: Bolton & Menk Inventory (October 2009)

Source: Bolton & Menk Inventory (October 2009)

AIRPORT MAINTENANCE

Airport maintenance activities are completed by the City of Redwood Falls. The City is responsible for monitoring the condition of the airport and performing maintenance activities including snow removal, grass mowing, annual minor pavement repair, and overall maintenance of the airfield. Assistance with on-site monitoring is completed by the FBO, Fuhr Flying Service. Airport maintenance equipment, including snow removal and mowing equipment, is stored onsite in the FBO building.

The City of Redwood Falls owns the following snow removal equipment:

- New Holland TV6070 Bi-Directional Tractor (State Funded)
- Tiger Triple Flail Mower Package (State Funded)
- Buhler 96” Snow Blower (Federally Funded)
- Monroe 144” Snow Plow (Federally Funded)
- Fiat Allis 120 HP Loader (State Funded)

SECURITY

Airport fencing is installed to deter accidental access by persons or animals onto the airside facilities or on airport property. Fencing increases the security of the airport, helps maintain safe airport operations and defines the outer property boundaries. RWF currently does not have comprehensive terminal area fencing or controlled access. Access to the terminal building is limited to airport traffic only with the installation of a keypad system. Perimeter "field-style" low fencing is sporadic along the airport property line.

It should be noted that the airport access road alignment proceeds unrestricted directly to the air operations area so additional fencing is highly recommended.

AIRFIELD LIGHTING, NAVAIDS, & WEATHER FACILITIES

AIRFIELD LIGHTING

Airfield lighting aids the pilot in identification, landing, and taxiing at an airport. Lighting aids are particularly useful at night and in poor weather conditions contributing to the safety of flight. Navigational aids (NAVAIDS) provide visual and/or electronic instrument guidance to pilots navigating to the airport.

Airfield lighting aids at RWF include an airport rotating beacon. The rotating beacon, a two-sided rotating light (white/green), provides the pilot with a visual indication to identify the airport visually several miles away. The beacon flashes 24 to 30 times per minute. The beacon at RWF is located south of the terminal building and parking area and operates sunset to sunrise.

Other airfield lighting aids include runway edge lighting, classified by their maximum intensity. At RWF, this includes Medium Intensity Runway Lights (MIRL) for Runway 12/30. Standard runway edge lights are white, except for the last 2,000 feet of runway which are amber in color. Threshold lights emit green at the approach end, and red at the runway end. Runway edge lights are visible 360 degrees and can be seen by pilots several miles from the Airport under good visibility conditions.

Runway 12/30 edge lights have a pre-set night intensity setting. The lighting can be activated or brightened through the use of a pilot-controlled lighting (PCL) system. White lights identify the runway edge and are located 200 feet apart. Red/green lights identify the runway threshold at each end. Taxiway lights are blue. Lights on instrument runways are required to be amber or red in color at the last 2,000 feet or half the runway length, whichever is less to alert pilots of the runway distance remaining.

Runway End Identifier Lights (REILs) are installed to provide rapid and positive identification of the approach end of a runway during night and low visibility conditions. The REIL lighting system consists of two synchronized flashing white strobe lights, located laterally on each side of the runway facing the approach path. REILs installed at both Runway 12/30 ends at RWF were recently upgraded in 2009.

Visual Guidance Slope Indicator (VGSI) systems are visual aids installed to provide guidance information to help the pilot acquire and maintain the correct glidepath to a runway clear of obstructions. There are various types of VGSI systems available including Visual Approach Slope Indicators (VASI) and Precision Approach Path Indicators (PAPI). VASIs are installed in two locations with its 2-box lights facing the runway approach. PAPIs are typically a 4-box version, meaning that there are four separate light boxes aligned perpendicular with the runway facing the approach. Each VASI or PAPI box emits a white and red light. The pilot interprets these lights to indicate whether the aircraft is too high, too low, or on the proper glidepath. A two-box PAPI system was installed in 1998 for Runways 12 and 30. The

new standard is a four-light PAPI system. A new PAPI system should be installed when the existing system reaches the end of its useful life.

Exhibit 1-16, RWF Airfield Lighting Summary

Type	Lighting
Airport	Rotating Beacon
Taxiway	Signage, Retroreflective Markers
Runway 12	MIRL, PAPI, REIL
Runway 30	MIRL, PAPI, REIL
Runways 5/23	None

Source: Bolton & Menk

NAVIGATIONAL AIDS

Navigational aids (NAVAIDs) provide visual and/or electronic guidance to pilots approaching the Airport. Airfield lighting is a form of a navigational aid. Other NAVIADS are ground-based or satellite-based to help the pilot navigate to the airport and/or approach a runway.

Navigation to the airport in adverse weather conditions requires the pilot to utilize NAVAIDS to approach a runway. These instrument approach procedures allow the pilot to safely navigate to the runway provided weather conditions meet specified minimums. Types of instrument approach procedures include ground-based utilizing radio beacons such as VOR (Very-High Frequency Omnidirectional Range), DME (Distance Measuring Equipment), or NDB (Non-Directional Beacon). Satellite-based navigation utilizes Global Positional System (GPS) technology. In equipped aircraft, pilots can locate the airport and/or execute an instrument approach procedure using route, altitude, or glidepath defined by the procedure. Examples of GPS procedures are Area Navigation (RNAV) and LPV (Localizer Performance with Vertical Guidance).

RWF has a rotating beacon installed at the airport, located south of the terminal building and parking area. RWF has published instrument approach procedures that provide a straight-in approach to Runway 30 and a circling approach to Runway 12. The Runway 30 GPS approach has LPV capability which provides both lateral and vertical guidance. The GPS RWY 30 procedure provides access to the airport with a cloud ceiling as low as 280 feet and visibility as low as 1 mile. The VOR-A circling procedure has cloud ceiling minimums of 516 feet and 1 mile visibility.

Exhibit 1-17, NAVAID Summary

Type	NAVAID
Airport	Redwood Falls (RWF)
Runway 12 Approach	VOR (circling)
Runway 30 Approach	GPS (straight-in), VOR (circling)

Source: Airnav.com

Exhibit 1-18, Selected Nearby Ground-Based NAVAID Summary

Name	ID/Distance	Frequency
Redwood Falls (VOR)	RWF - 5.2nm	113.30 MHz
New Ulm (NDB)	ULM - 28.5 nm	272 KHz
Marshall (VOR)	MML -32.3 nm	111.00 MHz
Willmar (VOR)	BDH – 34.3 nm	113.70 MHz
Hutchinson (NDB)	HCD – 35.1 nm	209 KHz
Montevideo (VOR)	MVE – 37.1 nm	111.60 MHz

Source: Airnav.com

AIRFIELD SIGNAGE

General aviation airports such as RWF are required to have a minimum level of airfield signage installed for safety. These mandatory signs help pilots identify the runway end at the hold line. Additional airport signage provides pilots with guidance identifying taxiways and common destinations.

RWF has mandatory signs installed for Runway 12/30. Other signage installed includes runway distance remaining signs. It is believed the signage was installed in 1998. Additional mandatory signage should be installed for Runway 5/23 when the parallel taxiway is upgraded to help prevent runway incursions.

WEATHER FACILITIES

An Automated Surface Observing System (ASOS) contains a suite of sensors to collect valuable weather information including temperature, dew point, wind speed/direction, visibility, cloud coverage/height, precipitation sensor, lighting detector, and barometric pressure. An ASOS system is different than an Automated Weather Observing System (AWOS). An ASOS is a more sophisticated system designed for the National Weather Service and the FAA. ASOS weather information is typically communicated to pilots on a designated frequency, and to the general public via the internet. An ASOS is located on site at RWF and broadcasts on 126.575 MHz. Other nearby weather systems include an AWOS system located 14 nautical miles to the north at the Olivia Municipal Airport and 32.3 nm to the west at the Southwest Minnesota Regional Airport in Marshall.

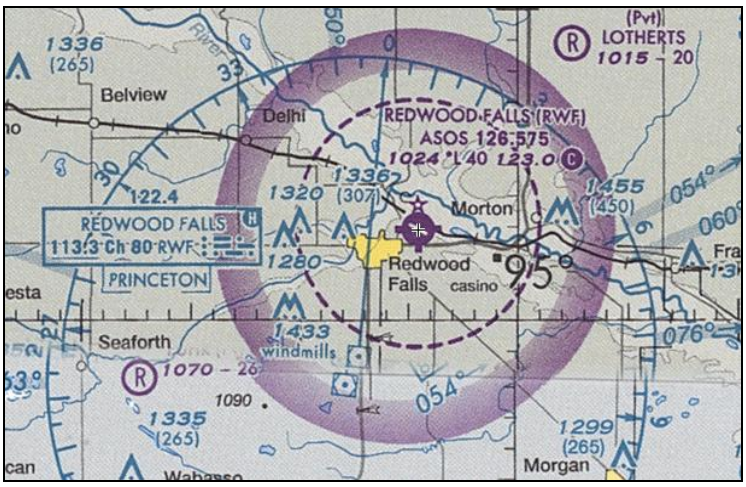
Wind direction indicators provide pilots with local wind condition at a glance. Wind direction indicators are commonly co-located with segmented circles to indicate the local airport traffic pattern to pilots. At RWF, a lighted windcone is located northwest of the Runway 12/30 and 5/23 intersections. This system was installed in 2009. A segmented circle is installed around the wind cone.

AIRSPACE & LAND USE

AIRSPACE

The Redwood Falls Municipal Airport is within the lateral limits of Class E Uncontrolled airspace as designated under Part 91 of the Federal Aviation Regulations. There is no air traffic control tower (ATCT) on site; pilots are required to “see and avoid” other aircraft under Visual Flight Rules.

Exhibit 1-19, Surrounding Airspace



Source: Skyvector.com, Twin Cities Aeronautical Sectional Chart (2012)

Airspace obstruction standards are defined by 14 CFR Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace.* Airspace should be clear of obstructions unless otherwise allowable through an FAA aeronautical study.

Runway 30 is classified as a non-precision instrument, other-than-utility-type approach under Federal Aviation Regulation (FAR) Part 77 Code C(NP). Runway 12 is classified as a visual, other-than-utility-type approach under Federal Aviation Regulation (FAR) Part 77 Code B(V). Runway 5 and Runway 23 approaches are classified by FAA as visual, utility type approaches under FAR Part 77 Code A(V). Non-precision approaches require a wider clear airspace area than visual approaches. Visual and non-precision utility have a 20:1 approach slope standard, and non-precision other-than utility instrument approaches have a 34:1 approach slope standard starting 200 feet beyond runway end.

Exhibit 1-20, Part 77 Approach Airspace Standards

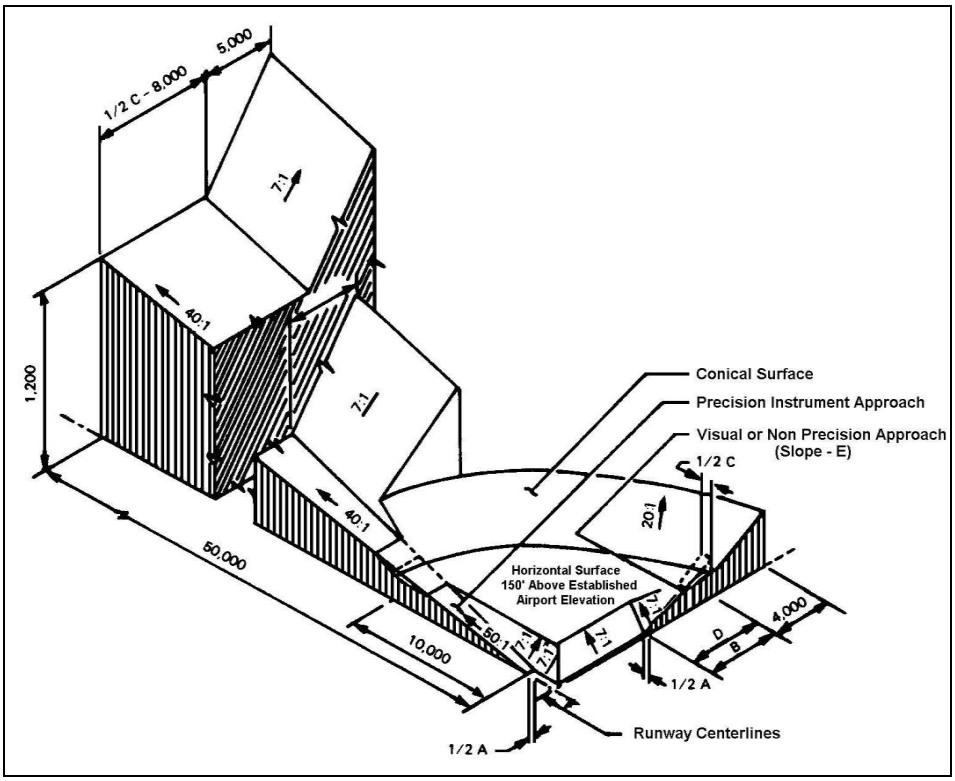
Runway Ends	Approach Type	Part 77 Code	Inner Width	Outer Width	Length	Slope
30	Non-Precision Other-Than-Utility	C(NP)	500’	3,500’	10,000’	34:1
12	Visual Other-Than-Utility	B(V)	500’	1,500’	5,000’	20:1
5, 23	Visual Utility	A(V)	250’	1,250’	5,000’	20:1

Source: Airport 5010 Report, 14 CFR Part 77

NOTE: Runway 12 follows visual other-than-utility standards due to Runway 30 requiring a wider 500’ inner width.

Beyond the approach surface, other airspace standards apply under Part 77 rules. A general graphical depiction of FAR Part 77 airspace surfaces is located below in Exhibit 1-23.

Exhibit 1-21, General FAR Part 77 Airspace



Source: National Geodetic Survey (NGS)
Note: Exhibits is for representational purposes only and do not necessarily depict the airspace at RWF.

Critical inner FAR Part 77 obstructions are noted on Exhibit 1-24 as surveyed by the airport in 2011. A complete graphical depiction of obstructions is located in the Airport Layout Plan sheet set.

Exhibit 1-22, Critical Inner-Airspace Obstructions

Runway End	Surface	Object Type	Distance from End	Distance from Centerline	Penetration	Slope to Clear
12	Approach	Trees	417’	280’	13.1’	14:1
30	Transitional*	Trees	247’	368’	31.2’	3:1
5	Approach	Trees	410’	6’	15.8’	12:1
23	Approach	Trees	796’	184’	20.7’	13:1

Source: Bolton & Menk Analysis from RWF LiDAR data (2011).
*No critical approach surface obstructions exist for Runway 30 to a 34:1 slope

Other penetrations to the Threshold Siting Surface (TSS) and Obstacle Free Zone (OFZ) may exist for runway ends and are evaluated in the Runway & Taxiway Analysis section of this ALP Update narrative.

LAND USE BACKGROUND

FAA and MNDOT Office of Aeronautics strongly recommend airport sponsors maintain airspace and land uses compatible with airport operations. Airport land use compatibility means planning and

controlling land uses in and around airports to promote use and development that does not create restrictions to the airport, or hazards to persons or property on the ground and the flying public. Maintaining compatible land use an FAA grant assurance and is driven by the design standards for the airport. Land uses should be controlled within the airport, runway protection zones, approach areas, and the general vicinity of the airport. Examples of incompatible land uses include airspace obstructions, residences near runway ends, and wildlife attractants.

FAA has established land use standards in the form of a Runway Protection Zone (RPZ). An RPZ area is designed to enhance protection of persons and property on the ground in the vicinity of the runway approach. An RPZ has a trapezoidal shape centered along runway centerline. It begins 200 feet beyond the end of each specially prepared hard surfaced runway. The FAA prefers that the RPZ be clear, and purchased in fee whenever practicable. RPZ dimensions are based on the runway design and approach types established for a runway.

According to the FAA, land uses prohibited in the RPZ include residences and places of public assembly (i.e. churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons). The FAA in 2012 published interim guidance about land uses within RPZs. If the RPZ dimensions or location change, or if there is a local development proposal, FAA coordination is required for specific land uses including public roads or other development. An alternatives analysis must be performed to avoid the new land use, minimize its impact within the RPZ, or mitigate risk to people and property on the ground.

RPZs have been established at each runway end at RWF of the dimensions below:

Exhibit 1-23 FAA Runway Protection Zone Dimensions

Runway	RPZ Dimensions (Inner width x length x outer width)
12/30	500’ x 1000’ x 700’
5/23	250’ x 1000’ x 450’

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

MNDOT Office of Aeronautics has developed Clear Zones (CZ) and CZ standards which are adopted as part of department policy. These dimensions match or are greater than the RPZ areas defined by FAA. MNDOT Aeronautics policy expects the CZ to be acquired in fee to continue to receive airport development funding. Dimensions for the MNDOT CZ are defined by runway classification, instrument approach type, and instrument approach minimums. A table of the existing MNDOT Clear Zones at RWF, according to the 2006 guidance, is shown below.

Exhibit 1-24 MNDOT Clear Zone Dimensions

Runway	Clear Zone Dimensions (Inner width x length x outer width)
12/30	500’ x 1000’ x 800’
16/34	250’ x 1200’ x 490’

Source: MNDOT Office of Aeronautics, Planning & Zoning (2006)

Airport zoning prevents from the creation of new airport hazards. Minnesota State Statue Chapter 360 requires owners of public airports to enact airport land use and airspace safety zoning standards. The

Minnesota Airport Land Use Compatibility Manual published in 2006 provides more background and resources on this topic. State Airport Zoning standards and process references are located on MNDOT Aeronautics website.

Minimum protected airspace generally follows FAA requirements. Minimum land use zoning standards for Minnesota are outlined below:

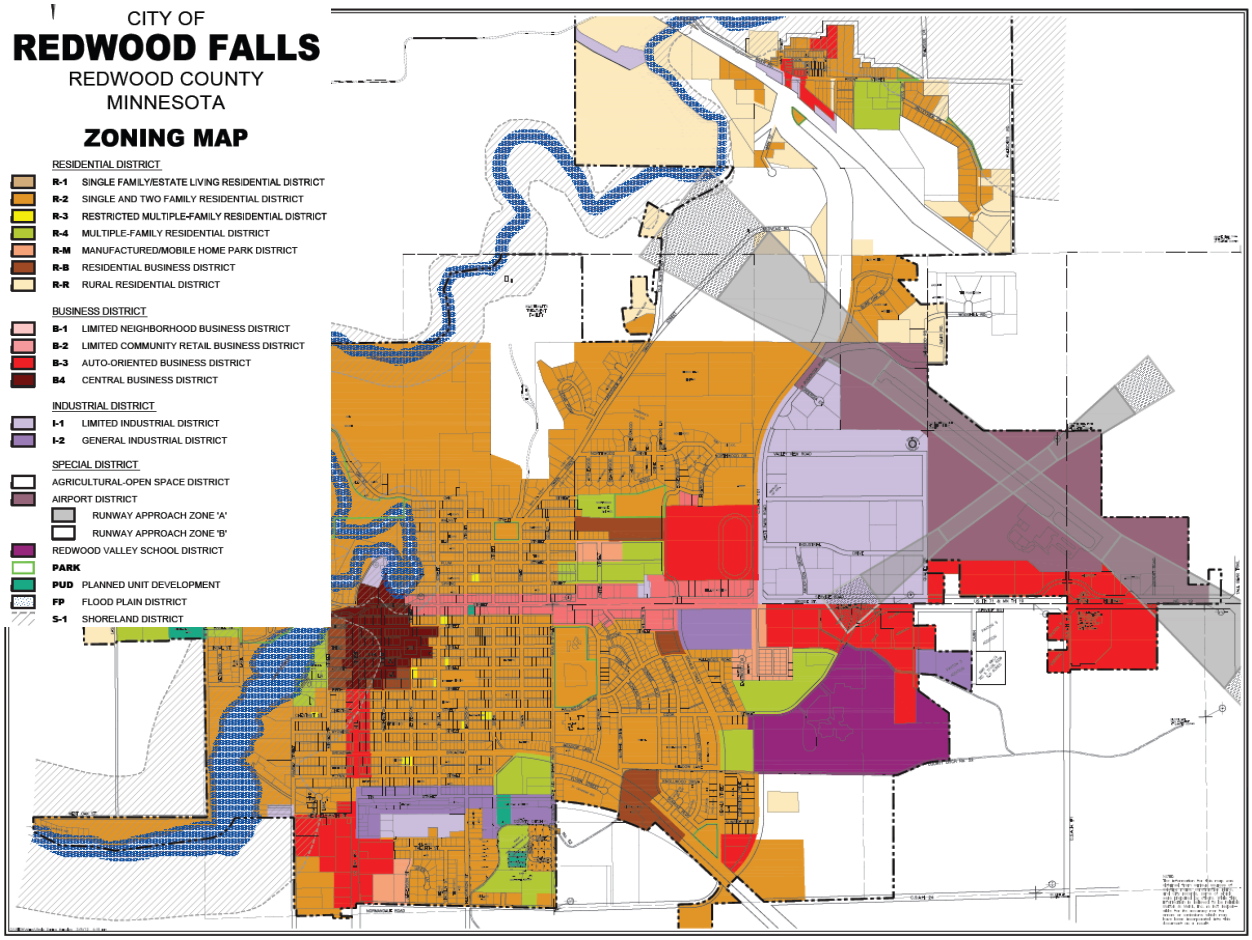
- Safety Zone A extends outward from the end of the primary surface on the extended runway centerline a distance equal to two-thirds of the runway length or planned runway length. This zone does not allow buildings, temporary structures, uses that create wildlife hazards or similar land use structural hazards and should be restricted from uses that would create, attract, or bring together an assembly of people. Typical allowed land uses in Zone A include agriculture, cemetery, and automobile parking.
- Safety Zone B extends farther outward from Safety Zone A, a distance equal to one-third the runway length or the planned runway length. This safety zone allows buildings on sites that encompass three or more acres; actual allowable building site area depends on the size of the parcel. Zone B should not create, attract, or bring together an assembly of people that would exceed 15 times the size of the parcel. Zone B cannot have more than one building plot area on which numerous structures can be constructed.
- Safety Zone C encompasses all of the land enclosed within the perimeter of the FAA horizontal surface that is not included in Safety Zone A or Safety Zone B. Zone C shall not contain land uses that create or cause interference with the operation of radio or electronic communications between the airport and aircraft make it difficult for pilots to distinguish between airport lights and other lights, result in glare, impair visibility of the airport vicinity, or endanger aircraft operations.

EXISTING & PLANNED LAND USES

The City of Redwood Falls owns approximately 210 acres of airport property in fee title, and has easement control over 28 acres of property off-airport to protect approaches to Runway 12 and Runway 30. Existing airport property is used for aeronautical purposes, open space, and agriculture.

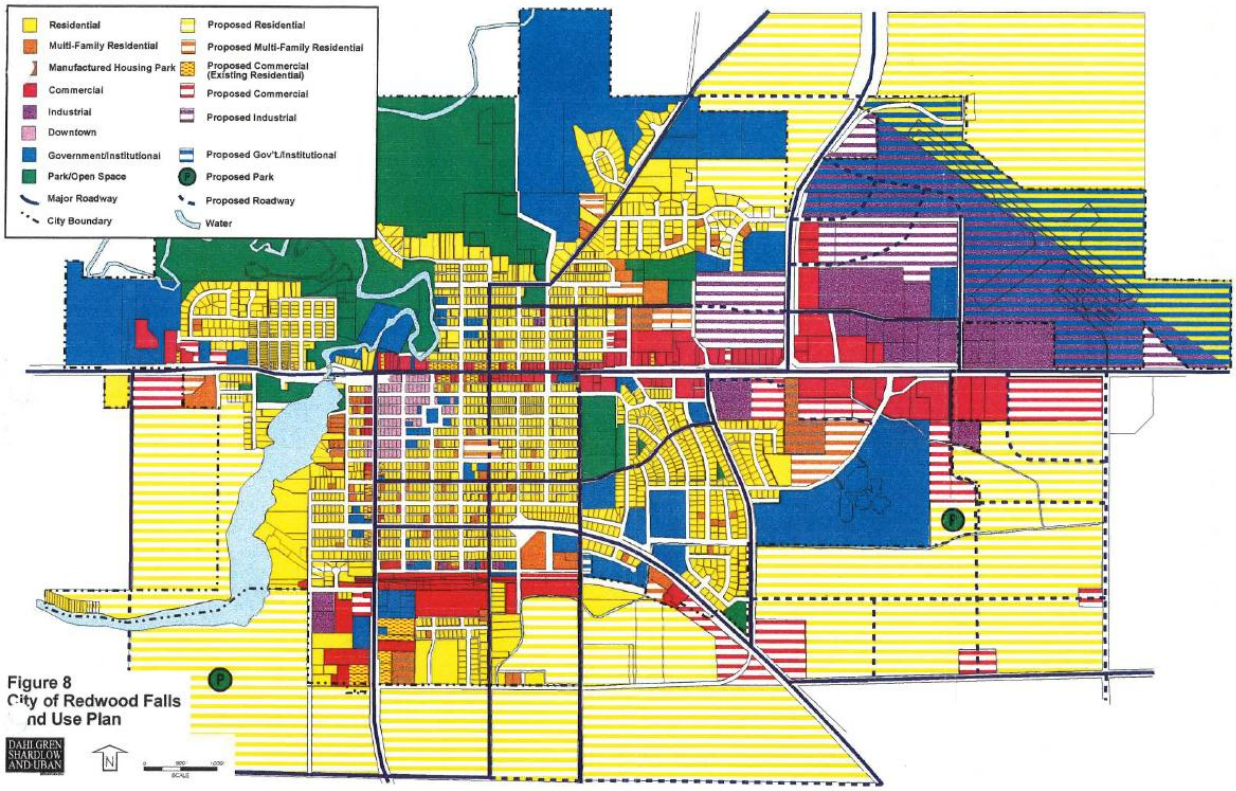
Land use within and immediately surrounding the Redwood Falls Municipal Airport facilities is regulated by Redwood County and the City of Redwood Falls. The Redwood Falls Municipal Airport is located within City limits in the northeast quadrant of the City. Airport property at RWF is zoned Airport District. Surrounding zoning districts within city limits include I-1 (limited Industrial), I-2 (General Industrial) and B-3 (Auto-Oriented Business District). See Exhibit 1-25 for the zoning map from the City of Redwood Falls. The City of Redwood Falls Comprehensive Plan was adopted in 1995.

Exhibit 1-25, City of Redwood Falls Surrounding Zoning Districts



The future land use plan proposes a mix of residential, government/institutional and industrial land uses in the area surrounding the airport. Exhibit 1-26 shows the proposed land uses.

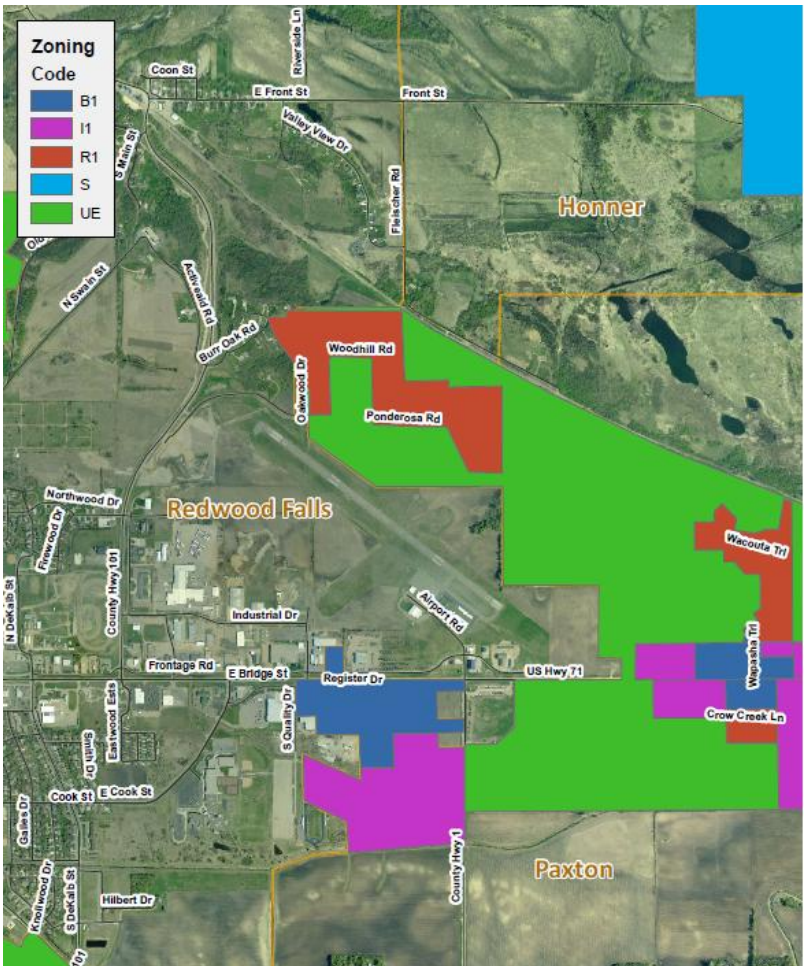
Exhibit 1-26, City of Redwood Falls Surrounding Land Use Plan



Source: City of Redwood Falls Comprehensive Plan (1995)

Redwood County has Zoning and Comprehensive Planning authority for the areas outside City limits. Zoning districts within the Counties jurisdiction and surrounding the airport include B1 (Highway Service Business), I1 (Industry District), R1 (Rural Residential District) and UE (Urban Expansion District). These land uses have the potential to be incompatible with airport operations.

Exhibit 1-27, Redwood County Surrounding Zoning Districts



The Redwood County Comprehensive Plan was completed in October 2007. As part of the planning process six policy districts, referred to as Landscape and Land Use Zones were identified to form a conceptual foundation for development the County's land use plan. The area surrounding the airport includes the City of Redwood Falls Protection Zone (Urban Expansion) and the County Future Development Zone.

LAND USE COMPATIBILITY

Permitted land uses in the underlying zoning districts or future planned uses for the area surrounding the airport have the potential to be incompatible with airport operations. Careful consideration is needed to maintain safety for passengers in the air and people and property on the ground. Residential land uses should be located outside of the airport approach area. Noise impacts have the potential to negatively affect surrounding residential properties. Industrial land uses could also create incompatible land uses with airport operations; smoke plumes from industrial buildings or obstructions to FAR Part 77 Airspace are a concern with industrial land uses surrounding airports. Particularly in the runway approach areas, land use policy should prevent land uses that bring a congregation of people or include buildings or others structures that could become a hazard to airport operations. The creation of new wildlife hazards (i.e. ponds) within the airport aircraft maneuvering area should also be avoided. Land uses near airports should be controlled as must as possible through land acquisition, easement, airport zoning, or other local

measures to ensure safe airport operations. Currently, there are incompatible high-density industrial structures located within the Runway 5 RPZ.

The City of Redwood Falls owns airport property for aeronautical development and open space. Most the Runway 12 and 30 RPZs, a portion of the Runway 23 RPZ, and only a small portion of the Runway 5 RPZ are under fee title control. Avigation easement controls much of the approaches to Runway 12 and 30.

The City of Redwood Falls has an Airport Zoning Ordinance that includes overlay districts to ensure airport safety. The Redwood Falls Municipal Airport Zoning Ordinance (1974) specifies height restrictions and permissible land uses within the airport environment. The ordinance is not consistently applied amongst the jurisdictions, thus an update is required. If the existing or planned airport configuration changes from that identified in the ordinance then that is also a trigger for a zoning update.

Land use compatibility also means preventing potentially hazardous wildlife (i.e. birds, deer) from becoming a conflict with aircraft on the ground or in the air. FAA has published Advisory Circular 150/5200-33B *Hazardous Wildlife Attractants On Or Near Airports*. Examples of potentially incompatible land uses include standing water on or near airports that would attract waterfowl. FAA is beginning to require Wildlife Hazard Assessment (WHA) studies at general aviation airports to evaluate potential wildlife hazards. A WHA has not yet been completed for RWF. There are no known significant wildlife issues at RWF that would require immediate management. Per the Advisory Circular, RWF should establish land use controls that would require new stormwater basins to drain within 48-hours per FAA requirements to help prevent any new hazards.

COMMUNICATIONS

Common Traffic Advisory Frequency (CTAF) is the name given to the VHF radio frequency used for air-to-air communications. Pilots use this common frequency to coordinate their arrivals and departures safely, giving position reports and acknowledging other aircraft. Pilots broadcast their position on the airport's CTAF frequency of 123.00 MHz. Air Traffic Control (ATC) services from Minneapolis Air Route Traffic Control Center (ARTCC) are available on 127.10 MHz. from the Redwood Falls Remote Communications Air-Ground (RCAG) facilities located at the airport.

AVIATION FORECASTS

Evaluation of current and forecasted aviation activity is vital in preparing an Airport Layout Plan. Aviation forecasts are necessary to evaluate current and potential future airport facility safety and capacity requirements. Common elements of an aviation forecast include annual operations, based aircraft, and critical aircraft types. For Redwood Falls, airport activity is classified as general aviation, or the operation of civilian aircraft for purposes other than commercial passenger transport.

Aviation forecasts are developed based on multiple variables including the following:

- Aircraft counts, aircraft types, and utilization
- Local industrial and businesses
- Socioeconomic factors including population, income, and labor force
- Adequacy and availability of airport facilities

The methodology used to develop aviation forecasts follows the FAA forecasting guidance available.

AVIATION TRENDS

NATIONAL, REGIONAL & STATE TRENDS

The general aviation industry from 2001-2005 was recovering from the decline after September 11, 2001. During that time period general aviation aircraft registered with the FAA declined nearly 3.1 percent. From 2005 through 2011, the total number of general aviation aircraft saw nearly flat growth. The economic decline since 2008 has resulted in a reduction in the number of general aviation aircraft. FAA projects that the overall general aviation fleet will have reduced by 2.7 percent from 2008 to 2011.

Shipments of new general aviation aircraft, according to the General Aviation Manufacturers Association (GAMA) 2012 Quarter 3 shipment report, have increased 13.5 percent year-to-year since in the same period in 2011. This represents an upturn in manufacturing after years of declines since the economic downturn in 2008. Total shipments in 2011 are down 56 percent from 2007. Manufacturing of turbine powered aircraft (turboprops and business jets) are up 22.4 percent in the same time period.

The outlook in the general aviation industry is favorable, especially in the areas of turbine aircraft, rotorcraft, and experimental aircraft. Overall activity levels are expected to grow as well as the economy recovers from the recent recession.

According to the FAA Aerospace Forecast (2012-2032):

> *"The forecast calls for robust growth in the long term outlook, driven by higher corporate profits and the growth of worldwide GDP. Additionally, continued concerns about safety, security, and flight delays keep business aviation attractive relative to commercial air travel. As the industry experts report a significant portion of piston aircraft hours are also used for business purposes, we predict business usage of general aviation aircraft will expand at a faster pace than that for personal and recreational use."*

Turbine powered general aviation aircraft (turboprop and turbojet) trends from 2000-2011 indicate a steady 4.7 percent annual growth in the number of aircraft, but usage only increased at 1.7 percent annual annually. This means that these aircraft are being flown less. In the future, the FAA projects that the

number of turbine general aviation aircraft will increase 2.9 percent annually from 2011 to 2032, and the usage will increase 4.0 percent. This indicates that usage of each aircraft will increase. The majority of these aircraft are used for business aviation activities.

Experimental aircraft provide pilots with the ability to construct an aircraft at a low cost. An increase in experimental aircraft is projected into the future with a 1.2 percent annual growth rate through 2032, and activity outpacing new aircraft at 2.6 percent during that same period.

Piston-powered fixed-wing aircraft, which make up the majority of general aviation aircraft, are projected to decrease in numbers through 2032, at a -0.1 percent average annual growth rate. The number of hours flown is projected to decrease by the same rate.

Overall, according to the FAA 2012 – 2032 aviation forecasts, the active general aviation fleet is projected to increase at an average of 0.6 percent per year for the forecast period, and activity increasing at 1.7 percent per year.

National and Minnesota aviation trends can be measured by activity levels published in the FAA Terminal Area Forecast. Statewide trends provide a closer look into how the national aviation trends translate on a regional level. Measures of based aircraft and operations are listed in Exhibit 2-1.

Exhibit 2-1, National & State Based Aircraft

Year	United States	Great Lakes Region	State of Minnesota
1990	162,286	26,576	3,317
1995	157,872	26,668	3,601
2000	180,050	30,561	4,520
2005	197,493	32,985	4,875
2010	165,860	27,620	4,105
2015	173,444	28,605	4,253
2020	181,035	29,652	4,412
2025	189,188	30,729	4,580
2030	197,357	31,802	4,766
2035	206,058	32,904	4,959
Historical Trend	**0.11%**	**0.19%**	**1.07%**
Future Trend	**0.87%**	**0.70%**	**0.75%**

Source: FAA Terminal Area Forecast (2012)

Notes: Trend indicates annual growth rate. Great Lakes Region includes North Dakota, South Dakota, Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio.

Overall aviation trends show a steady increase in based aircraft for the United States, the Great Lakes region, and in the State of Minnesota. Minnesota has historically has a higher rate of based aircraft growth.

Exhibit 2-2, National, Regional & State Annual Operations

Year	United States	Great Lakes Region	State of Minnesota
1990	105,437,428	17,393,585	2,195,004
1995	109,126,071	18,414,499	2,335,247
2000	122,017,520	20,373,859	2,624,609
2005	115,542,147	19,094,258	2,442,400
2010	101,543,192	16,338,713	2,133,332
2015	103,084,455	16,221,734	2,175,198
2020	106,949,690	16,744,692	2,246,839
2025	111,011,486	17,297,117	2,324,234
2030	115,486,124	17,901,376	2,408,738
2035	120,427,110	18,560,834	2,499,541
Historical Trend	**-0.18%**	**-0.31%**	**-0.14%**
Future Trend	**0.68%**	**0.51%**	**0.63%**

Source: FAA Terminal Area Forecast (2012)
Notes: Trend indicates annual growth rate. Great Lakes Region includes North Dakota, South Dakota, Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio.

Overall aviation trends show an average annual decrease in operations since 1990, and an increase in annual operations for the United States, Great Lakes Region, and the State of Minnesota.

Another set of data reviewed was the FAA Terminal Area Forecast (TAF), which is published for every Federal NPIAS airport in the United States. Data is available from 1990. These forecasts historically are very general, and not necessarily reflective of local activity fluctuations. The historical FAA TAF activity levels for Redwood Falls are shown in Exhibit 2-3.

Exhibit 2-3, FAA TAF Trends (2012)

Year	Annual Operations	Based Aircraft	Operations per Based Aircraft
1990	14,325	11	1,302
1995	15,075	16	942
2000	14,325	11	1,325
2005	9,800	12	816
2010	9,800	16	612
Trend	**-1.88%**	**1.89%**	**-1.38%**

Source: FAA Terminal Area Forecast (2012)
Notes: Trend indicates annual growth rate from 1990

Overall trends show a decrease in annual operations but a net increase in based aircraft. The resultant operations per based aircraft fluctuate widely which discounts the accuracy of the counts. Future trends show no growth (0.00%).

LOCAL AIRPORT TRENDS

USER SURVEY

To assist in determining the number of local aviation operations at RWF, and to help determine local aviation trends, an Airport User Survey was conducted. A questionnaire was sent to users or possible recreational and business users of the airport facility.

An Airport User Survey at general aviation airports such as RWF is administered to survey airport users to learn about the characteristics of the local based and itinerant operations. The survey is not designed to collect data to count airport operations, but provides information to establish trends that are useful for aviation forecasting.

The survey at Redwood Falls was completed in October 2012. There were a total of ten questionnaires returned that indicated an existing or future use of the airport; four from general airport users and six from businesses. The survey results are located in **Appendix A.** A summary of the operations is contained in Exhibit 2-4.

Exhibit 2-4, Local User Survey (2012)

Year	Aircraft Respondents	Annual Operations
2008	5	158
2011	5	189
2014	5	211
2017	5	239
Trend	**-**	**4.71%**

Source: RWF Airport User Survey (2012)
Notes: Trend indicates annual growth rate from 2008-2017

Overall, airport users indicate growth in annual operations from RWF. The sample size was determined to be too low to make specific conclusions on growth trends. The airport user survey information was used to supplement known information about existing or potential users of RWF. These generally include the following:

- North Memorial Air Care
    - North Memorial has a flight base in Redwood Falls which allows them to respond directly to the scene of an emergency. North Memorial bases an AgustaWestland AW 109 helicopter at Redwood Falls
- Fuhr Flying Service / Airborne Data Systems
    - Fuhr Flying Service is the local Fixed Based Operator providing aircraft maintenance services. Airborne Data Systems specializes in aerial mapping and photography. The company president owns and operates aircraft including a Piper Seneca and Piper Navajo twin-engine piston aircraft.
- Clayton Homes
    - Clayton Homes has a Cessna Citation III corporate business jet based in Knoxville, TN that visits Redwood Falls a few times per year. The current RWF runway length is

limiting if the runway is wet or icy. If larger aircraft were considered for use by Clayton Homes, RWF could no longer be used due to runway length.

- Farmers Union Industries
    - Farmers Union Industries owns a Cessna 414 twin-engine aircraft based in New Ulm. The aircraft travels frequently to Redwood Falls.
- Monsanto
    - Monsanto has a small corporate business jet that visits Redwood Falls a few times per year. The size of this aircraft means that the current RWF runway length limits weight or fuel loads.
- Northstar
    - Northstar currently uses the Southwest Minnesota Regional Airport in Marshall with their Challenger 604 business jet. The aircraft is based outside Minnesota. A future connection from their new facility in the Ponderosa Industrial Park to the airport is desired. A longer runway is required to fully serve the Challenger 604 aircraft (5,840 feet).

Many of the above listed users have airport operations that may affect future airport development at Redwood Falls, including a potential future runway extension. All airport operators, including those identified above should be monitored into the future to determine their aviation needs at RWF. This includes based users, aviation businesses local non-aviation businesses, transient users traveling to RWF for local business purposes, and based aircraft located at other airports.

The operations of agricultural aircraft are not included above. These users have a presence at Redwood Falls during the growing season. It should be noted that these operations cannot be counted toward runway extension justification because their operations are local, within 20 miles, and are not considered "transient" by FAA.

According to the 2012 State Aviation System Plan and local data, there are a total of 18 based aircraft, including 11 single-engine piston aircraft, three multi-engine piston aircraft, one light sport aircraft, one helicopter, and two ultralight/experimental aircraft.

SOCIOECONOMIC TRENDS

Socioeconomic data can play an important role in the description and projections of an airport's future activity by providing an independent variable for observing the trends at the Airport and the community as a whole. Socioeconomic data relevant to the Redwood Falls is presented in Exhibit 2-5.

Exhibit 2-5, Socioeconomic Data

Year	State of Minnesota	Redwood & Renville County	City of Redwood Falls
1970	3,806,103	41,163	4,774
1980	4,075,970	39,742	5,210
1990	4,375,099	34,927	4,859
2000	4,919,479	33,969	5,459
2010	5,303,925	31,789	5,254
2015	5,537,385	30,963	5,413
2020	5,772,258	30,285	5,507
2025	5,987,609	29,544	5,601
2030	6,182,306	28,756	5,728
2035	6,363,010	27,961	5,809
Historical Trend	**0.83%**	**-0.64%**	**0.23%**
Future Trend	**0.73%**	**-0.51%**	**0.40%**

Source: Minnesota State Demographic Center (2012)
Note: City of Redwood Falls estimates developed in 2006.
Trend indicates annual growth rate (Historical is 1970-2010 and Future is 2010-2035)

Redwood and Renville counties, considered to be the airport service area, are part of a larger trend of long-term population decline in most of Southwest Minnesota. Redwood Falls is the 4th largest city in Southwest Minnesota behind Marshall, Worthington, and Montevideo.

The overall trend shows an increase in overall population for the City of Redwood Falls and a decrease in overall population for the surrounding area historically and into the future. Population levels throughout Minnesota, however, have increased over the 40 year period and are projected to continue to do so at a somewhat reduced rate.

The largest employing industry in Redwood County is health care and social assistance (16.8%), followed by accommodation and food services (16.5%), then manufacturing (12.3%) and retail trade (10.9%). The single largest employer is Jackpot Junction Casino with over 500 employees. Redwood County relies on agricultural industry with 1,215 farms producing more than $364 million in market value products sold in 2007.

EXISTING FORECASTS

Existing aviation forecasts provide information about local aviation trends in the past. This data can be used as a reference to help determine baseline estimates for based aircraft and annual operations.

The first set of data reviewed was the FAA Terminal Area Forecast (TAF), which is published for every Federal NPIAS airport in the United States. These forecasts can be very general, and not necessarily reflective of local activity fluctuations. The FAA TAF for Redwood Falls is shown in Exhibit 2-6.

Exhibit 2-6, FAA TAF Forecast (2012)

Year	Itinerant Operations			Local Operations		Based Aircraft
	Comm.	Mil.	GA	GA	Mil.	
2010	0	300	3,000	6,500	0	16
2015	0	300	3,000	6,500	0	16
2020	0	300	3,000	6,500	0	16
2025	0	300	3,000	6,500	0	16
2030	0	300	3,000	6,500	0	16
2035	0	300	3,000	6,500	0	16
Trend	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**

Source: FAA Terminal Area Forecast (2012)
Note: Trend indicates annual growth rate

The accuracy of the FAA TAF, given the historical and future growth rates, is questionable. The FAA TAF is not considered to be a reliable source of data for forecasting at RWF.

The next source of existing forecasting data is from the draft 2012 Minnesota State Aviation System Plan. The study projected airport operations using local, regional, and national data and trends for general aviation. The RWF aviation forecast from the State Aviation System Plan is shown in Exhibit 2-7.

Exhibit 2-7, State Aviation System Plan Forecast (2012)

Year	Total Operations	Based Aircraft
2010	14,325	18
2015	15,264	19
2020	15,716	20
2030	18,247	20
Trend	**1.21%**	**0.52%**

Source: Draft Minnesota State Aviation System Plan (2012) for Redwood Falls Municipal Airport
Notes: Trend indicates annual growth rate

The Airport Master Plan completed in 2010 by Bolton & Menk, Inc. was also evaluated for previous projections. The Airport Master Plan forecasts a steady increase in the number of operations and based aircraft, as shown in Exhibit 2-8.

Exhibit 2-8, Airport Master Plan (2010)

Year	Itinerant Operations			Local Operations		Based Aircraft
	Comm.	Mil.	GA	GA	Mil.	
2008	0	0	3,554	3,554	0	17
2013	0	0	3,891	3,891	0	19
2018	0	0	4,260	4,260	0	20
2028	0	0	5,170	5,170	0	24
Trend	**0.00%**	**0.00%**	**1.83%**	**1.83%**	**0.00%**	**1.73%**

Source: Redwood Falls Municipal Airport Master Plan (2010) prepared by Bolton & Menk, Inc.
Notes: Comm. = Commercial, Mil. = Military, GA = General Aviation. Trend indicates annual growth rate

Aviation forecasts should be updated with each Master Plan or ALP Update project.

AVIATION FORECASTS

Aviation forecasts are based on numerous factors, including socioeconomic data and trends; local, regional, and national aviation trends; and FAA aviation forecasting methodology. Guidance used to help develop aviation activity forecasts includes the following resources:

- *Forecasting Aviation Activity by Airport* (July 2001), GRA, Inc., prepared for FAA.
- *Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data* (July 2001), GRA, Inc., prepared for FAA.

Basic aviation forecast products include annual operations and based aircraft over the 20-year planning period. Forecasts for general aviation airports commonly include based aircraft, annual operations, and critical aircraft projections. Based aircraft counts are split by general aircraft type including single-engine piston, multi-engine piston, turboprop, turbojet, rotorcraft, and experimental aircraft. Annual operations identify the type of flight operation including general aviation, military, and commercial. Annual operations are also split according to local or itinerant flights. Operations also include a component to annual instrument operations and peak hour operations. Critical aircraft projections are used to determine the airport design standards.

Forecasts developed are unconstrained, meaning they identify the actual aviation demand for the facility regardless of limiting factors (i.e. hangar availability, runway length, etc.). If the aviation forecast differ by more than 10 percent from what is published in the FAA Terminal Area Forecast (TAF), then FAA approval is required.

BASED AIRCRAFT

The baseline for the number and type of based aircraft at RWF is established from the locally reported number of based airplanes. There are 18 locally-reported based aircraft based on the State Aviation System Plan. Based aircraft demand is typically a product of population, income, and labor force. Statewide trends were used to estimate based aircraft. By multiplying RWF share of the current and projected based aircraft in the State of Minnesota (from FAA TAF) a based aircraft forecast is developed. Based Aircraft share analysis for RWF in 2012 shows that 0.432% of Minnesota's airplanes are based at the airport. This market share is expected to remain constant throughout the planning period. The split in the type of aircraft is based on a general evaluation of aircraft type trends.

Exhibit 2-9, RWF Based Aircraft Forecast (2012-2032)

Year	S	M	T	J	H	U/E	Total
2012	12	3	-	-	1	2	18
2017	13	3	-	-	1	2	19
2022	13	2	1	-	1	2	19
2032	14	2	1	-	1	3	21
Trend	**0.77%**	**-2.01%**	**-**	**-**	**0.00%**	**2.04%**	**0.77%**

Source: Bolton & Menk Analysis

S = Single Engine Piston, M = Multi-Engine Piston, T = Turboprop, J = Turbojet, H = Helicopter, U/E = Ultralight/Experimental, Growth rates may not balance due to rounding

ANNUAL OPERATIONS

For Redwood Falls, various forecasting methods were analyzed including market share analysis under various growth scenarios. The preferred method is the FAA method. This forecasting method multiplies the total number of based aircraft by the Operations Per Based Aircraft (OPBA) derived from previous FAA forecasts to obtain total estimated annual operations.

FAA Order 5090.3C *Field Formulation of the National Plan of Integrated Airport Systems* recommends 250 operations per based aircraft for rural general aviation airports and 350 operations per based aircraft for busier general aviation airports with more itinerant traffic. The current FAA TAF estimates 576 OPBA. Actual OPBA used assumes a busier general aviation airport (350) for each of the 18 based aircraft, adjusting upward for a unique 1,500 annual helicopter operations to reach an estimated 546 OPBA.

Inputting 18 based aircraft in 2012 and 576 operations per based aircraft provides a baseline of 9,828 operations in 2012. This differs only 0.29% from the FAA TAF for existing total annual operations. Operations forecasting is based on the projected increase in based aircraft at the airport.

Annual operations were forecasted to increase based on new forecasted based aircraft, and increase in average activity per based aircraft. FAA data interpolated from the Aerospace Forecasts 2012-2032 notes that total hours flown per aircraft were forecast to increase 1.069% annually for the next 20 years across the United States.

This method yields total annual operations increasing to 14,133 at the end of the planning period at a 1.833% average annual growth rate. Local input also confirms annual activity growth. The airport user survey recently conducted at Redwood Falls indicates an average annual activity growth rate of 4.17% over the next five years, not accounting for new aircraft types.

Local operations (within 20 nautical miles) are estimated at 45 percent and itinerant operations are estimated to be 55 percent of total annual operations based forecasts. A summary of the annual operations forecasts is below:

Exhibit 2-10, Annual Operations Forecast (2012-2032)

Year	Itinerant Operations			Local Operations		Total Operations
	Comm.	Mil.	GA	GA	Mil.	
2012	0	300	4,123	5,405	0	9,828
2017	0	283	4,510	5,754	0	10,547
2022	0	267	4,927	6,271	0	11,464
2032	0	237	5,927	7,969	0	14,133
Trend	**0.00%**	**-1.17%**	**1.83%**	**1.96%**	**0.00%**	**1.83%**

Source: Bolton & Menk, Inc. Estimates

CRITICAL AIRCRAFT

Development of the ALP Update relies upon the identification of the most demanding aircraft type currently or projected to utilize the airport. FAA defines a critical aircraft operation to be an aircraft or a family of aircraft that is expected to use the airport at least 500 itinerant operations annually. FAA airport design standards for airport infrastructure and safety area geometrics can then be developed around this aircraft type. One design standard controlled by critical aircraft types is the FAA Airport Reference Code (ARC) classification system.

The ARC system established by the FAA translates the operational and physical characteristics of the aircraft intended to operate at an airport to FAA airport design criteria. The ARC has two components relating to the airport design aircraft. The first component, depicted by a letter, is the *Aircraft Approach Category* and correlates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the *Aircraft Design Group* and relates to aircraft wingspan (physical characteristic).

Exhibit 2-11, Aircraft Approach Category

Category	Approach Speed (knots)	Example Aircraft Type
A	< 91	Cessna 172, Piper Warrior
B	91 - < 121	Beech King Air, Cessna Citation I & II
C	121 - < 141	Learjet 35, Gulfstream 550, B-737
D	141 - < 166	B-757, B-747, B-777

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

Exhibit 2-12, Aircraft Design Group

Group	Wingspan (feet)	Tail Height (feet)	Example Aircraft Type
I	< 49	< 20	Beech Baron 58, Cessna 172
II	49 - < 79	20 - < 30	Beech King Air, Cessna Citation Series
III	79 - < 118	30 - < 45	B-737, DC-9, CRJ-900
IV	118 - < 171	45 - < 60	A-300, B-757, B-767
V	171 - < 197	60 - < 66	B-747, B-777
VI	197 - < 262	66 - < 80	Lockheed C-5A, A-380

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

The current largest aircraft that is known to operate at the airport is the Cessna Citation 560 turbojet. The maximum takeoff weight of this aircraft is 16,630 pounds. The aircraft is categorized by aircraft approach category B and aircraft and aircraft design group II.

Exhibit 2-13 depicts the aircraft type and total estimated future annual operations in the short-term based on annual operations estimates and FAA Aerospace Forecasts for design groups. Critical aircraft for RWF will continue to be reference code B-II type aircraft.

Exhibit 2-13, Forecast Critical Aircraft (2017)

Operations	ARC A-II/ Small	ARC B-I/ Small	ARC B-II/ Small	ARC B-II +
Local	211	200	0	0
Itinerant	0	645	194	214
Total	**211**	**845**	**194**	**214**

Source: Bolton & Menk, Inc. Estimates
Notes: Small indicates aircraft with a maximum takeoff weight 12,500 pounds or less.

The current estimated critical aircraft type exceeding 500 annual operations is a B-I/Small aircraft such as the based Piper Navajo PA-31. Other critical aircraft include A-II/Small aircraft such as Air Tractor agricultural spray aircraft. Forecast critical aircraft types fall short of the required 500 annual operations for B-II/Large aircraft. The airport should however continue to identify the critical aircraft as a design code B-II/Large aircraft as the critical aircraft to accommodate regular users such as the Cessna Citation 560. Operations updates will be completed as necessary to justify future airport projects.

A future projection of critical aircraft types was also performed. Local trends were not determined to be accurate due to the low sample size and the additional of aircraft types. National trends were evaluated based on the FAA FY 2010-2030 Aerospace Forecasts for hours of time flown. Using the baseline operations described above for ARC B-II aircraft an applied long-term growth rate was used based on projected annual operations at the airport for each aircraft type.

Exhibit 2-14, Critical Aircraft Forecast (2017-2032)

Year	ARC A-II/Small	ARC B-I/Small	ARC B-II/Small	ARC B-II +
2017	211*	845	159	194
2022	223*	893	168	251
2032	249*	944	187	419
Trend	**1.11%**	**1.11%**	**1.11%**	**5.27%**

Source: Bolton & Menk Analysis
Notes: Trend indicates annual growth rate, small indicates aircraft with a maximum takeoff weight 12,500 pounds or less.

Based on the previous airport design critical aircraft, B-II/Large aircraft is the existing, and will to the future critical aircraft. The Airport Sponsor should continue monitor airport operations and evaluate the needs of current and future airport users. For smaller airports such as RWF, the addition of one business locally with aviation needs could influence airport activity to change the critical aircraft type and airport facility needs.

INSTRUMENT APPROACHES

Redwood Falls currently has a Runway 30 straight-in GPS instrument approach procedure developed by FAA. Exact numbers of instrument approaches at the airport are unknown but estimates have been

developed by using the type of known to operate at the airport. As new GPS approaches are developed at general aviation airports such as RWF, and aircraft are equipped to fly these approaches, the number of annual instrument approaches is expected to rise. Nationally, historical general aviation airport data provided by FAA has indicated that approximately 11.72% of the total itinerant flight operations are conducted utilizing instrument approaches. Exhibit 2-15 outlines the estimated instrument flight operations for Redwood Falls.

Exhibit 2-15, Annual Instrument Approaches (2012-2032)

Year	Instrument Approaches
2012	666
2017	745
2022	843
2027	965
2032	1113
Trend	**3.35%**

Source: Bolton & Menk Analysis
Growth rates may not balance due to rounding.

PEAKING CHARACTERISTICS

In order to arrive at a reasonable estimate of the actual demand upon the airport's facilities, it is necessary to develop a method to calculate the levels of activity during peak periods. This descriptor is used in airfield demand/capacity analysis, as well as in determining terminal building, parking apron, and access road requirements.

Peak aviation activity is based on FAA seasonal use trends, which generally define the peak activity month for general aviation activity as July with 14.8% of the total annual operations. Peaking tendencies at RWF used fuel sale to project peak month at 20% of the total annual operations. Typical general aviation peaking tendencies are described below.

- Peak Month Operations - The calendar month when peak operations occur. Total operations are multiplied by the seasonal use rate of 0.2.
- Design Day Operations- The peak month average day derived by dividing peak month operations by the number of days in the month (30).
- Design Hour Operations - The peak hour within the design day. Design hour estimated at 20 percent of the design day operations.
- Design Hour Passengers - The peak hour operations multiplied by a general FAA factor of 2 passengers per general aviation operation.
- Design Hour Vehicles - The peak hour operations multiplied by a general factor of 0.8 vehicles per general aviation passenger.

Exhibit 2-16, Peaking Characteristics (2012-2032)

Year	Peak Design Hour	Peak Passengers	Peak Vehicles
2012	13.1	26.2	10.5
2017	14.1	28.1	11.3
2022	15.3	30.6	12.2
2027	17.0	33.9	13.6
2032	18.8	37.7	15.1
Trend	**1.82%**	**1.82%**	**1.82%**

Source: Bolton & Menk Analysis

Detailed aviation forecasts are available in **Appendix B**.

FACILITY REQUIREMENTS

Airport facility requirements evaluate the design standards required to accommodate the aviation demand at an airport. Areas evaluated include critical aircraft / design standards, airfield wind coverage, runway and taxiway analysis, safety areas, terminal area facilities, airspace and approaches, navigational aids and lighting.

There are generally two defined areas for airport development; airside and landside. Airside areas include the runway and taxiway environment, but also include terminal area needs "inside the fence" to include apron space, aircraft parking, hangars, and fueling needs. Other airport support facilities, classified as landside facilities include the infrastructure not included as airside including airport support buildings, access roads, parking lots, fencing, and utilities.

DESIGN STANDARDS & CRITICAL AIRCRAFT

Airports are required to provide and maintain facilities in compliance with recommended design standards in order to be eligible for federal or state funding. These standards are established by these regulatory agencies in order to provide for the safe and efficient operation of aircraft on and in the vicinity of an airport.

Airport design standards correlate directly with the critical aircraft type(s) and FAA Airport Reference Code (ARC) system. When discussed specific to a runway and its related infrastructure, the ARC system is referred to as the Runway Design Code (RDC). The Runway Reference Code (RRC) identifies the operational capabilities of a runway using the RDC with planned runway visibility minimums to establish design standards. Taxiway design standards are established through the Taxiway Design Group (TDG) based on an aircraft's landing gear dimensions.

The planned family of critical design aircraft estimated to operate a minimum of 500 annual itinerant operations from RWF including Runway 12/30, taxiway, and apron is identified in Exhibit 3-1 below:

Exhibit 3-1, Critical Aircraft

Aircraft Type	ARC/RDC	TDG	Approach Speed (kts.)	Wingspan (ft.)	Tail Height (ft.)	Maximum T.O. Weight (lbs.)
Piper Navajo Turbo	B-I/Small	1 (est.)	91	40.6	13.0	6,500
Beech King Air B-200	B-II/Small	2	103	54.5	15.0	12,500
Cessna Citation 560	B-II	2	108	54.1	15.17	16,830

Source: Airport User Survey, Bolton & Menk Analysis

Exhibit 3-2, Piper PA-31-310 (ARC B-I/Small)

Source: Airliners.net

Exhibit 3-3, Beechcraft King Air B-200 (ARC B-II/Small)

Source: Airliners.net

Exhibit 3-4, Cessna Citation Series (ARC B-II)

Source: Airliners.net

The turf crosswind runway 5/23 is designed to accommodate smaller aircraft such as the Cessna 172 that are more susceptible to crosswind conditions. Agricultural spray aircraft are also known to use this runway at RWF. The critical aircraft type is RDC A-I/Small Aircraft both presently and into the future.

RUNWAY & TAXIWAY ANALYSIS

AIRFIELD CAPACITY

Airfield capacity is measured in terms of annual service volume and hourly capacity. The annual service volume is a calculated number that represents a reasonable estimate of an airport's annual operational capacity; taking into account differences in runway utilization, weather conditions, and aircraft mix that would be encountered in a year's time. The annual service volume is determined by reference to the charts contained in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

The FAA Airport Design Program calculates the annual service volume for a single runway (the turf runway is not considered in the annual service volume) airport with the forecasted operation levels determined in the previous chapter. The calculated annual service volume for single primary runway configuration like the one at RWF is 230,000 operations per year.

Exhibit 3-5, Annual Service Volume

Annual Operations	Annual Service Capacity	Percentage of Total
14,133	230,000	6.14%

Source: Bolton & Menk Analysis, FAA AC 150/5060-5 *Airport Capacity and Delay*

Under these conditions, a single runway facility will adequately meet the capacity demand within the time frame considered in this study.

The capacity of an airfield is a function of the number and location of exit taxiways, the runway configuration, wind, and weather conditions. The methodology for computing the relationship between the demands placed upon an airport versus its capacity is also contained in FAA AC 150/5060-5. In order to facilitate this comparison, computations were made to determine the hourly capacity of a single runway configuration in visual flight rules (VFR) and in instrument flight rules (IFR). The hourly capacity does not change for turf crosswind runways. The calculations were made using the assumptions recommended in the Advisory Circular for the particular airport layout and conditions shown below.

Exhibit 3-6, Hourly Capacity

Peak Hourly Operations	VFR Hourly Capacity	VFR Percentage of Total	IFR Hourly Capacity	IFR Percentage of Total
18.8	98	19.1%	59	31.8%

Source: Bolton & Menk Analysis, FAA AC 150/5060-5 *Airport Capacity and Delay*

Under these conditions, a single runway facility with the peak operations forecasted within the planning horizon will adequately meet the capacity of a single runway during VFR and IFR weather conditions.

For non-towered general aviation airports, capacity is variable on pilot operation in addition to the overall airfield layout. Good communications between pilots in the vicinity of an airport leads to enhanced situational awareness of local air traffic, leading to safe and efficient operations. Airfield enhancements also decrease the time an aircraft is on an active runway, leading to increased traffic flow at non-towered airports. Common improvements include additional taxiway turnoffs, holding bays, runway turnarounds and parallel taxiways.

RWF has a turnaround located on Runway 12, but no holding bay behind the runway hold line to exit the active runway environment. Runway 30 end is served by a direct connection to the main taxiway. A full turf parallel taxiway serving both Runway 30 and 12 ends is in use for small aircraft. Considering the mix of aircraft types using RWF, from small training aircraft, agricultural sprayers to large business jets, a paved parallel taxiway for Runway 12/30 is recommended to further enhance airfield capacity and safety.

WIND COVERAGE

The nearest source of wind data was from the AWOS located at RWF. Wind data was acquired from the National Oceanic and Atmospheric Administration (NOAA) National Data Center, North Carolina for the wind rose analysis. This data included daily wind direction and speed summaries for the period of January 1, 2002 to December 31, 2011.

To meet FAA design criteria, combined wind coverage of 95 percent must be met utilizing both the main runway and any crosswind runways given a crosswind component. The wind coverage percentage means the percent of the weather observations in which the crosswind component for an aircraft is less than a defined maximum value. Currently, the airport exceeds 95 percent for all weather in for a 10.5-knot crosswind component (98.60%). The wind coverage table is shown below.

Exhibit 3-7, All-Weather Wind Coverage

Runway	10.5 knots	13.0 knots
12/30	92.94%	96.35%
5/23	77.39%	-
Combined	98.60%	

Source: National Climatic Data Center (NCDC) for Redwood Falls, Minnesota ASOS (2002-2011)
Notes: The maximum crosswind component for Runway 5/23 is 10.5 knots for RDC A-I, and 13.0 knots for Runway 12/30 with RDC B-II. Combined wind coverage shows maximum crosswind components for the runway design.

The combined wind coverage for Runway 12/30 and Runway 5/23 meets minimum FAA wind coverage requirements. Both runways are necessary to achieve 95 percent wind coverage thus qualify for FAA funding participation.

RUNWAY LENGTH

Runway length is a critical component to any airport design as it provides a defined area for their takeoff and landing roll. FAA Advisory Circular AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance in determining runway length requirements. Runway length criterion was determined based on the design curves in the applicable Advisory Circular. This program evaluates the required runway length utilizing the average maximum temperature, runway gradient, and elevation. The existing Runway 12/30 at RWF is 4,000 feet in length and turf Runway 5/23 is 2,081 feet in length.

Input into the FAA Design program included the following variables:

- Field Elevation: 1,024 feet Mean Seal Level (MSL)
- Mean Maximum Temperature of Hottest Month: 85.2°F
- Maximum difference in runway centerline elevation: 5 feet
- Wet and slippery runways

Exhibit 3-8, Recommended Runway Lengths (Airplanes less than 60,000 pounds)

Airport Data	
Airport elevation	1,024 ft. MSL
Mean daily maximum temperature of the hottest month	85.2°F
Maximum difference in runway centerline elevation	5 feet
Wet and slippery runways	
Aircraft Criteria	**Length (feet)**
Small airplanes (with less than 10 passenger seats	
75 percent of these small airplanes	2,810
95 percent of these small airplanes	3,330
100 percent of these small airplanes	3,950
Small airplanes with 10 or more passenger seats	4,380
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,500
75 percent of these large airplanes at 90 percent useful load	7,000
100 percent of these large airplanes at 60 percent useful load	5,570
100 percent of these large airplanes at 90 percent useful load	8,370

Source: FAA Design Program based on AC 150/5325-4B *Runway Length Requirements for Airport Design*

FAA runway length requirements split small airplanes (less than 12,500 lbs.) into three categories to determine runway length. These are defined at the following:

Small Airplanes with less than 10 passenger seats:

- 75 Percent of Fleet - This category is generally applied to small airports, or secondary crosswind runways at airports with increased levels of aviation activity.
- 95 Percent of Fleet - This category applies to airports that are primarily intended to serve medium size population communities with a diversity of usage and a greater potential for increased aviation activities. Also included in this category are those airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas. Their inclusion recognizes that these airports in many cases develop into airports with higher levels of aviation activity.
- 100 Percent of Fleet - This type of airport is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area.

Small Airplanes with 10 or more passenger seats

- Airplanes with maximum takeoff weight of 12,500 pounds or less with 10 or more passenger seats, excluding the pilot and co-pilot.

Runway length requirements for large airplanes greater than 12,500 pounds but less than 60,000 pounds are further broken down into two categories to determine runway length. These are defined at the following:

Large Airplanes of 60,000 pounds or less:

- 75 Percent of Fleet – Representative airplanes include small business jets that require a smaller runway length such as Beech Jet 400A, Cessna Citation I/II/III, Cessna Citation 525A, Cessna Citation 560 Encore, Learjet 35A, Learjet 45, Hawker 400 XP, and Falcon 10.
- 100 Percent of Fleet – Representative airplanes include medium-size business jets that require a large runway length such as Bombardier 604 Challenger, Cessna Citation III/IV, Cessna Citation X, Learjet 60, and Hawker 800XP.

The larger community population and relative rural location of Redwood Falls would result in a 95 percent of fleet classification for primary runway length calculations for small airplanes with less than 10 passenger seats. The existing Runway 12/30 length of 4,000 feet meets this requirement for the existing critical design aircraft. The future critical design aircraft would be small aircraft with greater than 10 passenger seats. Operations in large airplanes are not anticipated to alone trigger the FAA substantial use threshold of 500 annual itinerant operations, but may contribute to the runway length justification case. Airplanes such as the Beechcraft King Air B-200 or Cessna Citation 560 are forecasted to drive future runway length needs for primary Runway 12/30. The future FAA recommended length of Runway 12/30 is 4,380 feet (rounded to 4,400 feet). Regular use of a business jet aircraft would justify 5,500 feet of runway. The Airport Master Plan evaluated existing site constraints and concluded a 4,400 foot runway can be accommodated along the current runway alignment. Further extensions to allow regular business jet usage greater than 12,500 pounds are not possible. Thus, a 4,400 foot planned runway length is considered reasonably adequate for the operations forecasted at RWF.

The turf runway 5/23 should follow the length recommendations of the 75 percent of fleet category. Runway 5/23 does not meet this runway length recommendation primarily due to existing site constraints. In fact, due to displaced thresholds both landing lengths are less than 2,000 feet. Any expanded runway would require these constraints (i.e. airspace obstructions) to be addressed. Based on the length of other crosswind runways, a fully usable runway length of at least 2,300 feet is considered adequate for takeoffs and landings. The length of the crosswind runway is recommended to be at least 2,300 feet to accommodate more than 75 percent of fleet for maximum airport usability.

RUNWAY WIDTH

FAA Airport Design standards require that an RDC B-II runway have a width of 75 feet. The current runway width is 100 feet and exceeds standards for the current critical aircraft. FAA has participated in maintaining the current runway width of 100 feet.

The current width of turf Runway 5/23 is 200 feet. A general width of at least 120 feet to match the width of the Runway Safety Area (RSA) is recommended for any future turf crosswind runway. The FAA specifies a minimum width of 60 feet, although this is generally applied to paved runways. The runway 5/23 width is considered adequate.

PAVEMENT STRENGTH

Airport pavement strength is dictated by the future critical aircraft anticipated to utilize the facility. The current published Runway 12/30 pavement strength is 23,000 single wheel and 42,000 pounds dual wheel. The maximum gross weight of the future critical design aircraft is 16,830 pounds. Future pavement improvements should be planned to match the existing pavement strength of 42,000 pounds

dual wheel, but at least 30,000 pounds at a minimum to serve large business aircraft that may use the airport on occasion.

The crosswind runway is recommended to remain as a turf surface. Paving the runway could be an option for future year-round use, however, FAA or State funding participation may not be available for significant improvements due incompatible land uses. An aggregate turf surface is recommended for stability if the runway were to remain as turf.

VISIBILITY MINIMUMS

Runway Reference Code (RDC) is composed of the Aircraft Approach Category, the Airplane Design Group, and the visibility minimums. Approach visibility minimums to 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. Aircraft desire to have lower approach minimums to access the airport during more weather conditions. The planned visibility minimums for an airport include visual (V) for runway ends with no instrument approaches, non-precision approaches (NPA) no less than 1 mile, non-precision approaches no less than ¾-mile, and lower than ½- or ¼-mile for precision instrument approaches (PA).

Airports such as RWF typically serve aircraft with non-precision approaches no less than 1 mile. An approach with 1 mile visibility allows aircraft to access the airport during the vast majority of weather conditions. Approaches down to ¾ mile visibility, although desired by regular based users, require additional airspace and infrastructure standards. Due to these requirements and lack of a need, visibility minimums of 1 mile are considered adequate for the planning period for Runway 12/30. The turf crosswind runway will continue to be served by a visual approach which is considered adequate.

RUNWAY DESIGNATION

Runways are designated according to magnetic bearing. Designation numbers range from 1 through 36 which represents magnetic direction rounded to the nearest 10 degrees. RWF has a magnetic declination of 2.1° east, changing by 0.116° west each year. Runway 12/30 currently has a magnetic bearing of 125.51°/305.51°, and Runway 5/23 has a magnetic bearing of 51.4°/231.4°. Runway 12/30 is recommended to change designation to Runway 13/31 in the future. Runway 5/23 can remain on the current designation through the planning period based on projected declination change.

Below is a summary of the FAA Runway Design Standards for RWF:

Exhibit 3-9, FAA Runway Design Standards

Description	Existing Runway 12/30	Future Runway 12/30
Runway Design Code (RDC)	B-II	B-II
Approach Type, Visibility	Non-Precision > ¾ mile	Non-Precision > ¾ mile
Runway Reference Code (RRC)	B-II-5000	B-II-5000
Runway Length Recommended	3,950 feet	4,380 feet (4,400)
Runway Pavement Surface	Asphalt	Same
Runway Pavement Strength	30,000 pounds	30,000 pounds
Runway Width	75 feet	75 feet

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

Description	Existing Runway 5/23	Future Runway 5/23
Runway Design Code (RDC)	A-I	A-I
Approach Type, Visibility	Visual, 3 miles	Visual, 3 miles
Runway Reference Code (RRC)	A-I-VIS	A-I-VIS
Runway Length Recommended	2,810 feet	2,810 feet
Runway Pavement Surface	Turf	Turf or Asphalt
Runway Pavement Strength	12,500 pounds or less	Same
Runway Width	60 feet	60 feet

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

TAXIWAY

Taxiway facilities at an airport are established to enhance the safety and efficiency of the airfield. Taxiways feed airport operations from the terminal and hangar area to the runways. Taxilanes are lower speed routes between parked aircraft or hangars.

Taxiways minimize runway occupancy time by promoting quick entry and exit from the primary runway. A full-parallel taxiway would follow the entire length of the runway and remove the need for aircraft to back-taxi on active runways, thus improving safety. The construction of parallel taxiways is generally recommended at paved runway airports with high activity or medium-activity airports with a wide mix of aircraft types.

Based on this assumption, a full parallel taxiway is recommended for RWF. A full parallel taxiway is also recommended by FAA when the airport is served by a vertically guided approach procedure such as Localizer Performance with Vertical guidance (LPV). Runway 30 is served by this type of instrument approach.

Taxiways are geometrically designed based on the Taxiway Design Code (TDG) of the critical aircraft identified for the taxiway segment. There may be more than one TDG for taxiway infrastructure at an airport.

Exhibit 3-10, FAA Taxiway Design Standards

Description	Existing Airport Configuration	Future Airport Configuration
Taxiway Design Group (TDG)	II	II
Taxiway Width	35 feet	35 feet
Taxilane Width (State Standard)	20 feet	20 feet
Taxiway/Taxilane Centerline from Centerline*	240 feet	240 feet
Holding Position Marking*	200 feet	200 feet

Source: FAA AC 150/5300-13A *Airport Design*
**Identified for Runway 12/30*

According to FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, the minimum recommended runway to taxiway centerline separation for a runway with an RDC of B-II is 240 feet with a minimum recommended width of 35 feet. The existing partial parallel taxiway at RWF is 50 feet wide and exceeds

the FAA width requirement. Taxilanes are constructed with full-width pavement between buildings thus exceed the minimum requirement. The runway holding position markings on the taxiways are currently placed 200 feet from Runway 12/30 centerline which meets minimum standards.

AIRFIELD SAFETY AREAS

Safety areas are FAA defined geometric boundaries that contain restrictions on grading, objects, or airspace to promote the safety of flight operations. FAA AC 150/5300-13A *Airport Design* outlines the requirements for each type of safety area. Safety areas should be acquired in fee acquisition as airport property. Safety areas for both runways and taxiways and are defined in this section for the RWF.

Exhibit 3-11, FAA Safety Area Standards

Description	Runway 12/30 Existing & Future	Runway 5/23 Existing & Future
Runway Design Code (RDC)	B-II	A-I*
Approach Type, Visibility	Non-Precision > ¾ mi.	Visual
Runway Safety Area (RSA) width	150 feet	120 feet
RSA length beyond runway end	300 feet	240 feet
Runway Object Free Area (ROFA) width	500 feet	250 feet
ROFA length beyond runway end	300 feet	240 feet
Runway Obstacle Free Zone (ROFZ) width	400 feet	250 feet
ROFZ length beyond runway end	200 feet	200 feet
Crops from Runway End	400 feet	300 feet
Crops from Runway Centerline	250 feet	125 feet
Crops from Taxiway Centerline	66 feet	45 feet
Taxiway Safety Area width	79 feet	49 feet
Taxiway Object Free Area width	131 feet	89 feet
Taxilane Object Free Area width	115 feet	79 feet

*Small Aircraft Exclusively design category

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

RUNWAY SAFETY AREA

Runway Safety Areas (RSA) are designed to accommodate the weight of an aircraft during an overshoot, undershoot, or veering from the defined pavement area. The size of the safety area is increased as the airport design standard increases or the instrument approach visibility minimums decrease. These areas must be free of non-required objects, cleared, graded, drained, and capable of supporting the weight of passing aircraft preventing damage. Dimensionally these areas are measured from runway centerline and runway end. FAA is making it a priority in their national objectives to have RSAs meet standards. The Runway Safety Areas at RWF meet the minimum FAA standard for the existing airport configuration.

TAXIWAY SAFETY AREA

The taxiway safety area is designed to accommodate the weight of an aircraft during accidental departure from taxiway pavement. These areas must be free of non-required objects, cleared, graded, drained, and capable of supporting the weight of passing aircraft preventing damage. The Taxiway Safety Areas at

RWF meet minimum Design Group II standards. Future taxiways are recommended to meet Design Group II standards.

OBSTACLE FREE ZONE (OFZ)

The Obstacle Free Zone (OFZ) is a defined volume of airspace centered above the runway centerline. The OFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual navigation aids that need to be located in the OFZ because of their function. The OFZ extends 200 feet beyond the end of each runway and the width is defined by the RDC.

Runway 5 OFZ extends into outside of airport property into a field road. This must be mitigated by a runway shift to remove the penetration. The runway OFZ for all other runways meets current standards.

OBJECT FREE AREA (OFA)

The Object Free Area (OFA) is a dimensional area centered on runway centerline. The OFA requires all objects to be cleared protruding above the runway safety area edge elevation. Objects necessary for air navigation purposes may be placed on the OFA, and other objects such as parked aircraft and agricultural operations may not be located within the boundaries of the OFA. Taxiways and taxilanes have established OFAs which prohibit service roads, parked airplanes, and other above ground objects. This dimension is critical in the airport apron areas and near runways.

Runway 5 OFA has an off-airport field road penetration that needs to be addressed by a runway shift. There are also agricultural operations within the OFA for Runway 5 end as well as near and beyond Runway 30 end. The taxiway OFA between the two public T-hangar buildings is only 68 feet when 79 feet is required to serve Design Group I aircraft. This discrepancy should be noted in the Airport Layout Plan. The other runway and taxiway OFAs at RWF meet current standards, but should be designed for future critical aircraft whenever possible.

RUNWAY VISIBILITY ZONE

Intersecting runways at airport can create a potential hazard for aircraft. To minimize this, line-of-sight requirements have been established by FAA increase the ability for pilots to see-and-avoid a potential conflict with traffic from intersecting runways. Per FAA, the Runway Visibility Zone requires terrain needs to be graded and permanent objects need to be designed or sited so that there will be an unobstructed line-of-sight from any point five (5) feet above one runway centerline to any point five feet above an intersecting runway centerline. The RVZ should be within airport property and cleared. The RVZ at RWF should be limited to low crops only. The windcone has been relocated outside of the RVZ. If runway ends change, the RVZ boundaries would also change. The RVZ at that time should be re-evaluated and cleared as necessary.

NAVIGATIONAL & VISUAL AIDS

NAVIGATIONAL AIDS

Navigational aids are any ground based visual or electronic device to assist pilots in air navigation. Ground-based terminal electronic navigational aids assist the pilot with en-route navigation and approaches into and out of airports. RWF has a VOR facility in close proximity to the airport providing electronic navigation and distance information. In general, ground based navigational aids are not recommended for airport like RWF due to the relative low activity. The benefits of ground-based

navigational aids are quickly being replaced by Global Positioning System (GPS) technology which requires little or no ground infrastructure.

INSTRUMENT APPROACHES

Instrument approach procedures provide arriving aircraft with electronic guidance to the airport runway environment. Satellite-based non-precision approaches developed today are based on GPS technology. These approaches are much less expensive to develop and maintain than those with ground-based equipment. GPS approaches are ideal for general aviation airports. GPS approaches contain only a horizontal component but new WAAS LPV (Localizer Performance with Vertical guidance) approaches have been developed to have both a horizontal and vertical component, similar but not equal to a ground-based precision Instrument Landing System (ILS).

RWF has a satellite-based (GPS) instrument approach procedure developed for the facility. This GPS RWY 30 approach procedure directly affects the operational capability of the airport. Lower weather minimums developed in an instrument approach procedure allow equipped pilots to operate aircraft legally to and from a facility with a published approach procedure. The published visibility minimums are 1 mile. The airport also still has the VOR-A circling procedure utilizing ground-based navigation.

Future approach procedures recommended for RWF include a straight-in approach with vertical guidance utilizing LPV technology for Runway 12. This is useful for pilots to access the airport when the wind conditions are from the south, southeast, or east. A vertically guided approach requires certain airport design criteria to be met. Accommodating a straight-in GPS procedure would change the airport design standards from a visual approach end to a non-precision approach end. Certain airport development and airspace clearance standards must be met to qualify for this type of instrument approach. Approaches with visibility minimums as low as ¾ mile requires a 1,000’ wide primary surface. This is not feasible along the current Runway 12/30 alignment at RWF. Non-precision approaches require a 500 foot wide primary surface which currently exists at RWF. For non-precision runway ends accommodating large aircraft, the approach slope changes from 20:1 to 34:1. This would change the approach slope for Runway 12. A vertically guided procedure requires a clear Glidepath Qualification Surface (GQS), which extends upward and outward from the arrival end of the runway at a 30:1 slope. It is recommended that the GQS remain clear for the existing Runway 30 and future Runway 12 ends.

The facility requirements for runways with vertically guided approaches with greater than 250 foot cloud ceiling requirements are outlined below:

Exhibit 3-12, FAA Non-Precision Approach Facility Requirements

Table 3-5. Standards for Non-precision Approaches (NPAs) and APV with ≥ 250 ft HATh

Visibility Minimums [1]	< 3/4-statute mile	< 1-statute mile	≥ 1-statute mile Straight In	Circling [10]
HATh [2]	250	400	450 ft	Varies
TERPS GQS (APV only)		Table 3-2, row 8 Clear		
TERPS Chapter 3, Section 3	34:1 clear	20:1 clear	20:1 clear or penetrations lighted for night minimums (See AC 70/7460-1)	
ALP [3]	Required			Recommended
Minimum Runway Length	4,200 ft (Paved)	3,200 ft [4] (Paved)	3,200 ft [4,5]	
Runway Markings (See AC 150/5340-1)	Precision	Non-precision [5]		Visual (Basic) [5]
Holding Position Signs and Markings (See AC 150/5340-1 and AC 150/5340-18)	Precision	Non-precision [5]		Visual (Basic) [5]
Runway Edge Lights [6]	HIRL / MIRL		MIRL / LIRL	MIRL / LIRL (Required only for night minimums)
Parallel Taxiway [7]	Required		Recommended	
Approach Lights [8]	MALSR, SSALR, or ALSF Required	Required [9]	Recommended [9]	Not Required
Applicable Runway Design Standards, e.g. OFZ	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums		Not Required
Threshold Siting Criteria To Be Met [10] (Reference paragraph 303)	Table 3-2, row 7	Table 3-2, row 6	Table 3-2, rows 1-5	Table 3-2, rows 1-4
Survey Required for Lowest Minimums	Vertically Guided Airport Airspace Analysis Survey AC 150/5300-18	Non-Vertically Guided Airport Airspace Analysis Survey AC 150/5300-18		

Notes:

1. Visibility minimums are subject to the application of Order 8260.3 ("TERPS"), and associated orders or this table, whichever is higher.
2. The HATh indicated is for planning purposes only. Actual obtainable HATh is determined by TERPS.
3. An ALP is only required for obligated airports in the NPIAS; it is recommended for all others.
4. Runways less than 3,200 feet are protected by Part 77 to a lesser extent. However, runways as short as 2,400 feet could support an instrument approach provided the lowest HATh is based on clearing any 200-foot (61 m) obstacle within the final approach segment.
5. Unpaved runways require case-by-case evaluation by the RAPT.
6. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
7. A full-length parallel taxiway must lead to the threshold.
8. To achieve lower visibility minimums based on credit for lighting, a full approach light system (ALSF-1, ALSF-2, SSALR, or MALSR) is required for visibility < 1-statute mile. Intermediate (MALSF, MALS, SSALF, SSALS, SALS/SALSF) or Basic (ODALs) systems will result in higher visibility minimums.
9. ODALS, MALS, SSALS, and SALS are acceptable.
10. Circling procedures to a secondary runway from the primary approach will not be authorized when the secondary runway does not meet threshold siting (reference paragraph 303), OFZ (reference paragraph 308), and TERPS Chapter 3, Section 3.

In summary, it is recommended that Runway 12 be upgraded to accommodate a straight-in non-precision instrument approach with vertical guidance. FAA facility requirements for a runway with a vertically guided approach recommend a parallel taxiway.

VISUAL AIDS & LIGHTING

Visual aids are a necessary component to facilitate an airport's flight operations and enhance safety during periods of inclement weather and darkness by providing visual guidance to pilots in the air and on the ground.

Visual aids currently at RWF include a rotating airport beacon and a lighted wind cone to determine runway usage based on wind conditions. Runway 12/30 has Medium Intensity Runway edge Lights (MIRL). The partial parallel taxiway and turnoffs have Medium Intensity Taxiway edge Lights (MIRL). Runway End Identifier Lights (REILs) as well as Precision Approach Path Indicator (PAPI) lights for Runway 12/30 are installed. Non-precision runway markings are in place for Runway 12/30. Runway 5/23 has edge cone markers.

To meet FAA requirements and recommendations, RWF should be maintained to non-precision instrument approach standards as discussed in the items below. Below are visual aid recommendations.

PAPI (Precision Approach Path Indicator Lights) – The precision approach path indicator (PAPI) provides visual descent guidance to aircraft on approach to landing through a single row of two to four lights, radiating high intensity red or white beams to indicate whether the pilot is above or below the required approach path to the runway. The existing system is adequate but should be upgraded to a standard 4-box system when other airfield lighting improvements are made.

REIL (Runway End Identifier Lights) – Runway End Identifier Lights (REIL) are designed to help pilots spot the approach end of a runway at night, in poor visibility conditions, in an area surrounded by other lighting, or anywhere that the runway is exceptionally difficult to identify. Unidirectional REIL lights are installed on Runway 12 and 30 ends and are in good condition.

Runway Edge Lighting – Runway Edge Lighting is installed to assist pilots in defining the pavement edge during night and instrument flight conditions. Runway 12/30 edge lighting is currently a MIRL system (Medium Intensity Runway Lighting), which meets recommended standards now and into the future.

Runway & Taxiway Signage – Airfield signage assists pilots in identifying critical airfield areas during ground operations. Current FAA standards require general aviation airports to have runway identification signs, with other airfield guidance signs recommended. RWF meets this requirement. It is recommended that runway signage be upgraded in the future during a future airfield lighting project.

Runway Markings – Runway 12/30 has non-precision runway markings. Runway markings are recommended to match the approach type at RWF, which is recommended to remain non-precision. The turf crosswind runways have edge markers installed approximately every 200 feet along the edge, with additional markers placed at the end threshold and displaced threshold points. Runway markings are considered adequate for the planning period.

Taxiway Lighting – Only taxiway turnoff lights exists at the airport. Retro-reflective markers are installed along the edge of the taxiway as it approaches the apron. Future taxiway development may include partial or full parallel taxiways. Edge lighting is not required. Medium Intensity Taxiway Lighting (MITL) can be installed apron and taxiway edges, but is not required. If no lighting is installed,

retro-reflective markers also will serve as an economical method to safely identify the taxiway pavement edge for this type of general aviation airport.

Airport Beacon – The beacon for RWF is located to the south of the FBO/Terminal Building. The beacon serves as the airport identification light so that pilots can identify the airport location during nighttime conditions. An airport beacon rotates to allow for a white and green flash at a lighted land airport. The airport beacon is considered adequate, but should be upgraded as needed to remain operational.

Approach Lighting System (ALS) – This system includes a series of steady burning and flashing lights up to 2,400' feet from the runway threshold to guide pilots to the runway threshold during times of low visibility. An approach lighting system is usually necessary to decrease visibility minimums from 1 mile to ¾ mile or below. These systems are installed at airports which can accommodate ¾ mile visibility runway design, a 1,000' wide Primary Surface, and require the lowest visibility minimums to accommodate corporate users. Examples of approach lighting systems include ODALS, MALS, MALSF, SSALS, or SALS. Given the marginal user benefit and large geometric 'footprint' for this type of lighting at RWF, it is not anticipated that FAA priority would be given to this airport to install an ALS. No ALS installation is recommended.

AIRSPACE & OBSTRUCTIONS

FAA grant assurances (obligations) state the Airport Sponsor has an obligation to take appropriate action to assure that such terminal airspace is adequately cleared to protect instrument and visual flight operations by removing, lowering, relocating, marking or lighting or otherwise mitigating existing airport hazards and preventing the establishment or creating of future airport hazards. This section identifies the required and recommended airspace standards for the RWF.

FAR PART 77

Federal Aviation Regulations (FAR) Part 77 *Safe, Efficient Use, Preservation of the Navigable Airspace* defines the standards used in determining obstructions in the navigable space around the airport. Simply put, FAR Part 77 is an obstruction identification standard. Obstructions are considered to penetrate the imaginary airspace surfaces and can be a hazard to air navigation unless an airspace study would show otherwise. Imaginary surfaces include approach surfaces, primary surfaces, horizontal surfaces, and conical surfaces.

Obstructions must lowered below the FAR Part 77 airspace surfaces, lighted with FAA approved obstruction lighting, or removed unless an FAA airspace study determines otherwise.

Primary Surface -- Imaginary airspace surface centered along runway centerline, ending at runway end for non-paved runways, and extending 200 feet beyond the runway ends for hard-surfaced runways. The width is defined as 250 feet for visual runways, 500 feet for non-precision runways greater than ¾ mile, and 1,000 feet for non-precision runways as low as ¾ mile and precision runways.

Approach Surface -- Centered along runway centerline extending outward and upward from the end of the primary surface. This airspace surface ensures the approach areas to each runway are clear of obstructions. The width and approach slope for the approach surface varies based on the type of runway and approach planned. Typical approach slopes are 20:1 (20 feet horizontal for every 1 vertical foot) for visual and non-precision utility runways, 34:1 for non-precision other-than utility runways, and 50:1 for precision runways out to 10,000 feet then 40:1 out to 50,000 feet.

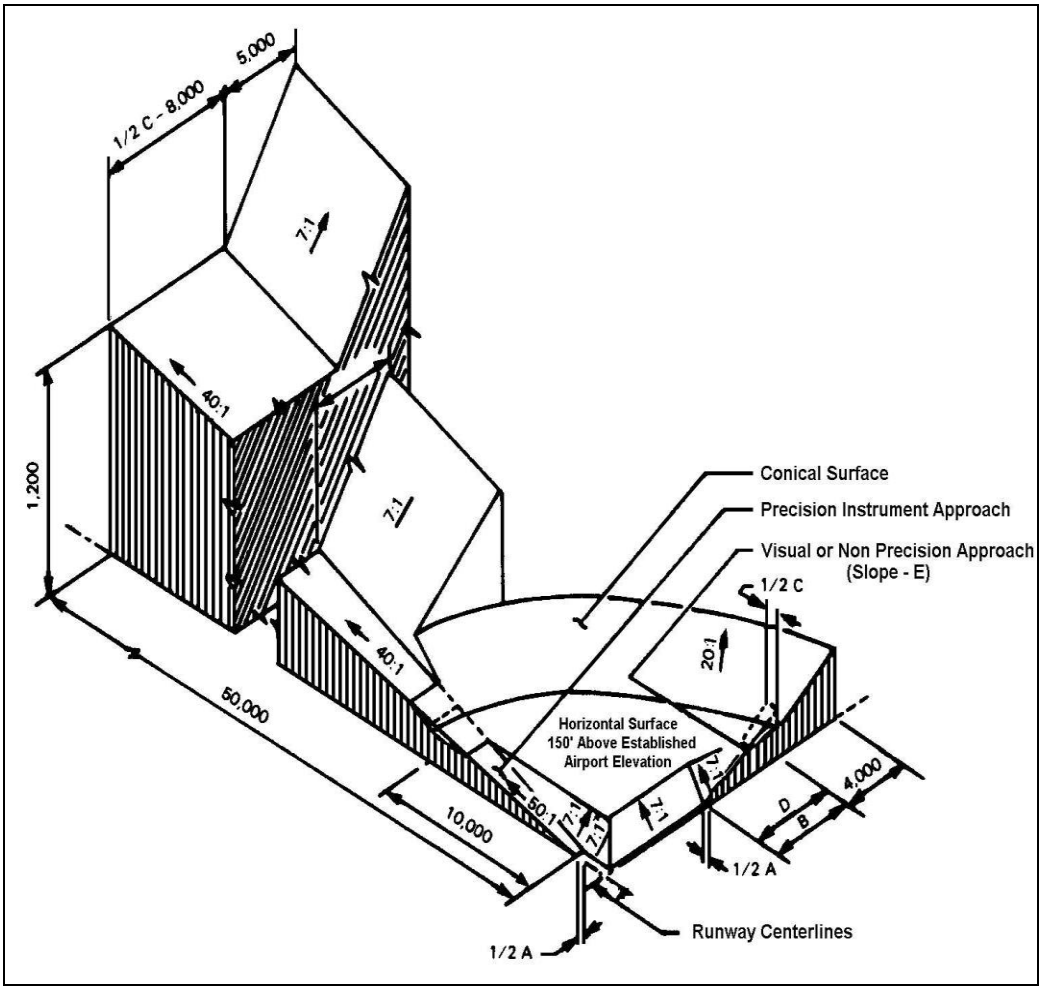
Transitional Surface -- This imaginary surface extends outward and upward at right angles to the runway centerline and extended centerline, from the sides of the Primary Surface and the Approach Surfaces at a 7:1 slope. Precision approaches have defined transitional surfaces near the outer ends of the approach surface.

Horizontal Surface -- This airspace surface protects for aircraft operations in the vicinity of each airport. The horizontal surface is an imaginary airspace surface located 150 feet above the established airport elevation, with perimeters calculated from the end of each primary surface for a runway. The radius of the horizontal surface is 5,000 feet for each visual or utility runway, or 10,000 feet for non-precision or precision runways.

Conical Surface -- This surface extends upward and outward from the end of the horizontal surface for a distance of 4,000 feet at a 20:1 slope.

The exhibit below depicts the three-dimensional nature of the airspace surfaces:

Exhibit 3-13, Example Part 77 Airspace



Source: National Geodetic Survey

Dimensional criteria for the FAR Part 77 airspace surfaces are defined by the instrument approach type, and runway classification. The following table identifies design criteria definitions used in FAR Part 77:

Exhibit 3-14, Part 77 Definitions

Approach Type	
Visual (V)	Runway intended solely for the operation of aircraft using visual approach procedures with no instrument approach designation on an approved FAA Airport Layout Plan
Non-Precision (NP)	Runway having an existing instrument approach procedure with only horizontal guidance with no precision approach designation on an approved FAA Airport Layout Plan
Precision (PIR)	Runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS) or other system with horizontal and vertical guidance
Runway Classification	
Utility	Runway constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight or less
Other-Than-Utility	Runway constructed for and intended to be used by turbine aircraft greater than 12,500 pounds
Part 77 Classifications	
A	Utility Runways
B	Other Than Utility Runways
C	Visibility minimums greater than ¾ mile
D	Visibility minimums as low as ¾ mile
PIR	Precision Instrument Runway

Source: FAR Part 77

RWF currently has a non-precision instrument approach established for Runway 30, and visual approaches for Runway 12 and Runway 5/23. The latest Airport 5010 report classifies RWF as a utility airport. Because the airport has published pavement strength of greater than 12,500 pounds and does accommodate business jet aircraft, it has been recommended that the airport protect for large aircraft other-than-utility standards for Runway 12/30. The Runway 12 approach is recommended to upgrade from a visual to non-precision.

The FAA dimensional standards of the existing and planned runways are presented below:

Exhibit 3-15, Part 77 Dimensions

Item	Visual Approach	Visual Approach (Utility)	Non-Precision Approach (Utility)	Non-Precision Approach (OTU)
Runway Classification	Utility	Utility	Utility	Other-Than-Utility (OTU)
Approach Type	Visual	Visual	Non-Precision	Non-Precision
Part 77 Code	A(V)	B(V)	A(NP)	C
Horizontal Zone Elevation	150 feet above Airport Elevation	150 feet above Airport Elevation	150 feet above Airport Elevation	150 feet above Airport Elevation
Horizontal Zone Radius	5,000 feet	5,000 feet	5,000 feet	10,000 feet
Conical Surface	20:1 for 4,000 feet	20:1 for 4,000 feet	20:1 for 4,000 feet	20:1 for 4,000 feet
Transitional Zone	7:1	7:1	7:1	7:1
Runway Ends	Existing & Future 5/23	Existing 12	Existing 30	Future 12/30
Primary Surface Width	250 feet	500 feet	500 feet	500 feet
Approach Surface Slope	20:1	20:1	20:1	34:1
Approach Zone Width	1,250 feet @ 5,000 feet	1,500 feet @ 5,000 feet	2,000 feet @ 5,000 feet	3,500 feet @ 10,000 feet

Source: FAA 5010 Report for RWF, FAR Part 77, Bolton & Menk Analysis

FAR Part 77 airspace surfaces must be clear of all objects, contain FAA approved obstruction lighting or marking for penetrating objects according to the established runways design standard, unless otherwise authorized by an FAA airspace study. According to the established rules, surfaces must clear public roads by 15 feet, interstate highways by 17 feet, railroads by 23 feet, and private roads by 10 feet or the height of the most critical vehicle.

At RWF, the FAR Part 77 approach surface should be clear of all natural or man-made objects. The approaches to Runway 12, 30, 5, and 23 all have identified penetrations to these surfaces in the latest inspection report. Obstructions to the approach surface are considered a high priority to remove. Obstructions to Runway 30 approach have been addressed. Land acquisition will begin in 2013 and Runway 12, 5, and 23 obstructions will be removed in an obstruction removal project scheduled to be completed in 2014.

FAA airspace studies were completed in 2011 for selected approach and transitional surface obstructions. The public hangar that penetrates the transitional surface airspace requires FAA-approved obstruction lighting. An off-airport building also required FAA-approved obstruction lighting for mitigation. Other trees within the Runway 12 transitional surface need to be removed and cannot be mitigated with obstruction lighting. These studies are noted in the ALP document.

APPROACH/DEPARTURE SURFACES

If FAR Part 77 approach surfaces are not cleared, then the approach/departure surface must be cleared at an absolute minimum for safety. All objects must clear the surface for the applicable runway design standard to meet minimum aviation safety standards. Penetrations require the runway threshold to be

shifted or displaced, in other words, moved further down the runway. This is currently the case for Runway 5 and 23 ends as a result of airspace obstructions. Displaced thresholds typically only reduce the length of runway available for landings. The dimensions of the approach/departure surfaces vary depending upon the type of aircraft operations, the approach visibility minimums, navigational instrumentation and the obstructions in the approach.

An evaluation of the approach/departure standards for each runway was completed for RWF. The exhibit below outlines the different standards.

There are penetrations to the Runway 5 and 23 visual approach (Row 2) surfaces which have led to the displaced runway ends. The current displacement should be increased to fully clear existing trees. These obstructions are scheduled to be removed in 2014 to re-establish a full-length runway.

Approach procedures for large aircraft (Category C and D) for Runway 12/30 cannot be completed because Row 5 standards cannot be met. As a result, the instrument approach procedure may not allow these aircraft to execute the approach. The Glidepath Qualification Surface (Row 8) is clear for existing Runway 30. Individual obstruction mitigation will be shown in Airport Layout Plan.

Exhibit 3-16, FAA Approach/Departure Surface Standards

Table 3-2. Approach/departure standards table

	Runway Type	DIMENSIONAL STANDARDS* Feet (Meters)					Slope/ OCS
		A	B	C	D	E	
1	Approach end of runways expected to serve small airplanes with approach speeds less than 50 knots. (Visual runways only, day/night)	0 (0)	120 (37)	300 (91)	500 (152)	2,500 (762)	15:1
2	Approach end of runways expected to serve small airplanes with approach speeds of 50 knots or more. (Visual runways only, day/night)	0 (0)	250 (76)	700 (213)	2,250 (686)	2,750 (838)	20:1
3	Approach end of runways expected to serve large airplanes (Visual day/night); or instrument minimums ≥ 1 statute mile (1.6 km) (day only).	0 (0)	400 (122)	1000 (305)	1,500 (457)	8,500 (2591)	20:1
4	Approach end of runways expected to support instrument night operations, serving approach Category A and B aircraft only. [1]	200 (61)	400 (122)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
5	Approach end of runways expected to support instrument night operations serving greater than approach Category B aircraft. [1]	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
6	Approach end of runways expected to accommodate instrument approaches having visibility minimums ≥ 3/4 but <1 statute mile (≥ 1.2 km but < 1.6 km), day or night.	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
7	Approach end of runways expected to accommodate instrument approaches having visibility minimums < 3/4 statute mile (1.2 km) or precision approach (ILS or GLS), day or night.	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	34:1
8 [3, 5, 6, 7]	Approach end of runways expected to accommodate approaches with vertical guidance (Glide Path Qualification Surface [GQS]).	0 (0)	Runway width + 200 (61)	1520 (463)	10,000 [2] (3048)	0 (0)	30:1
9	Departure runway ends for all instrument operations.	0 [4] (0)	See Figure 3-4.				40:1

* The letters are keyed to those shown in Figure 3-2.

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

AIRPORT GIS SURFACES

FAA has implemented Aeronautical Survey requirements per Advisory Circular 150/5300-18B *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards.* FAA airport survey requirements require obstruction data for specialized obstruction surfaces be collected using collected aerial imagery for the airport. Special obstruction surfaces are used for this effort to provide FAA sufficient information to develop instrument approach procedures.

RWF had an aeronautical survey completed in 2008 with obstruction data collected. When runway ends change or an enhanced instrument approach is proposed then a new obstruction analysis is necessary. This data is used to update aeronautical publications and instrument approach procedures. The next trigger for an Airports GIS obstruction analysis will be the establishment of a new straight-in instrument approach procedure to Runway 12.

AIRPORT PROPERTY & LAND USE

AIRPORT ZONING

FAA recommends airport sponsors maintain compatible land uses around airport property. Land use restrictions are aimed to protect persons and property on the ground, especially near airport runways and approaches. The State of Minnesota requires public airports to enact overlay zoning ordinance to:

- Protect the airport from incompatible land uses that could interfere with the safe operation of the airport.
- Protect public safety by reducing the potential for fatalities, property damage, or noise complaints within the vicinity of the airport.
- Protect the public investment made by taxpayers in their airport and the economic benefits it provides to the region.

Airspace requirements generally follow FAR Part 77 standards. MNDOT Aeronautics has minimum airport zoning requirements for Safety Zone A, Safety Zone B, and Safety Zone C. These land use standards are defined in are defined per Minnesota Rules 8800.2400 *Airport Zoning Standards*.

The Redwood Falls-Redwood County Joint Airport Zoning Board adopted a joint Redwood Falls Municipal Airport Zoning Ordinance in 1974. This ordinance protects surrounding land use and airspace from new incompatible land uses according to the standards required by the State of Minnesota at the time. The current airport zoning ordinance protects for a Runway 12/30 and Runway 5/23 runway length of 4,400 feet with a non-precision instrument approaches.

The existing ordinance does not meet current standards for the recommended airport configuration. The location of the assumed 4,400 foot runway cannot be exactly determined. The approach zone for Runway 12/30 is currently defined at 2,500 feet wide and does not meet the required 3,500 foot outer width. The recommended standards for Runway 5/23 would reduce the airspace and land use "footprints". The current ordinance protects for a horizontal surface of 6,000 feet when 10,000 feet is recommended in this ALP update for an other-than-utility airport. A full comparison between the 1974 airport zoning ordinance and the actual standards applied amongst the different jurisdictions was completed in the Master Plan.

An updated airport zoning ordinance is recommended. When enforced properly, the ordinance would meet or exceeds minimum airport zoning standards for the existing and ultimate planned airport configurations at RWF.

FAA RUNWAY PROTECTION ZONES

The Runway Protection Zone (RPZ) is trapezoidal in shape and centered about the runway centerline. It begins 200 feet beyond the end of the runway. The RPZ is a geometric land use standard designed to enhance protection of persons and property on the ground in the vicinity of the runway approach.

The FAA is now modifying its land use policy within the RPZ. FAA previously prohibited residences and places of public assembly (churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons), and recreational areas within the RPZ. FAA's interim guidance published on September 27, 2012 states that certain new or modified land uses in the RPZ as a result of a development proposal, airfield project, or change in airport design standards require prior coordination with FAA. These land uses include buildings, structures, recreational land uses, transportation facilities, fuel storage facilities, hazardous material storage, wastewater treatment facilities, or above-ground utility infrastructure. The Airport Sponsor must demonstrate that there are no other feasible alternatives to mitigate new land uses from the RPZ. New FAA guidance will be published in the future.

FAA strongly encourages the RPZ to be under the control of the Airport Sponsor with fee or easement interests. This will allow the airport to remove any obstructions and control the land use in this critical area. If fee acquisition is not feasible, that portion of the RPZ must be protected by an avigation easement. For existing runways, fee property interest is encouraged and satisfactory property interest must be included in the associated runway project. In the event acquisition of the RPZ is not feasible for any situation, FAA must approve a satisfactory plan for RPZ control. Acquisition is also recommended within the building restriction line, whenever possible.

RPZ dimensions are based on the RRC classification. The dimensions for each runway end as shown below.

Exhibit 3-17, FAA Runway Protection Zones

Runway Reference Code	Runway Protection Zone Dimensions (Inner width x length x outer width)
A-I-VIS (visual approach)	250 feet x 1,000 feet x 450 feet
B-II-5000 (1 mile visibility)	500 feet x 1,000 feet x 700 feet
B-II-4000 (3/4 mile visibility)	1,000 feet x 1,700 feet x 1,510 feet

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

RWF should plan to acquire control in fee within the Runway 12/30 and Runway 23 RPZs. The existing land uses generally includes open land, agricultural, or forested land uses. Part of the existing Runway 12 RPZ includes residential land uses but no structures.

Avigation Easement control is recommended to be acquired over properties within the fully-developed Runway 5 RPZ. This RPZ contains incompatible uses from the existing RPZ policy. One example is the Daktronics industrial park building. These incompatible land uses that cannot be feasibly mitigated without closing or dramatically shifting the runway end. A runway shift is not feasible as there is

insufficient land to shift the runway to the northwest to maintain the current runway length. The runway has been allowed to remain open safely for nearly 30 years by FAA and MNDOT Aeronautics.

MNDOT CLEAR ZONES

The MNDOT Clear Zone (CZ) is trapezoidal in shape and centered about the runway centerline. It begins 200 feet beyond the end of any paved runway and begins at the end of a turf runway.

The MNDOT CZ, similar to a FAA RPZ, is designed to enhance protection of persons and property on the ground in the vicinity of the runway approach. MNDOT Aeronautics adopted Policy Statement No. 1 on October 4, 2005 regarding Clear Zone Requirements. According to the policy, "State participation in acquisition, construction, maintenance operation, and improvement is limited to those airports at which adequate clear zones for the ultimate development of the airport have been acquired and maintained." Identified areas show minimum required property interests, however actual property interests are determined based on other factors.

CZ dimensions are based on the runway classification, approach type, and approach visibility minimums established for a runway. CZ dimensions for each runway end are shown below.

Exhibit 3.18, MNDOT Clear Zones

Runway Classification, Approach Type	Runway Protection Zone Dimensions (Inner width x length x outer width)
Utility, Visual	250 feet x 1,200 feet x 490 feet
Utility, Non-Precision (1 mile visibility)	500 feet x 1,000 feet x 800 feet
Other-Than Utility, Non-Precision (1 mile visibility)	1,000 feet x 1,700 feet x 1,510 feet

Source: MNDOT Office of Aeronautics, Policy Statement No. 1 (2006)

RWF should plan to acquire control over the Runway 12/30 and Runway 23 CZs. Avigation easement is in place over much of the existing CZs. In some cases, avigation easement may be acceptable for adequate control. Avigation Easement control is recommended to be acquired over properties within the fully-developed Runway 5 CZ.

AIRPORT PROPERTY INTERESTS

The existing airport property line encompasses approximately 210 acres in fee title. The airport also has easement interests for areas within the Runway 12 and 30 approaches. Fee acquisition is preferred so that the Airport Sponsor has control over areas necessary for airport safety and development. Considerations for airport property boundaries include the following existing and planned future elements:

- Airport Infrastructure (Runways, Taxiways, Aprons, Buildings, etc.)
- Runway and Taxiway Safety Area, Object Free Area
- FAR Part 77 Primary Surface
- Runway Visibility Zone
- Building Restriction Line (based on FAR Part 77)
- FAA RPZ, strongly recommended whenever possible

- Future Airport Expansion (i.e. terminal area, runway extensions)

Additional airport property interests are needed to cover the FAA RPZ (fee or easement) for all runway ends except existing Runway 30, the 20 foot Building Restriction Line for all runway ends (35 feet not feasible), the MNDOT CZ for all runway ends, and areas to cover any future runway development. The Runway 5 OFZ/OFZ penetration will be addressed through a runway shift.

TERMINAL AREA ANALYSIS

Terminal area facilities at a general aviation airport support airfield operations including aircraft parking and storage, fueling operations, aviation services, and terminal space. Individual terminal area facilities accommodate different types of critical aircraft and aviation demand. The terminal area facilities will be evaluated to accommodate the existing and future aviation demand needs for RWF. Overall facility requirements should be designed to accommodate RDC B-II aircraft to meet critical aircraft requirements. Areas designed to exclusively serve smaller aircraft can be reduced to Design Group I aircraft types.

APRON

An aircraft apron is a designated area outside of the runway and taxiway environment to accommodate aircraft parking and maneuvering to other terminal area facilities. The apron space requirements are developed according to recommendations provided in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design* and FAA Central Region guidance. The primary considerations for apron design include the purpose of the apron. Common purposes for the airport apron include transient aircraft parking and tie-downs, fueling operations, and based aircraft storage. Other considerations of apron design include spacing of tie-downs, wind orientation, proximity to other objects, critical design aircraft size, and overall circulation patterns.

AIRCRAFT TIE-DOWNS

An analysis of the overall apron size and tie-down requirements was completed utilizing the Apron Design Calculator available from FAA Central Region based on FAA AC 150/5300-13A *Airport Design* requirements. This calculator requires airport operational projections including overall annual operations, busiest month and busiest day data, and number of itinerant data. Other inputs include the apron design factors include consideration of a taxilane on the edge or in between tie-downs.

The analysis for RWF assumes annual operations reflect the design year 2032 with peak operations occurring in July with 20% of the annual total for planning purposes. Itinerant aircraft operations reflect 50% of annual operations, with 50% of those aircraft requiring tie-down space on the ground. Given 23 itinerant aircraft land at RWF during a peak day and an estimated 50% of those require tie-down facilities, utilizing the Apron Design Calculator yields a recommended 11 tie-down spaces is required in the next 20 years. Considerations should also be made for select Design Group II aircraft using these parking positions.

RWF currently has six permanent tie-downs at the facility. The current tie-down configuration is located in groups of three on the northwest and southeast side of the apron. The tie-downs are recommended to be geometrically re-oriented to the central part of the apron in the future to provide for maximum expandability and maneuverability for new development areas meeting applicable Object Free Area (OFA) requirements. Tie-downs should be sized for a mix of Design Group I and Design Group II aircraft.

APRON SIZE

Demand for general aviation apron space is driven by itinerant aircraft and based aircraft not desiring hangar storage. Determination of future general aviation apron requirements necessitates an assessment of the aircraft tie-down needs and parking needs, fueling operational needs, and taxiway and taxilane requirements to meet object free area requirements for maneuverability.

There are 11 aircraft tie-downs recommended for Design Group I and II aircraft at RWF, with additional space as needed for maneuverability. Existing apron facilities at the Airport consist of a main 11,600 SY area for parking, aircraft tie-down, fueling, circulation, and general aircraft movement.

Per the Apron Design Calculator for Design Group I aircraft accommodating a taxilane (960 SY per tie-down), the recommended apron size to accommodate a taxilane is 11,915 SY. Accommodations for Design Group II sizing (1,385 SY per tie-down) yield a recommended size of 17,191 SY. Both calculations include a 10% factor for growth.

Future apron size requirements specific to RWF require adequate space to meet Design Group II aircraft parking requirements, adequate wingtip clearance space to accommodate the OFA requirements for a taxilane and parallel taxiway, and aircraft maneuverability need for fueling and hangar parking. Tie-downs are sized for all Design Group I aircraft, and selected Design Group II aircraft. If needed, taxilane and taxiway OFA requirements can be reduced to a minimum level of safety if an FAA modification to standard is granted. This is recommended as the apron should be sized to accommodate the largest aircraft, not necessarily the critical design aircraft.

Given the existing apron size at RWF meeting all applicable OFA requirements, the existing apron can accommodate nine tie-downs parking spaces for a mix of Design Group I and Design Group II aircraft. The recommended number of tie-downs for Design Group I and selective Design Group II aircraft is 11 to meet long-term demand. Per the design calculations an apron expansion is needed to accommodate three additional tie-downs. Exact site dimensions of the apron area will be determined in the Airport Layout Plan.

TERMINAL BUILDING

General aviation terminal buildings are built to serve general aviation pilots and the airport sponsor's airport needs. The existing terminal facility at RWF was constructed in 2002 and is in very good condition. Amenities include a restroom, common area, conference room, pilot briefing area, and public office space.

Space requirements are designed around the number of passengers (including pilot) during the design hour at the airport, calculated to be 18.8 operations per hour per the Aviation Forecasts. Given a general average of 2 passengers per general aviation flight (pilot and passenger); an ultimate terminal facility should be designed to accommodate 37.6 (or 38) persons. The existing facility is considered adequate to meet current and future requirements.

HANGAR FACILITIES

Aircraft hangars are classified as either T-hangars or conventional hangars for aircraft storage. Aircraft hangars can be publically-owned, privately-owned, or non-commercial or commercial use. The number of aircraft that each hangar can accommodate varies according to the aircraft size, door width, and other hangar specifications of the airport owner or operators. Currently, RWF has 2 public T-hangars (16 units) and 2 public conventional hangars housing all of the airport's 18 reported based aircraft. These hangars

can hold up to 21 based aircraft for Design Group I aircraft. Design Group II aircraft may be accommodated in the conventional hangars.

Planning considerations for hangar facilities include the appropriate number and type of hangars to accommodate the projected based aircraft, airport sponsor preferences, and hangar owner/tenant needs. Hangar layout considerations include utilizing the best use of available ground space, environmental factors (i.e. wetlands), available airspace, locating commercial hangars close to the main apron, locating T-hangars and private non-commercial hangars away from the main apron, providing for potential expansion space, and avoiding north-facing doors whenever possible. Pavement outside of a standard taxilane width of 20 feet serving non-Federally funded hangars is typically ineligible for Federal AIP funding.

Future hangars typically include a mix of T-hangars and individual conventional hangar lots. Actual demand for T-Hangars and private hangars is dependent on individual hangar owners' preferences for aircraft storage development. Based aircraft forecasts project 21 based aircraft by the end of the 20-year planning horizon. Private conventional hangar development space does not currently exist at RWF. It is recommended that a private conventional hangar development area be shown on the ALP. The hangar development will be reviewed and refined in the Airport Layout Plan.

PUBLIC HANGAR REQUIREMENTS

Publically-owned "T" Hangar facilities are commonly utilized by smaller general aviation aircraft for safe, reliable, and inexpensive storage. A T-Hangar is a building that is partitioned into "T" shaped units to maximize aircraft storage. These units are ideal for aircraft operators who do not have the required capital to privately construct a conventional hangar. T-Hangars can be desirable for the airport sponsor because they generate regular monthly income; however, initial capital expenses are high.

Demand for T-hangar space at RWF is assumed to remain strong for Design Group I aircraft; and is one means of storing additional based aircraft. For this purpose of planning for the long-term development of T-Hangars at RWF, one (1) additional T-hangar building is recommended to accommodate demand through the 20-year planning level. Additional T-hangars should be planned as space considerations permit. Existing 8-unit structures, constructed in the 1960s, should be planned for replacement within the later end of the planning period.

PRIVATE/COMMERCIAL HANGAR REQUIREMENTS

The airport sponsor should also consider developing infrastructure and providing long-term land leases to interested parties for purposes of constructing private aircraft hangars. This method allows the aircraft owner to privately fund and construct a hangar building at little cost to the airport. Recent trends at other general aviation airports indicate general resurgence in the construction of private hangars built specifically for the needs of the owner. This, however, has not yet occurred at RWF. The City does currently have interest in users developing these types of hangars at RWF to accommodate larger aircraft types.

Based on indicated demand for private hangar space, hangar development areas are recommended to be shown in the ALP. Demand forecasts indicates approximately two (2) or three (3) of these hangars are expected through the 20-year planning horizon. It is recommended that a private hangar development area be explored and shown on the Airport Layout Plan to accommodate increased demand. This area should maximize space whenever possible. Additional hangars should be planned when feasible.

Commercial hangar requirements are based on local aviation demand for a business providing aviation services such as aircraft maintenance, flight instruction, line services, etc. These types of hangars can also be occupied by a corporate flight department. A provider of multiple aviation services is known as a Fixed Based Operator (FBO). There currently exists an FBO at RWF. A single-aviation service operator could operate from the publically-owned conventional hangar; however a larger hangar is necessary for a full-service FBO facility. An additional commercial hangars and corresponding apron expansion is recommended to be shown on the ALP to accommodate any future demand for this type of facility at RWF.

TRANSIENT STORAGE FACILITIES

Transient aircraft storage facilities are desired by transient aircraft to protect the aircraft from inclement weather, or if the operator is planning an extended stay. Transient single-engine and multi-engine piston aircraft operators may or may not require aircraft storage facilities. However, many higher performance single-engine, multi-engine, turboprop and jet aircraft operators desire overnight aircraft storage or a heated hangar in the winter. At RWF, there is available transient aircraft hangar space in the public FBO conventional hangar for Design Group I and occasional Design Group II aircraft. This is considered adequate to meet the needs provided an adequate portion of the hangar space is dedicated for this use. Exhibit 3-18, Apron and Aircraft Storage Area is a summary of the requirements for RWF:

Exhibit 3-18, Apron and Aircraft Storage Area

Item	2012	2017	2022	2032
Aircraft Apron Size (Design Group I)	8,286	8,892	9,665	11,915
Aircraft Apron Size (Design Group II)*	11,954	12,829	13,944	17,191
Aircraft Tie-Downs	8	8	9	11
Based Aircraft Storage Recommendations				
T-Hangar	15	15	15	16
Conventional Hangar	3	4	4	5
Tie-Down	0	0	0	0
TOTAL Based Aircraft Storage Needed	18	19	19	21

* Smaller area can be considered with approved FAA Modification to Design Standards for actual critical design aircraft
Source: Bolton & Menk Analysis

FUEL REQUIREMENTS

Fuel storage requirements are based on the average forecasted number of annual operations for the airport. A fuel ratio can be estimated by analyzing fuel flowage on a national level and from other general aviation airports. Based on general aviation trends, an estimated fuel consumption rate of 2 gallons per aircraft operation for aviation gasoline (100LL) was used. A consumption rate of 5 gallons per turbine operation for Jet-A was used. Multiplying the fuel ratio by the forecasted annual operations for the airport results in the forecasted annual fuel requirement at the Airport. Required fuel storage assumes limiting fuel deliveries to once per month, thus having a 30-day capacity during peak airport operations.

Exhibit 3-19, Fuel Requirements

Item	2012	2017	2022	2013
Total Operations	9,828	10,547	11,464	14,133
Piston*	7,862	8,438	9,171	11,306
Turbine*	1,966	2,109	2,293	2,826
AvGAS (100 LL)				
Annual Gallons	15,725	16,875	18,342	22,612
Monthly Peak Storage Needs (20%)	3,145	3,375	3,669	4,522
Jet-A				
Annual Gallons	9,828	10,547	11,464	14,133
Monthly Peak Storage Needs (20%)	1,966	2,109	2,293	2,826

*Estimated split between Piston and Turbine aircraft types. Turbine includes Helicopter operations
Source: Bolton & Menk Analysis

The fuel facility at RWF is located along the main apron. A card reader system is installed for 24-hour refueling operation. The existing above-ground 12,000 gallon 100-LL tank and 12,000 gallon Jet-A tank will need to be replaced in the near-term to meet environmental protection requirements.

AUTOMOBILE PARKING

It is recommended that the airport provide adequate automobile parking to accommodate pilots, employees, visitors, and passengers. The existing parking lot does not have any designated parking stalls but generally can hold 22 vehicles. Public automobile parking requirements can be estimated as 0.8 automobiles per peak hour general aviation passenger. Using the peak hour operations developed in the previous chapter, the existing parking lot will require 30.1 (or 30) spaces to adequately serve demand through the end of the planning horizon. Each stall is estimated to need 320 square feet, which would require 9,600 square feet of automobile parking space. The public automobile parking lot is recommended to be reconfigured accommodate at least an additional 8 spaces.

On-site aviation businesses often lead to additional vehicular parking needs for employees and visitors. Additional space is recommended for planning-purposes to accommodate these needs. The total number of automobile parking of approximately 50 spaces is anticipated to adequately meet demand at the end of the planning period for additional aviation businesses that may locate to RWF.

Exhibit 3-20, Public Automobile Parking Requirements

Year	Peak Vehicles	Space Requirements
2032	30	9,600 SF

Source: Bolton & Menk Analysis

FENCING & SECURITY

Fencing and security importance for general aviation airports have increased since the events of September 11, 2001. Both the Transportation Security Administration (TSA) and Aircraft Owners and Pilots Association (AOPA) have published recommended security practices for general aviation airport. Currently there are no specific FAA requirements for airport security at General aviation airports, however TSA has published guidelines for GA airport security in *Security Guidelines for General aviation Airports (May 2004)*. Although highly recommended, none of these guidelines have a dedicated

funding source or are required for GA airports at this time. General recommendations include controlling airport access points, installing perimeter fencing, installing adequate lighting, establishing security procedures, and identifying airport and law enforcement personnel.

FAA recommends a 10 to 12-foot high wildlife fence to prevent intrusions onto airport property by animals if so recommended by a Wildlife Hazard Assessment (WHA). TSA recommends a 10-foot high chain link fence is recommended to control intrusions by people. A terminal area fence is recommended to be maintained around the parking area near the apron, separating airside and landside operations. The higher the fence, the less likely unauthorized persons are able to access airport airside areas. Controlled access gates are recommended to directly control the entry of unauthorized persons onto aircraft operational areas. These gates can have card-readers or keypad type entry systems.

RWF currently does not have terminal fencing separating the terminal area from the apron and public hangar area. Other fencing includes field fence to separate on and off airport property areas. Future improvements include installing terminal controlled access fencing to prevent unwarranted activity from entering the airside portions of the airport. These fencing and security improvements are generally desired more as the cost of aircraft frequently operating to the airport increase. These improvements enhance safety and security by protecting against inadvertent access by the general public.

Perimeter wildlife fencing is not recommended at this time as a priority item. FAA is beginning to require general aviation airports to complete a WHA study to determine the risk wildlife pose to aircraft at an individual airport. The recommendations from this study become eligible for FAA funding. RWF is not anticipated to complete a WHA for at least the next few years. If recommended by the WHA or other TSA regulations, a perimeter fence should be installed as funding becomes available to protect the Airport from unauthorized access from persons and animals entering the airfield. Other security improvements are recommended to comply with any future FAA or TSA requirements for general aviation airports.

SNOW REMOVAL EQUIPMENT AND STORAGE

The City of Redwood Falls own dedicated snow removal equipment and attachments for specific use on the airport. The equipment is stored in the south portion of the public FBO hangar with dedicated access to the airfield. The equipment and storage space is considered adequate for the planning period.

WEATHER REPORTING & COMMUNICATIONS

Future critical aircraft and instrument approaches require timely, up-to-date, local weather reporting to determine the use of approach procedures. RWF is served by an Automated Surface Observation Station (ASOS) located at the airport. This more sophisticated system is considered adequate for the planning period.

The current Common Traffic Advisory Frequency (CTAF) at RWF is sufficient for the frequency of operations through the next 20 years. Pilot Controlled Lighting (PCL) is installed and meets the current needs.

ALTERNATIVES

The purpose of this section of the report is to propose and evaluate feasible airport development alternative configurations that would enable the airport to meet its needs as outlined in the previous sections. This report provides the methodology used to develop the airside and landside configuration recommended in the 2010 Airport Master Plan and this ALP Update. The following is a summary of the major planned development needs at RWF:

- Runway 12/30 should be evaluated for their ability to meet FAA safety criteria for an other-than-utility runway with dual non-precision approaches with LPV instrument approach capability. FAA approach/departure surfaces need to be clear, and FAR Part 77 should be cleared whenever feasible.
- The primary runway length at RWF may be insufficient for future anticipated aircraft types. An extension from 4,000 feet to 4,400 feet would satisfy FAA requirements for future critical design aircraft as large as the Beechcraft King Air B-200 (RDC B-II).
- An ultimate runway extension to 5,500 feet to accommodate regular business jet traffic in a Cessna Citation 560 or similar aircraft (RDC B-II) should be considered for an unconstrained airport; however the 2010 Master Plan concluded that this runway cannot fit within the existing airport environs.
- A full parallel taxiway to serve Runway 12/30 is recommended for this type of airport with a non-precision LPV approach.
- The crosswind runway 5/23 should be evaluated for their ability to meet FAA safety criteria for a utility runway with dual visual approaches. FAA approach/departure surfaces need to be clear, and FAR Part 77 should be cleared whenever feasible. The runway OFA needs to be unobstructed. The recommended runway length is 2,810 feet; however a length as short as 2,300 feet should be accommodated for safety.
- The aircraft apron needs to be expanded to meet future transient aircraft parking requirements (11) and maneuverability for up to Design Group II aircraft.
- Accommodate future and ultimate hangar requirements including a private conventional hangar development area meeting Design Group II aircraft requirements, and a reconfigured public T-hangar area meeting Design Group I requirements.

The alternatives presented in this section were reviewed by the Redwood Falls Airport Commission.

PRIMARY RUNWAY & TAXIWAY

New obstruction data was obtained in 2011 for the Environmental Assessment. Action is required by the Sponsor in the near-term to address FAR Part 77 airspace obstructions for the existing configuration. This will clear the airspace for this other-than-utility runway serving non-precision instrument approaches for both ends (including a future Runway 12 non-precision approach). Land acquisition is necessary to gain control of obstruction removal and land use areas. Obstructions will be removed with some obstructions mitigated through the use of FAA-approved obstruction lighting. Agricultural operations should also be removed from critical areas.

Runway 12/30 is planned to remain on its current alignment based on the 2010 Airport Master Plan. The critical aircraft is a RDC B-II. The preliminary alternative screening process during that study concluded that Alternative A3 can be accommodated along the existing runway alignment to serve non-precision

instrument approaches and 4,400 feet of runway length. The alternative analysis exhibits are contained in **Appendix C**.

A realigned runway alignment could not reasonably accommodate a significantly longer runway and enhanced instrument approaches without major impacts such as land acquisition, road relocation, restricted community growth corridors, and cost. It was concluded that the "highest and best use of the existing airport site" is to maximize the existing runway length to best meet FAA recommended standards.

A more detailed Alternatives Analysis was completed in the Master Plan for each runway end along the existing primary runway alignment. Below is a summary of the planning considerations relative to each runway end for an other-than-utility Runway 12/30:

- Runway 30 (extend 300 feet): This runway end can be reasonably extended up to 300 feet and allow Highway 19/71 to clear a 34:1 non-precision approach slope by 18 feet (15 feet required). Transitional surface obstructions still remain (buildings) and could be mitigated through obstruction lighting. An extension to 400 feet would allow Highway 19/71 to clear airspace by mere inches. An extension beyond 300 feet may impact a nearby commercial business as the parallel taxiway centerline would be within 70 feet of the property boundary and would be additionally impacted by noise and jet blast. Thus, a 300 foot runway extension reasonably maximizes the use of the existing runway without additional impacts.

- Runway 12 (extend 100 feet): This runway end can be extended up to 100 feet and still clear an assumed 15-foot obstacle along existing Ponderosa Road for a 34:1 non-precision approach slope. A runway length beyond 100 feet would identify Ponderosa Road as an airspace obstruction. At a 200 foot extension, Runway 12 would be limited to a visual approach. FAA policy is to have future runway ends clear FAR Part 77 standards. Thus, a 100 foot runway extension maximizes the use of the existing runway and preserves future instrument approach goals.

There are no changed in this ALP Update to the recommended plan for Runway 12/30. Runway 30 end (southeast) is planned to be extended 300 feet, and Runway 12 end (northwest) is planned to be extended 100 feet to accommodate an FAA recommended runway length of 4,400 feet.

As a result of the new FAA RPZ policy, any runway end modification or change in the RPZ dimensions would trigger an RPZ Alternatives Analysis. Public roadways within the proposed RPZs are land uses that would trigger an analysis at RWF for Runway 12/30. Existing public roadways (Ponderosa Road, Highway 101) are within the FAA RPZ for Runway 12 approach. A proposed 100 foot extension would continue to have these roadways within the RPZ. These roadways cannot be realigned without significant cost due to surrounding land uses (trail, residences) and terrain. Shifting the runway approximately 800 feet to the southeast would remove roadways from the RPZ. For Runway 30, a sliver of Highway 19/71 is within the FAA RPZ currently. The proposed 300 foot runway extension would increase the length of the roadway within the RPZ. A shift of the runway approximately 100 feet to the northwest would remove the roadway from the RPZ. The roadway cannot be shifted without significant cost and impacts to nearby businesses. A runway length of approximately 3,100 feet is unsafe for the existing airport operations. No feasible alternatives exist to remove these land uses from the RPZ for the future runway configuration and meet FAA recommended runway lengths for safety.

Runway 12/30 is planned to remain at a 100 foot width as it stands today. The cost to narrow Runway 12/30, remove pavement, and realigned runway lights is believed to cost more than the additional cost of 25 feet of pavement.

Runway grooving is also recommended by the Sponsor to serve business jet operations during wet runway conditions. FAA has determined that this may be eligible for FAA funding.

Instrument approaches to both Runway 12 and 30 are planned to be non-precision, with straight-in GPS LPV procedures and visibility minimums no less than 1 mile. This approach type exists currently for Runway 30. No new enhancements are recommended due to site constraints and justification. An enhancement of the Runway 12 approach to accommodate a GPS approach with LPV is recommended and obstruction removal should meet this standard.

Facility requirements recommend a full 35 foot wide parallel taxiway to serve the extended Runway 12 end for approaches with vertical guidance. This will enhance safety at RWF considering the wide mix between small and large aircraft operations on the same primary runway. A 48-hour draining stormwater basin and outlet is necessary to be constructed with the parallel taxiway to meet local drainage requirements.

In summary, a 400 foot extension of Runway 12/30 is recommended to meet future critical design aircraft requirements for RWF. Approaches should be upgraded for dual GPS straight-in LPV procedures each with no lower than 1 mile visibility. A full-parallel taxiway is also recommended for a vertically guided LPV approach.

CROSSWIND RUNWAY

Several options were reviewed in the Airport Master Plan for the ultimate disposition of the crosswind runway 5/23. The Airport Master Plan recommended Runway 5/23 remain in its existing alignment with modifications to meet FAA approach/departure and Part 77 airspace standards. This guiding principal is still recommended for this ALP Update. New obstruction data was collected in 2011 (after the Master Plan) which will be considered in this ALP Update. The future and ultimate disposition of each crosswind runway end can now be adequately planned.

Runway 5/23 provides RWF with a combined wind coverage exceeding 95%, thus is eligible for Federal funding and is necessary for airport operational safety. The existing and planned RDC is A-I, Small Aircraft. Action is required to be taken by the Airport Sponsor to mitigate airspace obstructions and remove a field road from the Runway OFA. Agricultural operations should also be removed from critical areas.

New alternatives were reviewed to best meet airport design standards. Below is a summary of the planning considerations relative to each runway end to meet airport design standards for Runway 5/23:

- Runway 5: Land uses beyond this runway end are completely developed thus no extension can occur. To remove an off-airport field road from the Runway OFA, Runway 5 end should be moved 80 feet to the northeast to place the OFA completely within airport property. New obstruction data shows that airspace obstructions need to be removed or lowered to meet approach/departure and FAR Part 77 standards. Once obstructions are removed then the current displaced threshold can be removed. In the long-term, the runway may have to be displaced another 80 feet to accommodate an extension of Quality Drive to the north.

- Runway 23: New obstruction data shows that airspace obstructions need to be removed or lowered to meet approach/departure and FAR Part 77 standards. Once obstructions are removed then the current displaced threshold can be removed. This, combined with an 80 foot runway end shift on the Runway 5 end, will allow Runway 5/23 to be a total length if 2,001 feet. A planned

long-term extension to 2,300 feet is feasible given obstruction data. This will place the runway end well away from the beginning of a steep drop-off and still meet FAA design standards. Any further extension is not recommended, however an increased safety area beyond the Runway 23 end could be implemented by the Sponsor to enhance safety.

To accomplish these actions, land acquisition and obstruction removal must be completed along the Runway 23 end to remove obstructions and protect land use. Acquisition in fee title is not feasible over the Runway 5 approach due to industrial development. Landowners within the Runway 5 approach are willing to work directly with the City to accomplish obstruction removal. An aviation easement is recommended to be acquired in the future to maintain clear approaches.

The planned runway length for Runway 5/23 is 2,001 feet in the near-term and 2,300 feet for the future. A runway extension to the recommended 2,810 feet is not feasible. This runway is planned to remain as turf due to its length constraints. Any near-term runway shift should be coordinate with MNDOT Aeronautics and FAA to ensure runway records are properly updated. An AGIS survey will need to be conducted because the runway end points are considered safety critical data.

Any runway end change or change in the RPZ dimensions would trigger an RPZ Alternatives Analysis. Public roadways and structures within the proposed RPZs are land uses that would trigger an analysis at RWF for Runway 5/23. Existing public roadways (Quality Drive, Industrial Drive) are within the FAA RPZ for Runway 5 approach. A proposed 80 foot runway end shift would continue to have these roadways within the RPZ. Roadways cannot be realigned without significant cost due to surrounding industrial park businesses. Shifting the runway over 1,000 feet to the northwest would remove roadways from the RPZ. For Runway 23 end there are no incompatible land uses in the existing or planned RPZ. An extension beyond 300 feet to the northeast may place a public low-use roadway within the RPZ. A runway length of approximately 1,400 feet to remove all incompatible land uses is unsafe for the existing airport operations. No feasible alternatives exist to remove these land uses from the RPZ for the future runway configuration and meet recommended runway lengths for safety.

In summary, Runway 5/23 is planned to remain and be utilized to its highest and best use along the current runway alignment. Obstructions will be removed and runway ends changed to meet current airport design standards. A future extension to 2,300 feet is also recommended.

TERMINAL AREA

The Airport Master Plan recommended improvements to the terminal plan to accommodate future expansion, reconfigure the existing T-hangar area, and develop an ultimate west hangar site. Some considerations that have changed since the Master Plan were reviewed in this ALP Update:

- There is current demand for private conventional hangars up to 100’ x 100’ in size. As a result, accommodating these hangars in the existing terminal area compatible with future development and at minimal site preparation cost is recommended.
- The cost of a new public T-hangar building has increased dramatically within the last few years. Demand is not anticipated to be as high with the development of private hangar sites. As a result, there is a commitment to utilize existing infrastructure as much as possible yet plan for economical growth.

Future development of the terminal area includes the apron, tie-downs, hangars, airport buildings, and automobile parking. Current facility recommendations for terminal area development at RWF include the following:

- Accommodate 11 aircraft tie-downs for transient traffic, and expanded maneuvering area capable of accommodating selected Design Group II aircraft,
- Plan for future conventional hangars to meet current and future demand,
- Plan for the replacement of existing T-hangar buildings and development of new hangars to meet the needs within and beyond the next 20 years,
- Maintain FAA design standards.

Aircraft parking tie-downs in the primary apron are recommended to be reconfigured to maximize demand. To accommodate Design Group II taxiways and taxilanes, seven small aircraft tie-downs and two large aircraft tie-downs can be constructed. The City has verified that this modified layout will be compatible with North Memorial Air Care helicopter operations if they hover-taxi around parked aircraft. Additional transient aircraft storage to meet demand can be accommodated with an expanded long-term parking apron to the southeast, or providing indoor transient storage in the FBO hangar.

Private hangars will be located in several areas. A larger 100’ x 100’ and a 60’ x 60’ hangar will be planned along the southeast side of the existing apron. These sites can accommodate Design Group II aircraft and can have access to a future parking lot and fit well within the planned terminal area fencing. An additional four 60’ x 60’ hangar sites along the southwest side of the public T-hangar area are also shown for Design Group I aircraft. The planned west hangar area can accommodate three 80’ x 80’ hangars for Design Group II aircraft, however additional infrastructure is necessary. A future 100’ x 100’ commercial or FBO hangar is able to be accommodated to the northwest of the existing public FBO/terminal building. Another future 120’ x 120’ commercial or FBO hangar is able to be accommodated southeast of the existing public FBO/terminal building provided the entrance road is relocated. Both hangars will be designed to serve Design Group II airplanes.

The public T-hangar area has been redesigned from the Master Plan. The hangar closest to the runway must be removed once it has reached the end of its useful life because it is an airspace obstruction. A recent FAA determination indicated that it must be obstruction lighted and marked to FAA standards. The hangar building to the southwest is planned to be replaced with a new structure. The remaining T-hangars are planned to be developed in the west hangar area in the long-term.

A relocated airport entrance road is recommended to allow an expanded terminal area to maximize available space. The relocated entrance road is proposed to serve the terminal area from the south though a connection with Frontage Road. Airport automobile parking would then be reconfigured fit with the entrance road to maximize public parking for the terminal building and commercial aviation hangars. A future airport-compatible stormwater basin is also planned for this area to meet local drainage requirements.

Additional automobile parking lots are shown near the private hangar areas. Dedicated automobile parking and access roads are recommended by FAA to remove vehicles driving onto active airside areas. The existing airport entrance road access point would be utilized as a dedicated hangar area access road. Controlled access fencing and gates are recommended to separate traffic.

Various terminal area alternatives were developed and shared with the Airport Sponsor for review to modify the layout from the Master Plan based on the new planning considerations. The preferred development will be incorporated into the Airport Layout Plan.

IMPLEMENTATION

This chapter describes the improvements and actions to be taken by RWF to implement to recommendations of the Airport Layout Plan Update.

IMPLEMENTATION PLAN

The implementation plan is necessary to provide guidance to the airport sponsor on how to implement the conclusions of the preferred airfield development alternative. A realistic, sequenced plan is developed to ensure that airport development is completed to meet aviation demand, rules, regulations, and grant requirements. The implementation plan consists of a sequenced listing of projects over the 20-year planning period and beyond.

Development projects are grouped into general categories including the short-term stage (0-5 years), mid-term stage (6-10 years), and long-term stage (11-20+ years). The development that will be depicted in the updated Airport Layout Plan drawing set corresponds to the recommended development for each of the stages. Planning level development cost estimates in 2012 dollars are included for each item in the facility implementation plan. The projects are based on the recommended facility requirements and alternatives previously discussed. The phasing of the projects assists the airport sponsor in budgetary planning for projects necessary to meet aviation safety and demand needs. The implementation plan is subject to project justification, demand, priority, eligibility, and funding availability. All improvements must also have a completed environmental determination. Project sequence should be updated periodically as local priorities change.

The comprehensive implementation of all airport projects should be linked to the Airport Capital Improvement Program (ACIP), updated each year by the airport sponsor and submitted to MNDOT Aeronautics and FAA. All costs are estimated for planning-level purposes.

A full implementation plan is located in **Appendix D**.

RECOMMENDED AIRPORT DEVELOPMENT PROJECTS

Project Name:	Update Joint Airport Zoning Ordinance
Project Sequence:	A1
Project Description:	Update the multi-jurisdictional joint airport zoning ordinance to cover the existing, future, and ultimate airport configurations.
Project Justification:	The current airport zoning ordinance is from 1974 and may not be uniformly enforced, thus an update is necessary. The new Airport Layout Plan depicts a new planned runway configuration which also needs to be property protected.
Project Trigger:	FAA and MNDOT Aeronautics approval of Airport Layout Plan (ALP).
Action Items:	None
Estimated Cost:	$54,000
Funding Plan:	State Airport Development Funding for eligible units of work

Project Name:	Install A/D Building Elevator
Project Sequence:	A2
Project Description:	Construct elevator in the current arrival/departure building to serve the accessibility needs of the general public.
Project Justification:	The existing public space is in need of an elevator to meet Americans with Disabilities Act (ADA) requirements.
Project Trigger:	Available project funding participation.
Action Items:	Coordinate funding plan with MNDOT Aeronautics
Estimated Cost:	$275,000
Funding Plan:	State Airport Development Funding

Project Name:	Acquire Land for Runway 23 RPZ/Clear Zone, Runway 12/30 BRL
Project Sequence:	A3
Project Description:	Acquire approximately 17.4 acres of property in fee simple
Project Justification:	Land acquisition is required to acquire control over the Runway 23 Runway Protection Zone (RPZ), MNDOT Clear Zone, Runway 12/30 Building Restriction Line, and FAR Part 77 obstruction removal areas.
Project Trigger:	Finding of No Significant Impact (FONSI) issued – expected in mid-2013
Action Items:	None
Estimated Cost:	$356,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Remove & Mitigate Runway 5/23, Other Transitional FAR Part 77 Obstructions
Project Sequence:	A4
Project Description:	Remove approximately 8.5 acres of trees that are obstructions to the Runway 5/23 airspace, as well as lower/obstruction light existing light poles.
Project Justification:	An obstruction survey found man-made and natural growth objects to be obstructions to the FAR Part 77 airspace, thus action must be taken to remove, light, or lower the object to meet airspace standards.
Project Trigger:	Finding of No Significant Impact (FONSI) issued – expected in mid-2013, land acquisition
Action Items:	Begin negotiations with affected landowners in Runway 5 end separate from project as no land interests will be acquired for Runway 5.
Estimated Cost:	$165,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Complete FAA Airports GIS Survey for Runway 5/23
Project Sequence:	A5
Project Description:	Complete survey of new Runway 5/23 ends to FAA standards to update aeronautical data and publications.
Project Justification:	Any change in runway end data requires data to be submitted to FAA to AC 150/5300-18B standards.
Project Trigger:	Runway 5/23 Obstruction Removal
Action Items:	None
Estimated Cost:	$15,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Crack Seal Airport Pavements
Project Sequence:	A6
Project Description:	Crack seal existing runway, taxiway, apron, and hangar area pavements as identified.
Project Justification:	On-going, regular pavement maintenance is necessary to preserve and extend the useful life pavement infrastructure.
Project Trigger:	An on-going crack seal projects should also occur as necessary into the mid-term and long-term. A comprehensive project should occur every 3-5 years.
Action Items:	None
Estimated Cost:	$54,000
Funding Plan:	State Airport Development Funding

Project Name:	Acquire Land for Runway 12 RPZ, Obstruction Removal
Project Sequence:	A7
Project Description:	Acquire approximately 6.9 acres of property in fee simple
Project Justification:	Land acquisition is required to acquire control over the Runway 12 Runway Protection Zone (RPZ) and FAR Part 77 obstruction removal areas.
Project Trigger:	Finding of No Significant Impact (FONSI) issued – expected in mid-2013, available funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$409,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding

---

Project Name:	Remove & Mitigate Runway 12/30 FAR Part 77 Obstructions
Project Sequence:	A8
Project Description:	Remove approximately 5 acres of trees that are obstructions to the Runway 12/30 airspace.
Project Justification:	An obstruction survey found man-made and natural growth objects to be obstructions to the FAR Part 77 airspace, thus action must be taken to remove, light, or lower the object to meet airspace standards.
Project Trigger:	Finding of No Significant Impact (FONSI) issued – expected in mid-2013, land acquisition, available funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$165,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding

---

Project Name:	Rehabilitate Runway 12/30, Taxiway, Secondary Apron
Project Sequence:	A9
Project Description:	Perform crack seal and/or seal coat of identified airport pavements
Project Justification:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The current pavement management program can be referenced for current pavement condition data.
Project Trigger:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The latest pavement management program can be referenced for pavement condition data.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA, obtain FAA environmental approval
Estimated Cost:	$268,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding

Project Name:	Groove Runway 12/30
Project Sequence:	A10
Project Description:	Apply pavement grooves in Runway 12/30 pavement
Project Justification:	Runway pavement grooving will remove standing water from the runway, thus allowing pilots claim less runway length during landing and aborted takeoff scenarios.
Project Trigger:	Available funding
Action Items:	Obtain FAA environmental approval, coordinate project eligibility with FAA, and coordinate project funding with MNDOT Aeronautics and FAA.
Estimated Cost:	$132,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding

Project Name:	Construct Parallel Taxiway, South Watershed Drainage Improvements
Project Sequence:	A11
Project Description:	Construct full-length parallel taxiway (2,400’ x 35) and associated drainage improvements including a 48-hour basin and outlet.
Project Justification:	A full-length parallel taxiway is needed to enhance the safety of the airport by minimizing runway occupancy times and separating traffic. Drainage improvements are necessary to treat and outlet stormwater for existing and future improvements including the new parallel taxiway.
Project Trigger:	Finding of No Significant Impact (FONSI) issued – expected in mid-2013, available funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$3,446,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Rehabilitate Primary Apron, Reconfigure Tie-Downs
Project Sequence:	A12
Project Description:	Mill & overlay primary airport apron pavement, install new tie-downs to meet recommended configuration.
Project Justification:	The existing primary aircraft apron pavement is expected to require major rehabilitation to adequately serve airport needs. A tie-down reconfiguration is recommended to provide taxilane access to future hangars.
Project Trigger:	Pavement Condition Index (PCI) rating of 55 or below, available funding
Action Items:	Obtain FAA environmental approval, coordinate project funding with MNDOT Aeronautics and FAA.
Estimated Cost:	$325,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Rehabilitate Hangar Area Pavement
Project Sequence:	A13
Project Description:	Perform crack seal and/or seal coat of hangar area pavements
Project Justification:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The current pavement management program can be referenced for current pavement condition data.
Project Trigger:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The latest pavement management program can be referenced for pavement condition data.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA, obtain FAA environmental approval
Estimated Cost:	$103,000
Funding Plan:	State Airport Development Funding, Federal Non-Primary Entitlement Funding

---

Project Name:	Conduct Wildlife Hazard Site Visit
Project Sequence:	B1
Project Description:	Perform a Wildlife Hazard Site Visit (WHSV) to determine if any wildlife hazards exist that require additional study and/or mitigation.
Project Justification:	FAA requires a WHSV to be completed for this category of airport within the next 5 years (2017).
Project Trigger:	FAA requirement
Action Items:	None
Estimated Cost:	$35,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Construct Terminal Area Fencing & Controlled Access Gates
Project Sequence:	B2
Project Description:	Construct approximately 1,700 linear feet of fence and three vehicular access gates
Project Justification:	Controlled access is needed to limit vehicles from accessing aircraft movement areas. Separate aircraft and vehicular traffic provides an enhanced level of airport safety and reduces the risk of an incident or accident.
Project Trigger:	Available funding, additional airport hangar development and/or investment.
Action Items:	Obtain FAA environmental approval
Estimated Cost:	$175,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Complete Runway Length Justification Report for 4,400 feet
Project Sequence:	B3
Project Description:	Complete airport user survey, collect documentation, and develop report to justify a runway extension to FAA.
Project Justification:	A justification report is needed to demonstrate to FAA that a runway extension is needed at the airport so the airport can compete for Federal funding.
Project Trigger:	Known operators of critical aircraft (i.e. Beechcraft King Air or larger) that may operate to the airport at least 500 annual itinerant operations each year within the next five years.
Action Items:	Monitor airport operations for additional traffic in critical aircraft that may warrant further study.
Estimated Cost:	$23,000
Funding Plan:	Local funding until the project is approved and related work begins, then Federal Non-Primary Entitlement Funding reimbursement

---

Project Name:	Conduct Environmental Assessment Study
Project Sequence:	B4
Project Description:	Examine potential environmental impacts associated with an extension of Runway 12/30 to 4,400 feet, an associated taxiway extension, airfield lighting upgrades, and an extension of Runway 5/23 to 2,300 feet.
Project Justification:	A comprehensive environmental review is necessary to meet National Environmental Policy Act (NEPA) requirements. The critical design aircraft during this time is expected to increase in size and use the airport at least 500 itinerant operations annually. This change in aircraft type recommends a runway extension to better meet FAA runway requirements for these aircraft types.
Project Trigger:	FAA approval of Runway Length Justification Report
Action Items:	None
Estimated Cost:	$154,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Construct East Taxilane Widening
Project Sequence:	B5
Project Description:	Construct additional pavement on the southwest and southeast portions of the existing hangar area to match the existing typical section, as well as construct drainage improvements.
Project Justification:	Taxiway widening is necessary to meet FAA Taxilane Object Free Area requirements from the existing T-hangar and proposed private hangar development.
Project Trigger:	Demand for private hangar in east hangar area
Action Items:	Obtain FAA environmental approval
Estimated Cost:	$162,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	East Hangar Site Preparation
Project Sequence:	B6
Project Description:	Complete rough grading for four hangar sites for development of private hangars
Project Justification:	Hangar site preparation is needed to provide for compatible development of private hangars in this area.
Project Trigger:	Demand for private hangar in east hangar area, East Taxilane Widening
Action Items:	None
Estimated Cost:	$40,000
Funding Plan:	State Airport Development Funding

Project Name:	Acquire Land for Runway 12/30 Extension
Project Sequence:	B7
Project Description:	Acquire approximately 27.5 acres of property in fee simple
Project Justification:	Land acquisition is required to acquire control over the Runway 12 and 30 Runway Protection Zone (RPZ), MNDOT Clear Zone and any FAR Part 77 obstruction removal areas.
Project Trigger:	Finding of No Significant Impact (FONSI), available funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$577,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Acquire Land for Runway 5/23 Extension
Project Sequence:	B8
Project Description:	Acquire approximately 12.4 acres of property in avigation easement
Project Justification:	Easement acquisition is required to acquire adequate land use and airspace control over the Runway 5 Runway Protection Zone (RPZ), MNDOT Clear Zone, and FAR Part 77 airspace.
Project Trigger:	Finding of No Significant Impact (FONSI) issued, available funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$244,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Design Runway 12/30, Taxiway, Lighting Runway 5/23 Extension
Project Sequence:	C1
Project Description:	Complete engineering design for proposed Runway 12/30, Runway 5/23 and Taxiway construction improvements.
Project Justification:	Engineering plans and specifications are needed to meet FAA and State airport design and bidding requirements for the proposed project. A separate design project is recommended due to the project size to maximize available funding.
Project Trigger:	Finding of No Significant Impact (FONSI) issued, available funding.
Action Items:	None
Estimated Cost:	$180,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Complete FAA AGIS Survey for Runway Approaches
Project Sequence:	C2
Project Description:	Complete survey of proposed new runway ends to FAA standards to update aeronautical data and publications. Aerial imagery and obstruction analysis will be collected for Runway 12/30 to update the instrument approach procedure.
Project Justification:	Any change in runway end data or new instrument approaches requires data to be submitted to FAA to AC 150/5300-18B standards.
Project Trigger:	Runway 12/30, Runway 5/23 Extension Design
Action Items:	None
Estimated Cost:	$114,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Runway Length Justification Study (Reimbursement)
Project Sequence:	C3
Project Description:	Receive reimbursement for previously completed and approved Runway Length Justification Study
Project Justification:	The Runway Length Justification Study is a project formulation cost that is eligible for FAA grant funding reimbursement. An approved study justifies funding.
Project Trigger:	Finding of No Significant Impact (FONSI) issued, project design funding.
Action Items:	None
Estimated Cost:	$20,700 (Federal Share)
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Construct Runway 12/30 Extension (400’)
Project Sequence:	C4
Project Description:	Construct an extension to Runway 30 (300’) and Runway 12 (100’)
Project Justification:	An extended runway is needed to safety accommodate the critical airplane types using and projected to use the airport.
Project Trigger:	Finding of No Significant Impact (FONSI) issued, project funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$387,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

---

Project Name:	Construct Taxiway Extension (400’), Lighting
Project Sequence:	C5
Project Description:	Construct an extension to the existing parallel taxiway to serve an extended Runway 12/30, construct related taxiway edge lighting and airfield guidance signs.
Project Justification:	An extended taxiway is needed to continue to provide a full-length parallel taxiway serving the runway ends at the airport. A full-length parallel taxiway is needed to enhance the safety of the airport by minimizing runway occupancy times and separating traffic.
Project Trigger:	Construct Runway 12/30 Extension project
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$279,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Replace Airfield Lighting (MIRL, REIL, PAPI, Beacon)
Project Sequence:	C6
Project Description:	Replace existing airfield lighting systems including the Medium Intensity Runway Edge Lights (MIRL) to Runway 12/30, the Runway End Identifier Lights (REIL), the Precision Approach Path Indicator Lights (PAPI), and the airport beacon, along with other necessary electrical improvements.
Project Justification:	The airfield lighting system was replaced in 1998 with new REILs installed in 2009. A lighting replacement is projected to be needed at this time. The typical useful life of a system is 20 to 25 years.
Project Trigger:	Construct Runway 12/30 Extension project
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$424,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Construct Runway 5/23 Extension
Project Sequence:	C7
Project Description:	Construct an extension to Runway 23 (300')
Project Justification:	An extended runway is needed to enhance safety accommodate the critical airplane types using and projected to use the runway.
Project Trigger:	Finding of No Significant Impact (FONSI) issued, project funding.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA
Estimated Cost:	$204,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Rehabilitate Runway 12/30, Taxiway, Apron Pavement
Project Sequence:	C8
Project Description:	Perform crack seal and/or seal coat of identified airport pavements
Project Justification:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The current pavement management program can be referenced for current pavement condition data.
Project Trigger:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The latest pavement management program can be referenced for pavement condition data.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA, obtain FAA environmental approval
Estimated Cost:	$333,000
Funding Plan:	Federal Non-Primary Entitlement Funding and/or State Apportionment Funding or Federal Discretionary Funding

Project Name:	Rehabilitate Hangar Area Pavement
Project Sequence:	C9
Project Description:	Perform crack seal and/or seal coat of hangar area pavements
Project Justification:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The current pavement management program can be referenced for current pavement condition data.
Project Trigger:	Existing pavements are expected to be in need of regular pavement maintenance is to preserve and extend the useful life pavement infrastructure. The latest pavement management program can be referenced for pavement condition data.
Action Items:	Coordinate project funding with MNDOT Aeronautics and FAA, obtain FAA environmental approval
Estimated Cost:	$109,000
Funding Plan:	State Airport Development Funding, Federal Non-Primary Entitlement Funding

---

Project Name:	Update Airport Master Plan
Project Sequence:	C10
Project Description:	Conduct Airport Master Plan study to evaluate the 20-year future of the airport
Project Justification:	An update to the Master Plan is needed approximately 10 to 15 years since previous Master Plan, or when existing Master Plan no longer meets the airport vision.
Project Trigger:	At this time the existing Master Plan would be more than 10 years old.
Action Items:	None
Estimated Cost:	$86,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	Construct West Hangar Site Taxilane
Project Sequence:	C11
Project Description:	Construct a 950’ x 35’ taxilane to serve future public and private hangar development area.
Project Justification:	A new hangar taxilane is needed to provide access to the identified T-hangar replacement site, T-hangar expansion area, and private hangar expansion area.
Project Trigger:	Existing T-hangar is within 5 years of replacement and/or demand for additional private hangar development.
Action Items:	Obtain FAA environmental approval.
Estimated Cost:	$304,000
Funding Plan:	Federal Non-Primary Entitlement Funding

Project Name:	West Hangar Site Preparation
Project Sequence:	C12
Project Description:	Complete rough grading for three hangar sites for development of private hangars
Project Justification:	Hangar site preparation is needed to provide for compatible development of private hangars in this area.
Project Trigger:	Demand for private hangar in west hangar area, West Hangar Site Taxilane
Action Items:	Coordinate funding plan with MNDOT Aeronautics, obtain necessary environmental approval.
Estimated Cost:	$123,000
Funding Plan:	State Airport Development Funding

Project Name:	Construct New Airport Entrance Road, Parking Lot, Drainage Improvements
Project Sequence:	C13
Project Description:	Construct a new 650’ x 25’ airport entrance road, expand automobile parking lot, construct east hangar site access road, reconfigure terminal area fencing & controlled access gates, construct necessary drainage improvements.
Project Justification:	A relocated airport entrance road is necessary to provide hangar expansion and maximize the existing terminal area space. Additional automobile parking will be necessary to be compatible with the entrance road to serve airport parking needs. An east hangar access road and fencing will provide secure access, separate vehicular traffic, and enhance airport safety.
Project Trigger:	Demand for future automobile parking and hangar development, obtain necessary environmental approval.
Action Items:	Coordinate project funding plan with MNDOT Aeronautics and FAA as certain project elements may not be fully eligible for grant funding.
Estimated Cost:	$507,000
Funding Plan:	Federal Non-Primary Entitlement Funding, State Airport Development Funding

---

Project Name:	Public 10-Unit T-Hangar Site Preparation – West Hangar Area
Project Sequence:	C14
Project Description:	Construct hangar site taxilanes and prepare site for construction of a 250’ x 60’ T-hangar building
Project Justification:	Site preparation for new hangar is needed to replace existing hangar that will be approaching the end of its useful life. New replacement hangar cannot be constructed at location of existing hangar due to proximity to Runway 12/30.
Project Trigger:	Existing T-hangar building approaching the end of its useful life.
Action Items:	Obtain necessary environmental approval
Estimated Cost:	$324,000
Funding Plan:	State Airport Development Funding

Project Name: Construct 10-Unit T-Hangar – West Hangar Area
Project Sequence: C15
Project Description: Construct a new 250' x 60' T-hangar building
Project Justification: New hangar is needed to replace existing hangar that will be approaching the end of its useful life. New replacement hangar cannot be constructed at location of existing hangar due to proximity to Runway 12/30.
Project Trigger: Existing T-hangar building at the end of its useful life, hangar site preparation complete
Action Items: Obtain necessary environmental approval
Estimated Cost: $832,000
Funding Plan: State Airport Development Funding (Hangar Loan)

Project Name: Demolish 8-Unit T-Hangar
Project Sequence: C16
Project Description: Demolish existing 240' x 35' T-hangar building located in east hangar area.
Project Justification: Building demolition is needed because hangar would be at the end of its useful life and hangar is an airspace obstruction.
Project Trigger: Completion of new 10-Unit T-Hangar in west hangar area, favorable environmental determination issued.
Action Items: Obtain necessary environmental approval.
Estimated Cost: $58,000
Funding Plan: Federal Non-Primary Entitlement Funding

Project Name: Reconstruct Hangar Area Pavement
Project Sequence: C17
Project Description: Reconstruct pavement and base in east hangar area to configuration identified in ALP.
Project Justification: The existing east hangar area pavement is expected to require major rehabilitation to adequately serve airport needs. The pavement receives annual crackseal maintenance. A reconfiguration is necessary to fit with new hangar development.
Project Trigger: Pavement Condition Index (PCI) rating of 55 or below, available funding, need for replacement T-hangar in near-term.
Action Items: Obtain FAA environmental approval, coordinate project funding with MNDOT Aeronautics and FAA.
Estimated Cost: $832,000
Funding Plan: Federal Non-Primary Entitlement Funding, State Apportionment Funding

---

Project Name: Construct 10-Unit T-Hangar
Project Sequence: C18
Project Description: Demolish existing 240' x 35' T-Hangar in east hangar area; construct a new 250' x 60' T-hangar building at same location.
Project Justification: New hangar is needed to replace existing hangar that will be approaching the end of its useful life.
Project Trigger: Existing T-hangar building at the end of its useful life, hangar area pavement reconstruction project complete
Action Items: Obtain necessary environmental approval
Estimated Cost: $900,000
Funding Plan: State Airport Development Funding (Hangar Loan)

Project Name: Construct Apron Expansion
Project Sequence: C19
Project Description: Construct 185' x 65' expansion of aircraft parking apron with three aircraft tie-downs
Project Justification: Aviation activity forecasts project the need for additional transient aircraft parking space that cannot be accommodated in the existing apron.
Project Trigger: Aviation activity approaching 14,000 annual operations or observed limited tie-down space during peak activity.
Action Items: None
Estimated Cost: $166,000
Funding Plan: Federal Non-Primary Entitlement Funding

Project Name: Rehabilitate Runway 12/30, Partial Parallel Taxiway, Apron Pavement
Project Sequence: C20
Project Description: Mill & overlay primary runway, taxiway and apron pavements.
Project Justification: The existing identified airfield pavements are expected to require major rehabilitation to adequately serve airport needs.
Project Trigger: Pavement Condition Index (PCI) rating of 55 or below, available funding.
Action Items: Obtain FAA environmental approval, coordinate project funding with MNDOT Aeronautics and FAA.
Estimated Cost: $1,348,000
Funding Plan: Federal Non-Primary Entitlement Funding, State Apportionment Funding

---

Exhibit 5-1, Recommended Development Cost

Sequence	Federal	State	Local	Total
Short-Term	$4,859,400	$260,000	$662,200	$5,775,000
Mid-Term	$992,000	$39,250	$165,550	$1,166,000
Long-Term / Ultimate	$4,741,794	$1,026,010	$980,708	$6,729,000
TOTAL	**$10,593,894**	**$1,325,260**	**$1,808,458**	**$13,670,000**

NOTE: Costs in Fiscal Year 2012 Dollars. Major airport capital improvement projects shown. Project sequence is subject to change based on changes in local priority or funding availability.

ENVIRONMENTAL

ENVIRONMENTAL PROCESS

This chapter provides an overview of environmental conditions and issues at RWF and the immediate vicinity. The review is organized according to the National Environmental Policy Act (NEPA) checklist, but does not meet the full analytical and procedural requirements associated with the NEPA process. Appropriate NEPA documentation in accordance with Federal Aviation Administration (FAA) Order 5050.4B, *NEPA Instructions for Airport Actions*, and FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, needs to be conducted prior to commencing with future projects. A NEPA Environmental Assessment document and process has been completed covering five-year improvements to the RWF. Longer term improvement actions will require additional NEPA review for actions funded with Federal dollars. The following environmental documentation is required for utilizing federal grant funds on airports:

- Categorical Exclusion (CATEX). This documentation is used for actions that have a very low potential for environmental impacts. Typical projects that can be covered by a CATEX include planning projects and standard, low-impact development projects such as pavement rehabilitation or lighting replacement. Documentation required includes the completion of a checklist and supporting information as needed certifying that the project will not exceed applicable environmental impact thresholds.

- Environmental Assessment (EA). Typical projects that require an EA are those that are not categorically excluded (see above) and include significant development actions, land acquisition, and runway extensions. Extraordinary circumstances such as impacts to wetlands, historical properties, or floodplains will also trigger the need to complete an EA. Documentation required includes a more comprehensive environmental review of the proposed action and the potential for impacts resulting from the project. Public and agency review is an important part of the EA process. The primary purpose of the EA is to determine if a full Environmental Impact Statement (EIS) is required. If the result of the EA process is a Finding of No Significant Impact (FONSI) as issued by FAA, an EIS is not required. A FONSI is typically valid for three years.

- Environmental Impact Statement (EIS). This is the most comprehensive level of environmental analysis in the NEPA program. Projects that require an EIS include those that will have significant impacts as determined in the EA process. There are also mandatory EIS categories defined in State statuts, such as the construction of a new paved runway of 5,000 feet or greater, that can require preparation of a State EIS. A State EIS could be necessary in addition to environmental review under Federal NEPA requirements. A Record of Decision (ROD) is produced at the end of the process in support of the Final EIS. The EIS is valid for a period of three years.

IMPACT CATEGORY OVERVIEW

The following information includes information from the 2010 RWF Master Plan, updated as appropriate with information from work performed during the 2011-2013 Environmental Assessment process.

AIR QUALITY

There are two components to air quality, the Clean Air Act (CAA) and National Environmental Policy Act (NEPA). The CAA established six criteria pollutants and required the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for these criteria pollutants.

Projects located in nonattainment or maintenance areas may require a conformity determination.

NEPA requires the consideration of a proposed project's impact to local air quality. General Aviation airports with more than 180,000 forecasted operations have the potential to negatively impact air quality.

Redwood Falls is not part of a nonattainment or maintenance area for any of the six pollutants identified by the EPA. Approximately 10,000 operations were estimated in 2012 and airport operations are projected to reach over 14,000 in 2032. Airport development will not have a measureable impact on air quality and a NEPA air analysis is not required for the site.

BIOTIC RESOURCES

Biotic resources are those flora and fauna which are present in a particular area. Biotic communities include rivers, lakes, wetlands, forests, upland communities, and other habitat types supporting flora, and aquatic and avian fauna. The Airport is located in the Minnesota River Prairie Subsection of the North Central Glaciated Plains Ecological Section in the Minnesota DNR's Ecological Land Classification Program. Pre-settlement vegetation was primarily tall grass prairie, with many islands of wet prairie. Currently, agriculture is the dominant land use. DNR information indicates that upland prairie species are common throughout most of the Subsection.

The Airport is largely surrounded by cultivated cropland, roadways, and urban and/or residential development. The flora, fauna, and habitat associated with these areas are typical of such areas in this part of Minnesota. As is discussed further under the Wetlands heading, there is a series of wetlands bounded by the Airport, urban development, and County State Aid Highway 101, and one wetland area just north of Runway 30. Based on information provided by the Minnesota Department of Natural resources, the wooded area northeast of the Airport is a mesic hardwood forest which includes Bur Oak, Green Ash, Elm, and other common species.

The Preferred Alternative is not anticipated to have significant impacts on flora, fauna, and their habitat. The 2013 EA concluded that there would not be significant impacts to biotic resources. It is possible, with the extension of Runway 5/23 on its alignment to the northeast that additional tree removal will be required relative to what was addressed in the 2013 EA. These additional removals would be limited and would likely not change the finding of the EA relative to biotic resources.

COASTAL RESOURCES

Barrier islands are geologically unstable formations and cannot support development. However, they protect the mainland by buffering storm or hurricane-driven winds or waves. These islands are protected under the Coastal Barrier Resources Act of 1982, as amended by the Coastal Barrier Improvement Act of 1990. No improvements at RWF would involve coastal barriers.

Coastal Zones are those waters and their bordering areas in states along the coastlines of the Atlantic and Pacific Oceans, the Gulf of Mexico, and the shorelines of the Great Lakes. These areas are protected under the Coastal Zone Management Act. No improvements at RWF would involve any Coastal Zones.

COMPATIBLE LAND USE

As identified in FAA's *Environmental Desk Reference for Airport Actions* (2007), the compatibility of existing and planned uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Refer to the previous discussion for more information on airport noise (no impacts anticipated with any of the alternatives).

Besides the effects of noise, the compatibility of land uses also evaluates surrounding uses to protect pilots, and persons and property on the ground near airports. FAA has established land use standards in the form of a Runway Protection Zone (RPZ). An RPZ area is designed to enhance protection of persons and property on the ground in the vicinity of the runway approach. Land uses prohibited in the RPZ include residences and places of public assembly (i.e. churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons). Based on 2012 Interim guidance, if the RPZ dimensions or location change, or if there is a local development proposal, FAA coordination is required for specific land uses including public roads or other development.

MNDOT Office of Aeronautics has developed Clear Zones (CZ) standards which are adopted as part of department policy. These dimensions match or are greater than the RPZ areas defined by FAA. MNDOT Aeronautics policy expects the CZ to be acquired in fee title to continue to receive airport development funding.

Additionally, MNDOT Office of Aeronautics has established minimum standards for airport safety zoning at public airports in the state, consistent with Minnesota Rules Chapter 8800. An airport zoning ordinance is required to be established by the local unit (s) of government located within the three land use safety zones to protect the airport from incompatible land uses. An airport safety zoning ordinance also protects airspace from incompatible object heights around airports.

EXISTING LAND USE

The Airport property is surrounded by a mix of agricultural crop production, forested, residential, commercial and industrial land uses. Part of this land is located in city limits. The rest extends into Redwood County and Renville County within two miles of airport property.

North of the airport includes low density residential and wooded areas. Immediately east of the airport is a ravine with associated environmental features. The land to the southwest of the crosswind runway (Runway 5 approach & RPZ) includes three industrial buildings, automobile parking and associated uses that are not compatible. These types of uses are not allowed within Land Use Safety Zone A and inconsistent with RPZ guidelines. These land uses have been allowed to remain and are considered non-conforming land uses. Any expansion that would place the property in further nonconformance would be prohibited.

Surrounding roadways that affect the ability for Runway 12/30 to expand is Highway 19/71 to the south, County Highway101 to the west, Ponderosa Road to the north/northwest. A portion of these roadways are within the Runway 12 and 30 RPZ.

FUTURE CITY/COUNTY DEVELOPMENT

Future off-airport development has the potential to affect safe airport operations. Areas surrounding the Airport are located outside the jurisdiction of Redwood Falls and within the boundaries of Honner and Paxton Township in Redwood County, as well as across the Minnesota River into Beaver Falls Township in Renville County. The City of Redwood Falls, Redwood County and Renville County have adopted airport zoning ordinances, comprehensive plans and local zoning ordinances to guide and manage existing and future land uses.

Each unit of government's adopted comprehensive plans and local zoning ordinances allow for the potential siting of uses that may be incompatible with existing or future airport operations. Airport safety zoning essentially places additional zoning requirements on properties within the airport's proximity.

Where airport safety zones and local zoning requirements conflict, the more restrictive requirements will be enforced. As individual development proposals are presented, each unit of government will need to closely coordinate with one another and the airport sponsor to ensure incompatibilities with safe airport operations do not result.

FUTURE AIRPORT DEVELOPMENT

The Preferred Alternative includes a 100 foot extension of Runway 12, a 300 foot extension of Runway 30, and a 300' extension of Runway 23. Highways are currently located in the respective RPZ of each runway end. Extending Runway 30 will place an increased portion of Highway 19/71 in the RPZ, and the roadway will be closer to the runway pavement. Extending Runway 12 will place an increased portion of Ponderosa Road and County Highway 101 within the RPZ.

Prior to the extension of Runway 12 and 30, an RPZ Alternatives Analysis will need to be completed to evaluate alternative designs that would limit the encroachment of roadways in the RPZ. Extending Quality Drive through the Runway 5 RPZ would also trigger an RPZ Alternatives Analysis. This effort will require coordination between the Airport Sponsor and FAA staff. Highlights of the Alternative Analysis process include:

- Cost estimates for all alternatives
- Practicability assessment (cost, constructability, other factors)
- Identification of Preferred Alternative that would meet the purpose and need while minimizing risk associated with location in the RPZ
- Analysis of the specific portion (s) and percentages of the RPZ affected, distinguishing between the Central Portion of the RPZ versus the Controlled Activity Area
- Analysis of (and issues affecting) sponsor control of the land within the RPZ
- Other considerations appropriate to each case

A preliminary evaluation was completed in the Alternatives section of this ALP Update. If the roadway relocation is supported with federal funding, associated NEPA environmental evaluation and documentation will be required.

As required by MNDOT Aeronautics, airport zoning will need to be updated to protect for the existing and ultimate runway configuration as identified in the Preferred Alternative at RWF. To improve consistency and ensure a Commissioner's Order is issued approving the amended Airport Zoning Ordinance, a multi-jurisdictional effort to adopt one ordinance for all jurisdictions in the airport proximity is recommended. Airport zoning is essential to protect the funding provided to operate the airport. It also protects RWF for the future airport configuration regarding safe flight operations as well as the health and safety of people and land uses on the ground.

CONSTRUCTION IMPACTS

Airport construction may cause various short-term environmental effects primarily due to dust, equipment emissions, storm water runoff, and noise. All airport development construction projects need to comply with FAA AC 150/5370-10A, *Standards for Specifying Construction for Airports* to minimize any impacts and follow all applicable regulations. Such regulations include National Pollution Discharge Elimination (NPDES) construction permitting to limit the potential for stormwater impacts during construction. This compliance would involve the use of best management practices (BMPs) during construction activities.

SECTION 4(F)

Section 4(f) is part of the Department of Transportation Act which states that the Secretary of Transportation will not approve any project that requires the use of publicly owned land from a public park, recreation area, wildlife and waterfowl refuge, or historic site that is of national, state, or local significance, if there is a feasible and prudent alternative.

The closest recreational park is the Richard Sears Memorial Park approximately 0.5 mile east of the Airport. The closest wildlife area is the Tiger Lake Wildlife Management Area approximately 1.5 miles northeast of the Airport. A recreational bike trail located on the west side of County Highway 101 is located within the Runway 12 approach. Acquiring land and removing a few selected trees was determined to have a *De minimus* impact by FAA. The Preferred Alternative is not anticipated to have impacts to these or other Section 4(f) resources.

SECTION 6(F)

Section 6 (f) of the Land and Water Conservation Fund Act (LWCFA) concerns transportation projects that propose impacts, or the permanent conversion, of outdoor recreation property that was acquired or developed with LWCFA grant assistance. Section 6 (f) of the act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the Department of Interior's National Park Service (NPS). Section 6(f) directs the NPS to assure that replacement lands of equal value, location and usefulness are provided as conditions to approval of land conversions. Therefore, where a Section 6(f) land conversion is proposed for a transportation project, replacement land will be necessary, and the NPS's position on the land transfer must be documented. The closest 6(f) property is the Honner State Wildlife Management Area, located over 3,000 feet northeast of the Airport. The Preferred Alternative is not anticipated to impact this or any other 6(f) resources.

ENDANGERED SPECIES

According to the Endangered Species Act of 1973, an endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or significant portion of its range. Section 7 of the Endangered Species Act, as amended, requires each federal agency to insure that no future action will jeopardize the continued existence of any endangered or threatened species.

Based on information on the U.S. Fish and Wildlife Service website, the only federally listed Threatened, Endangered, Proposed, or Candidate species in Redwood County or Renville County is Prairie Bush-Clover (*lespedeza leptostachya*, a Threatened Species). The habitat for this species is tall grass prairie. The Preferred Alternative will not impact any open prairie areas, thus no Prairie Bush-Clover impacts are anticipated. During the 2013 EA process for the five-year Airport improvement projects, the Minnesota Department of Natural Resources opined that the project would not adversely affect any known occurrences of rare features. The Preferred Alternative identified in this ALP is not anticipated to have significantly more potential for impacts to rare species than the improvements covered in the 2013 EA.

ENERGY, NATURAL RESOURCES, AND SUSTAINABLE DESIGN

Airport development actions have the potential to change energy requirements or use consumable natural resources. In NEPA documentation for airport projects must evaluate potential impacts on supplies of

energy and natural resources needed to build and maintain airports. FAA policy supports developments that promote environmental sustainability.

Implementation of the Preferred Alternative will not place excessive demands on local existing or planned power utility systems. Scarce or unusual materials would not be required to build or maintain any of the alternatives. Implementation of the Preferred Alternative will not induce significantly large enough increases in aircraft operations such that aviation fuel consumption would be substantially increased.

ENVIRONMENTAL JUSTICE

Environmental Justice considers the potential of Federal actions to cause disproportionate and adverse effects on low-income or minority populations. Based on evaluation done in the 2013 EA and the general location of the airport, it is not anticipated that the Preferred Alternative would cause Environmental Justice impacts.

FARMLANDS

Farmland Protection Act (FPPA) of 1984 creates the statutory framework for considering important farmlands in Federal decisions. Important farmlands include all pasturelands, croplands, and forests (even if zoned for development) considered to be prime, unique, or statewide or locally important lands. Coordination with the Natural Resource Conservation Service (NRCS) of the United States Department of Agriculture (USDA) is required to determine if impacts will be significant.

For the 2011 Master Plan, a Farmland Conversion Impact Rating Form (AD-1006) was completed jointly with the NRCS to determine the potential for impact on farmlands resulting from the Preferred Alternative. If the combined score on the site assessment is below 160 total points, this signifies no further investigation or action regarding farmlands is required per NRCS guidelines. Total points assessed in the Master Plan for the Preferred Alternative fell below this threshold.

FLOODPLAINS

Floodplains are defined in Executive Order 11988, *Floodplain Management*, as:

> *"…the lowland and relatively flat areas adjoining inland and coastal water including flood prone areas of offshore islands; including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year."*

This definition refers to any area that would be inundated with floodwaters from a 100-year flood. According to the Federal Emergency Management Act (FEMA) 100- and 500-year Floodplain Maps for the City of Redwood Falls, the Preferred Alternative would not have floodplain impacts.

HAZARDOUS MATERIALS

Federal, State, and local laws regulate the use, storage, transport, and disposal of hazardous materials. Liability associated with these laws may extend to past and future landowners of properties contaminated with these materials. In addition, disrupting sites containing hazardous materials or contaminants may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. Airport sponsors purchasing or developing land for airport purposes may encounter hazardous materials contamination. Known information regarding hazardous sites or materials that may affect the proposed action need to be disclosed and evaluated in NEPA documentation.

Based on a review of the Minnesota Pollution Control Agency's database regarding contaminated properties, construction of the Preferred Alternative will not disturb any known contaminated areas.

Prior to acquisition in fee title by an airport sponsor of a parcel or parcels for an airport projects using federal funding, FAA recommends that an Environmental Due Diligence Audit (EDDA) be performed using the procedures and methodologies identified in ASTM 1527-05 (*Standard Practice for Site Assessments: Phase I Environmental Site Assessment Process*). An EDDA includes a more detailed review of an area, relative to NEPA-level review, for the possible presence of environmental contamination. It includes a site visit, owner/operator interview, and more extensive environmental records review than typically done for NEPA documentation. An EDDA was prepared for the properties proposed to be acquired under the 2013 EA for the Airport. This work identified no known environmental contamination on the acquisition parcels or on adjacent properties. For property acquisition required for development of the ALP Preferred Alternative beyond the limits of the 2013 EA, another EDDA (s) should be performed.

HISTORIC AND ARCHEOLOGICAL

Section 106 of the National Historic Preservation Act, as implemented through 36 CFR Part 800, requires Federal agencies to consider the effects of their undertakings on historic properties. A "Historic Property" is "any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places maintained by the Secretary of the Interior." To qualify, properties must meet the criteria of eligibility under 36 CFR Section 60.4.

A Section 106 evaluation, including field sampling and review, was performed as part of the 2013 EA. The determination was "no historic properties affected." The State Historic Preservation Office (SHPO) concurred with this determination. As identified in the 2010 RWF Master Plan, there are no known archaeological or historic sites that would be affected by the construction of the five-year Preferred Alternative. However, for project areas beyond the limits of the 2013 EA, further Section 106 review will be required to confirm no impacts if federal funding and/or permits are involved.

INDUCED SOCIOECONOMIC

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
- Other factors identified by the public

It is not anticipated that any of the alternatives evaluated in this Master Plan would have induced socioeconomic impacts.

LIGHT EMISSIONS AND 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 uses. Visual effects deal broadly with the extent to which airport development contrasts with the existing environment, architecture, historic or cultural setting, or land use planning. There are no Federal statutory or regulatory requirements for adverse light emission or other visual effects. Therefore, the assessment of these types of impacts involves subjectivity.

Since the Preferred Alternative will lengthen the runway and bring the runway ends closer to receptors, the potential for light emission impacts will need to be reviewed in associated NEPA documentation. Lighting associated with proposed new buildings in the terminal/hangar area would also need to be reviewed. Significant impacts are not anticipated.

NOISE

Aircraft sound emissions are often the most noticeable environmental affect an airport will produce on the surrounding community. If the sound is sufficiently loud or occurs too frequently, it may interfere with various activities or be considered objectionable. The basic measure of noise is the sound pressure level that is recorded in decibels.

The FAA does not require a noise analysis if the proposed project involves Design Group I and II airplanes in Approach Categories A through D operating at airports whose forecasted operations do not exceed 90,000 annual propeller operations or 700 annual jet operations. An airport experiencing these or smaller operations levels normally result in a 65 decibel contour area covering less than 0.5 square miles and extending no more than 10,000 feet from the start of a takeoff roll. As operational levels at RWF are forecasted to remain well below this level, noise will not be required based on current guidelines.

SOCIAL IMPACTS

Projects must be evaluated to ensure that no impacts to the "human environment" which may be triggered by moving homes and businesses, dividing or disrupting established communities, changing surface transportation patterns, disrupting planned development, or employment.

It is not anticipated that construction of the Preferred Alternative would require residential or business relocations beyond the residential relocation identified and addressed in the 2013 EA.

SOLID WASTE

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 Environmental Assessment does not include hazardous waste, which is more rigorously regulated. Hazardous materials are covered under a separate heading in this chapter.

The construction activities associated the Preferred Alternative will not require unusual techniques or waste products. Solid waste generated at the airport during and after construction activities would need to be disposed of in accordance with applicable regulations.

WATER QUALITY

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, establishes the authority to define water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, and issue permits for discharges. Water quality concerns related to airport development are most often associated with increased impervious surface runoff, as well as erosion and pollution from fuel, oil, solvents, and deicing products. Runway and aircraft deicing products are not used at the Airport. A National Pollution Discharge Elimination System (NPDES) permit is required for any airport development disturbing at least one (1) acre. NPDES

requirements call for control through constructing basins for developments with one acre or more of new impervious surface. These must drain within 48-hours to meet FAA wildlife attractant requirements. Major existing airport drainage ways include an earth dam to the northwest of the airport and a ravine to the northeast. A stormwater basin is located on-airport to the northeast of the Runway 12 end. This basin ultimately conveys treated stormwater from the north watershed through an earth dam to the north across Ponderosa Road and out to the Minnesota River basin. The ravine to the northeast serves the northeast watershed and ultimately drains to the Minnesota River basin. The south watershed does not have a drainage outlet. A full drainage study was completed in 2007 and updated in 2012.

The 2012 EA identified the drainage improvements required for planned five-year actions at RWF. These included the construction of a five acre (approximate) detention basin west of the runway intersection, as well as buried conveyance piping generally along the southwest and south border of airport property draining to a buried pipe adjacent to County Highway 1. This pipe would then drain to County Ditch 52 approximately 0.4 mile south of Highway 19/71. The conveyance system identified in the EA was sized to be able to accommodate 20 year development including the runway extension to 4,400 feet and long-term hangar/terminal development. Prior to construction of the Preferred Alternative beyond the EA actions, ponds and other connections between the new buildings and pavements and the conveyance system defined in the EA will need to be considered in future NEPA documentation.

WETLANDS

Wetlands are defined in Executive Order 11990, Protection of Wetlands, as "those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. Wetlands also include estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation.

Federal Law, Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act protect wetlands. These laws mandate the "no net loss" of wetland functions and values; and require that projects seek to avoid, minimize, and mitigate any potential impacts (referred to as sequencing).

The 2013 EA identified wetlands on the airport. Most of these are located west of runway 12/30 and north of Runway 5/23. The five-year actions will not impact the wetlands identified in the EA. Based on available information, it is not anticipated that the extension of Runway 12/30 and the hangar/terminal development associated with the Preferred Alternative will have wetland impacts. It is possible that shifting Runway 5/23 to the northeast could impact probable wetland areas identified in the EA analysis. While the development of the Preferred Alternative is not anticipated to involve substantial wetland issues, further wetland review will be required as part of the future NEPA documentation.

Exhibit 6-1, National Wetlands Inventory

Source: National Wetlands Inventory (NWI)

WILD AND SCENIC RIVERS

Designated Wild and Scenic Rivers have remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values as determined by the federal government. The National Park Service (NPS) has the primary role in maintaining the rivers covered under the Wild and Scenic Rivers Act. These rivers must be maintained for their scenic and recreational value.

The Minnesota River in the vicinity of the Airport is classified as Scenic in the Minnesota Department of Natural Resource's Wild and Scenic Rivers Program. However, it is over a mile from the Airport, and implementation of the Preferred Alternative will not impact this resource.

SUMMARY

As addressed in Section 4 of this Master Plan, the avoidance of environmental impacts as defined under the National Environmental Policy Act of 1969 (NEPA) was an important goal in the selection of the Preferred Alternative. This section has summarized the environmental issues to be considered and addressed as appropriate in the implementation of the Preferred Alternative. In general, there do not appear to be any unique ecological or physical challenges regarding the implementation of the Preferred Alternative. The most substantial issue is likely to be land use compatibility, including conducting an FAA RPZ Alternatives Analysis as well as significant administrative zoning actions. Any improvement actions funded with federal dollars associated with the Preferred Alternative will require more detailed NEPA analysis and documentation prior to final design and construction. This includes new terminal area development and planned runway extensions.

Appendix A

AIRPORT USER SURVEY – REDWOOD FALLS MUNICIPAL AIRPORT (RWF)

The Redwood Falls Municipal Airport is conducting an Airport Layout Plan (ALP) update for the airport facility. This study will analyze the existing and future usage and facility needs anticipated at the airport. The city is conducting a User Survey for airport planning purposes. You have been identified as a recipient of this user survey as either a current user or potential future user of the airport.

The Redwood Falls Municipal Airport (RWF) currently has a paved primary Runway 12-30 (4,000' x 100'), and a turf Runway 05-23 (2,050' x 200'), 16 reported based aircraft, and nearly 10,000 annual operations.

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 RWF. Please indicate any airport improvements you desire or require to operate safety from RWF.

Your detailed input is **very important** to the accuracy and viability of this study for RWF. We request that you please complete the survey online at the following address by **August 31st, 2012**: https://www.surveymonkey.com/s/2012RedwoodFallsAirport-usersurvey. If you choose to complete the paper version, please return it to the address below. Any questions regarding the survey should be directed to:

Jim Doering, Public Works Project Coordinator
City of Redwood Falls
333 Washington Street South; P.O. Box 10
Redwood Falls, MN 56283
Phone (507) 637-5755
Email: jdoering@ci.redwood-falls.mn.us

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

   Yes_____ No_____

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

   Recreational (percentage of operations at Redwood Falls) _____%

   Business (percentage of operations at Redwood Falls) _____%

   Use Redwood Falls Municipal on a transient basis – Aircraft is based elsewhere (indicate airport)

   Yes_____ No_____

   Where is/are your aircraft based? _____

   Please explain your business/personal air transportation needs:

   Currently:_____

   _____

   Future:_____

   _____

   _____

2. Please complete the following table about your aircraft operations to and from Redwood Falls Municipal Airport. Given the current primary paved runway length of 4,000 feet is maintained, what types of aircraft and number of operations has your firm used or have a high probability of occurring for travel to/from the Redwood Falls area? A takeoff and a landing are 2 operations (consider touch-and-go's as well). If you operate to any alternative airports (i.e. Marshall) for travel to the Redwood Falls area, please indicate.

   NOTE: If your firm or company attracts aviation activity to Redwood Falls, please indicate estimated airport operations as well.

Aircraft Name, Model	Airport	Number of Annual Operations		Projected Number of Annual Operations	
		2008	2011	2014	2017

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, etc.) of your aircraft on an 85 degree day, 1023' 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 Redwood Falls Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redwood Falls Municipal and fly to an alternative airport, please indicate why.

   _____

5. Is the current paved primary Runway 12-30 (4,000' x 100') at Redwood Falls a limiting factor to your operations?

   Yes_____ No_____

Please Return by August 31, 2012

6. Would your aircraft operations at Redwood Falls Municipal benefit from and/or require a runway extension to 4,400 feet in the next 5 years?

Yes_____ No_____

If a runway extension were constructed at Redwood Falls, how would the extension benefit your future operations at Redwood Falls Municipal (i.e. allow for safer operations, new aircraft type, allows for increased weight & fuel loads, eliminate previous limitations, etc.):

_____

_____

7. Do you utilize the turf Runway 5-23 at Redwood Falls Municipal Airport?

Yes_____ No_____

If yes, please list your annual operations:_____

8. Are there any other airport facilities that prevent you from operating to/from Redwood Falls Municipal Airport (i.e. fuel, hangar availability, parallel taxiway)?

Yes_____ No_____

If yes, please explain:

_____

_____

9. What percentage of your flight operations within a 20 mile radius of Redwood Falls Municipal Airport

_____%

10. Please rank the adequacy of the facilities at Redwood Falls Municipal Airport.

	Excellent	Good	Fair	Poor	N/A
Terminal Building					
Hangar Facilities					
Runways					
Runway Approaches					
Fixed-Base Operator (FBO)					

Comments: _____

_____

Please Return by August 31, 2012

Please indicate the importance of the following upgrades for your future use of the Redwood Falls Municipal Airport?

	Extremely Important	Somewhat Important	Not Important
Runway 12-30 Extension			
Parallel Taxiway			
Private Hangar Sites			
Public Aircraft Storage			

Comments: _____

_____

11. Please rate your overall impression of the Redwood Falls Municipal Airport.

	Extremely Satisfied	Satisfied	Neutral	Dissatisfied	Extremely Dissatisfied
Impression					

12. What do you like most about the Redwood Falls Municipal Airport:

_____

_____

13. What do you like the least about the Redwood Falls Municipal Airport:

_____

_____

14. Please provide any additional comments about the long-term development of the Redwood Falls Municipal Airport:

_____

_____

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

Name: _____

Company/Affiliation: _____

Address: _____

_____

Phone: _____

E-mail: _____

16. May we contact you with any specific questions about this user survey? Yes_____ No_____

The Redwood Falls Municipal Airport Commission and the City of Redwood Falls thank you for completing this Airport User Survey!

Please Return by August 31, 2012

Airport User Survey-Redwood Falls Municipal Airport (RWF)

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

		Response Percent	Response Count
Yes		**83.3%**	**5**
No		16.7%	1
		answered question	**6**
		skipped question	**0**

2. Please indicate your percentage of operation at the Redwood Falls Municipal Airport.

	1-20%	21-40%	41-60%	61-80%	81-100%	Do not use this Airport	Response Count
Recreational	25.0% (1)	0.0% (0)	0.0% (0)	0.0% (0)	**75.0% (3)**	0.0% (0)	4
Business	33.3% (1)	0.0% (0)	0.0% (0)	0.0% (0)	**66.7% (2)**	0.0% (0)	3
						answered question	**5**
						skipped question	**1**

3. I use the Redwood Falls Municipal Airport on a transient basis (my aircraft is based elsewhere).

		Response Percent	Response Count
Yes		**80.0%**	**4**
No		20.0%	1
		answered question	**5**
		skipped question	**1**

4. Where is/are your aircraft based?

	Response Count
	6
answered question	6
skipped question	0

5. Please explain your business/personal air transportation needs at present time.

	Response Count
	4
answered question	4
skipped question	2

6. Please explain your anticipated business/personal air transportation needs for the future.

	Response Count
	3
answered question	3
skipped question	3

7. Please indicate your aircraft name/make and model.

	Response Count
	5
answered question	5
skipped question	1

8. Number of Annual operations from Redwood Falls in

	Response Percent	Response Count
2008	**100.0%**	**4**
2011	**100.0%**	**4**
	answered question	**4**
	skipped question	**2**

9. Number of projected annual operations from Redwood Falls in

	Response Percent	Response Count
2014	**100.0%**	**4**
2017	**100.0%**	**4**
	answered question	**4**
	skipped question	**2**

10. Takeoff weight requirement for your aircraft.

	Response Percent	Response Count
Up to 2,500 pounds	0.0%	0
2,501-5,000 pounds	20.0%	1
5,001-12,500 pounds	**80.0%**	**4**
12,501 or greater	0.0%	0
	answered question	**5**
	skipped question	**1**

11. Runway length requirement for your aircraft.

	Response Percent	Response Count
0-2,000 feet	0.0%	0
2,001-2,912 feet	0.0%	0
2,913-3,500 feet	**60.0%**	**3**
3,500 feet or longer	40.0%	2
	answered question	**5**
	skipped question	**1**

12. Do you fly this aircraft to an alternative airport instead of Redwood Falls?

	Response Percent	Response Count
Yes	0.0%	0
No	**100.0%**	**5**
	If yes, name of airport and number of annual operations:	0
	answered question	**5**
	skipped question	**1**

13. Do you operate any other aircraft to/from the Redwood Falls Municipal Airport?

	Response Percent	Response Count
Yes	16.7%	1
No	**83.3%**	**5**
	answered question	**6**
	skipped question	**0**

14. Please indicate your aircraft name/make and model as well as location of airport where aircraft is located.

	Response Count
	1
answered question	1
skipped question	5

15. Number of annual operations from Redwood Falls in

	Response Percent	Response Count
2008	100.0%	1
2011	100.0%	1
answered question		1
skipped question		5

16. Number of projected annual operations from Redwood Falls in

	Response Percent	Response Count
2014	100.0%	1
2017	100.0%	1
answered question		1
skipped question		5

17. Takeoff weight requirement for your aircraft.

	Response Percent	Response Count
Up to 2,500 pounds	0.0%	0
2,501-5,000 pounds	0.0%	0
5,001-12,500 pounds	**100.0%**	**1**
12,501 or greater	0.0%	0
	answered question	**1**
	skipped question	**5**

18. Runway length requirement for your aircraft.

	Response Percent	Response Count
0-2,000 feet	0.0%	0
2,001-2,912 feet	0.0%	0
2,913-3,500 feet	0.0%	0
3,500 feet or longer	**100.0%**	**1**
	answered question	**1**
	skipped question	**5**

19. Do you fly this aircraft to an alternative airport instead of Redwood Falls?

	Response Percent	Response Count
Yes	0.0%	0
No	0.0%	0
If yes, name of airport and number of annual operations:	**100.0%**	**1**
answered question		**1**
skipped question		**5**

20. Do you or your company utilize or benefit from general aviation at the Redwood Falls Municipal Airport (i.e. close to clients, fly to/from business, etc.)?

	Response Percent	Response Count
Yes	**66.7%**	**4**
No	33.3%	2
Please explain:		3
answered question		**6**
skipped question		**0**

21. Is the current paved primary Runway 12-30 (4,000' X 100') at Redwood Falls a limiting factor to your operations?

	Response Percent	Response Count
Yes	16.7%	1
No	**83.3%**	**5**
If yes, why is it a limiting factor?		1
answered question		**6**
skipped question		**0**

22. Would your aircraft operations at Redwood Falls Municipal benefit from and/or require a runway extension to 4,400 feet in the next 5 years?

	Response Percent	Response Count
Yes	33.3%	2
No	**66.7%**	**4**
answered question		**6**
skipped question		**0**

23. If a runway extension were constructed at Redwood Falls, how would the extension benefit your future operations at Redwood Falls Municipal?

	Response Percent	Response Count
Allow for safer operations	**83.3%**	**5**
Allow for new aircraft type	16.7%	1
Allow for increased weight & fuel loads	16.7%	1
Eliminated previous limitations	0.0%	0
	Other (please specify)	1
	answered question	**6**
	skipped question	**0**

24. Do you utilize the turf Runway 5-23 at Redwood Falls Municipal Airport?

	Response Percent	Response Count
Yes	16.7%	1
No	**83.3%**	**5**
	If yes, please list your annual operations:	1
	answered question	**6**
	skipped question	**0**

25. Are there any other airport facilities that prevent you from operating to/from Redwood Falls Municipal Airport (i.e. fuel, hangar availability, parallel taxiway)?

	Response Percent	Response Count
Yes	0.0%	0
No	**100.0%**	**6**
	If yes, please explain:	0
	answered question	**6**
	skipped question	**0**

26. What percentage of your flight operations within a 20 mile radius of Redwood Falls Municipal Airport?

	Response Percent	Response Count
0-10%	**50.0%**	**3**
11-20%	0.0%	0
21-30%	0.0%	0
31-40%	0.0%	0
41-50%	0.0%	0
51-60%	16.7%	1
61-70%	16.7%	1
71-80%	0.0%	0
81-90%	0.0%	0
91-100%	16.7%	1
	answered question	**6**
	skipped question	**0**

27. Please rank the adequacy of the facilities at Redwood Falls Municipal Airport.

	Excellent/Meets my needs	Good/Mostly meets my needs	Fair/Sometimes meets my needs	Poor/Does not meet my needs	N/A	Rating Average
Terminal Building	**66.7% (4)**	16.7% (1)	0.0% (0)	0.0% (0)	16.7% (1)	1.20
Hangar Facilities	16.7% (1)	**33.3% (2)**	16.7% (1)	0.0% (0)	**33.3% (2)**	2.00
Runways	16.7% (1)	**66.7% (4)**	0.0% (0)	0.0% (0)	16.7% (1)	1.80
Runway Approaches	0.0% (0)	**66.7% (4)**	0.0% (0)	16.7% (1)	16.7% (1)	2.40
Fixed-based Operator (FBO)	**50.0% (3)**	0.0% (0)	0.0% (0)	0.0% (0)	**50.0% (3)**	1.00

Comments:

answered question	
skipped question	

28. Please indicate the importance of the following upgrades for your future use of the Redwood Falls Municipal Airport.

	Extremely Important	Somewhat Important	Not Important	Rating Average	Response Count
Runway 12-30 Extension	16.7% (1)	33.3% (2)	**50.0% (3)**	2.33	6
Parallel Taxiway	33.3% (2)	**50.0% (3)**	16.7% (1)	1.83	6
Private Hangar Sites	33.3% (2)	16.7% (1)	**50.0% (3)**	2.17	6
Public Aircraft Storage	16.7% (1)	**50.0% (3)**	33.3% (2)	2.17	6
				Comments:	1

answered question	**6**
skipped question	**0**

29. Please indicate your overall impression of the Redwood Falls Municipal Airport.

	Extremely Satisfied	Satisfied	Neutral	Dissatisfied	Extremely Dissatisfied	Rating Average	Response Count
Impression	16.7% (1)	**66.7% (4)**	16.7% (1)	0.0% (0)	0.0% (0)	2.00	

answered question	
skipped question	

30. What do you like most about the Redwood Falls Municipal Airport?

Response Count
3

answered question	**3**
skipped question	**3**

31. What do you like the least about the Redwood Falls Municipal Airport?

	Response Count
	3
answered question	3
skipped question	3

32. Please provide any additional comments about the long-term development of the Redwood Falls Municipal Airport:

	Response Count
	2
answered question	2
skipped question	4

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

		Response Percent	Response Count
Name:		**100.0%**	**6**
Company:		33.3%	2
Address:		**100.0%**	**6**
Address 2:		16.7%	1
City/Town:		**100.0%**	**6**
State:		**100.0%**	**6**
ZIP:		83.3%	5
Country:		**100.0%**	**6**
Email Address:		33.3%	2
Phone Number:		**100.0%**	**6**
		answered question	**6**
		skipped question	**0**

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

		Response Percent	Response Count
Yes		**100.0%**	**6**
No		0.0%	0
		answered question	**6**
		skipped question	**0**

Page 3, Q4. Where is/are your aircraft based?		
1	ULM	Sep 13, 2012 7:19 AM
2	KOVL	Sep 13, 2012 7:02 AM
3	KOVL	Sep 13, 2012 6:58 AM
4	New Ulm	Sep 11, 2012 1:42 PM
5	Redwood Falls	Aug 15, 2012 7:05 PM
6	in my garage in Belview, mn	Aug 13, 2012 8:38 PM

Page 3, Q5. Please explain your business/personal air transportation needs at present time.		
1	Aerial Spraying	Sep 13, 2012 7:02 AM
2	Runway and Terminal	Sep 11, 2012 1:42 PM
3	Tar taxi-way, new t-hanger's/doors	Aug 15, 2012 7:05 PM
4	Calm winds, crew and fair weather	Aug 13, 2012 8:38 PM

Page 3, Q6. Please explain your anticipated business/personal air transportation needs for the future.		
1	Aerial Spraying	Sep 13, 2012 7:02 AM
2	same	Sep 11, 2012 1:42 PM
3	2 - 5 flights a month	Aug 13, 2012 8:38 PM

Page 4, Q7. Please indicate your aircraft name/make and model.		
1	A-36	Sep 13, 2012 7:19 AM
2	AT-502B	Sep 13, 2012 7:03 AM
3	Bonanza U-35B	Sep 13, 2012 6:59 AM
4	Cessna 414A	Sep 11, 2012 1:45 PM
5	Piper Cherokee 180	Aug 15, 2012 7:09 PM

Page 4, Q8. Number of Annual operations from Redwood Falls in		
	2008	
1	100	Sep 13, 2012 7:03 AM
2	10	Sep 13, 2012 6:59 AM
3	14	Sep 11, 2012 1:45 PM
4	25	Aug 15, 2012 7:09 PM
	2011	
1	100	Sep 13, 2012 7:03 AM
2	10	Sep 13, 2012 6:59 AM
3	20	Sep 11, 2012 1:45 PM
4	50	Aug 15, 2012 7:09 PM

Page 4, Q9. Number of projected annual operations from Redwood Falls in		
	2014	
1	100	Sep 13, 2012 7:03 AM
2	10	Sep 13, 2012 6:59 AM
3	20	Sep 11, 2012 1:45 PM
4	75-100	Aug 15, 2012 7:09 PM
	2017	
1	100	Sep 13, 2012 7:03 AM
2	10	Sep 13, 2012 6:59 AM
3	20	Sep 11, 2012 1:45 PM
4	100-150	Aug 15, 2012 7:09 PM

Page 6, Q14. Please indicate your aircraft name/make and model as well as location of airport where aircraft is located.		
1	BE-200	Sep 13, 2012 7:20 AM

Page 6, Q15. Number of annual operations from Redwood Falls in		
	2008	
1	80	Sep 13, 2012 7:20 AM
	2011	
1	80	Sep 13, 2012 7:20 AM

Page 6, Q16. Number of projected annual operations from Redwood Falls in		
	2014	
1	80	Sep 13, 2012 7:20 AM
	2017	
1	80	Sep 13, 2012 7:20 AM

Page 6, Q19. Do you fly this aircraft to an alternative airport instead of Redwood Falls?		
1	ULM	Sep 13, 2012 7:20 AM

Page 7, Q20. Do you or your company utilize or benefit from general aviation at the Redwood Falls Municipal Airport (i.e. close to clients, fly to/from business, etc.)?		
1	Corporate/Private	Sep 13, 2012 7:22 AM
2	Convenience since we are headquartered in RWF	Sep 11, 2012 1:49 PM
3	AWOS	Aug 14, 2012 7:04 AM

Page 7, Q21. Is the current paved primary Runway 12-30 (4,000' X 100') at Redwood Falls a limiting factor to your operations?		
1	New aircraft would use as alternative or base	Sep 13, 2012 7:22 AM

Page 7, Q23. If a runway extension were constructed at Redwood Falls, how would the extension benefit your future operations at Redwood Falls Municipal?		
1	It wouldn't	Aug 14, 2012 7:04 AM

Page 7, Q24. Do you utilize the turf Runway 5-23 at Redwood Falls Municipal Airport?		
1	for cross wind	Aug 15, 2012 7:12 PM

Page 8, Q27. Please rank the adequacy of the facilities at Redwood Falls Municipal Airport.		
1	Need lighting in Parking Lot	Sep 13, 2012 7:23 AM

Page 8, Q28. Please indicate the importance of the following upgrades for your future use of the Redwood Falls Municipal Airport.		
1	Should be on hangar list for hangars and work on Taxiway for hard surface.	Sep 13, 2012 7:23 AM

Page 9, Q30. What do you like most about the Redwood Falls Municipal Airport?		
1	I live in RWF. would like to use it more for alternative airport	Sep 13, 2012 7:24 AM
2	It is in Redwood	Sep 11, 2012 1:49 PM
3	clean FBO, very neat appearance of grounds	Aug 15, 2012 7:19 PM

Page 9, Q31. What do you like the least about the Redwood Falls Municipal Airport?		
1	No GPS approach to Runway 12 and no rental cars in town	Sep 13, 2012 7:24 AM
2	Nothing	Sep 11, 2012 1:49 PM
3	Taxi-way	Aug 15, 2012 7:19 PM

Page 9, Q32. Please provide any additional comments about the long-term development of the Redwood Falls Municipal Airport:		
1	Would use as an alternate but runway too short for future aircraft	Sep 13, 2012 7:24 AM
2	longer runway and tar taxiway would be bring larger aircraft to our community	Aug 15, 2012 7:19 PM

Page 10, Q33. Please provide the following information pertaining to the individual who completed this survey.

	1	
Name:	Al Lothert	Sep 13, 2012 7:24 AM
Address:	110 Knollwood	Sep 13, 2012 7:24 AM
City/Town:	Redwood Falls	Sep 13, 2012 7:24 AM
State:	MN	Sep 13, 2012 7:24 AM
Country:	US	Sep 13, 2012 7:24 AM
Phone Number:	612-889-1767	Sep 13, 2012 7:24 AM
	2	
Name:	Richard Siqurdson	Sep 13, 2012 7:18 AM
Company:	Willmar Aerial Spraying, Inc.	Sep 13, 2012 7:18 AM
Address:	Box 169	Sep 13, 2012 7:18 AM
City/Town:	Olivia	Sep 13, 2012 7:18 AM
State:	MN	Sep 13, 2012 7:18 AM
ZIP:	56277	Sep 13, 2012 7:18 AM
Country:	US	Sep 13, 2012 7:18 AM
Phone Number:	320-523-2186	Sep 13, 2012 7:18 AM
	3	
Name:	Richard Siqurdson	Sep 13, 2012 7:01 AM
Address:	1321 W. Birch Ave	Sep 13, 2012 7:01 AM
City/Town:	Olivia	Sep 13, 2012 7:01 AM
State:	MN	Sep 13, 2012 7:01 AM
ZIP:	56277	Sep 13, 2012 7:01 AM
Country:	US	Sep 13, 2012 7:01 AM
Phone Number:	320-979-8326	Sep 13, 2012 7:01 AM
	4	
Name:	Don Davis	Sep 11, 2012 1:51 PM
Company:	Farmers Union Industries	Sep 11, 2012 1:51 PM

Page 10, Q33. Please provide the following information pertaining to the individual who completed this survey.

Address:	590 W Park Road	Sep 11, 2012 1:51 PM
City/Town:	Redwood Falls	Sep 11, 2012 1:51 PM
State:	MN	Sep 11, 2012 1:51 PM
ZIP:	56283	Sep 11, 2012 1:51 PM
Country:	US	Sep 11, 2012 1:51 PM
Email Address:	dwdavis@centralbi.com	Sep 11, 2012 1:51 PM
Phone Number:	507-637-4235	Sep 11, 2012 1:51 PM
	5	
Name:	David Bunting	Aug 15, 2012 7:21 PM
Address:	346 laser trail	Aug 15, 2012 7:21 PM
City/Town:	Redwood Falls	Aug 15, 2012 7:21 PM
State:	MN	Aug 15, 2012 7:21 PM
ZIP:	56283	Aug 15, 2012 7:21 PM
Country:	USA	Aug 15, 2012 7:21 PM
Phone Number:	480-606-8937	Aug 15, 2012 7:21 PM
	6	
Name:	John Lewis	Aug 14, 2012 7:15 AM
Address:	P.O. box 85	Aug 14, 2012 7:15 AM
Address 2:	104 Marion St	Aug 14, 2012 7:15 AM
City/Town:	Belview	Aug 14, 2012 7:15 AM
State:	MN	Aug 14, 2012 7:15 AM
ZIP:	56214	Aug 14, 2012 7:15 AM
Country:	USA	Aug 14, 2012 7:15 AM
Email Address:	johnlewis715@gmail.com	Aug 14, 2012 7:15 AM
Phone Number:	507-430-5556	Aug 14, 2012 7:15 AM

BUSINESS USER SURVEY – REDWOOD FALLS MUNICIPAL AIRPORT (RWF)

The Redwood Falls Municipal Airport is conducting an Airport Layout Plan (ALP) update for the airport facility. This study will analyze the existing and future usage and facility needs anticipated at the airport. The city is conducting a User Survey for airport planning purposes. You have been identified as a recipient of this user survey as either a current user or potential future user of the airport.

The Redwood Falls Municipal Airport (RWF) currently has a paved primary Runway 12-30 (4,000' x 100') and a turf Runway 5-23 (2,050' x 200'), 16 based aircraft, and nearly 10,000 annual operations.

The purpose of this survey is to identify your personal aircraft or the aircraft in your current or planned corporate fleet, the runway length requirements of that fleet, and your forecasted levels of activity at RWF, assuming necessary runway improvements existed to accommodate your aircraft.

Your input is **very important** to the accuracy and viability of this study, and has a **direct** effect on possible improvement to the RWF. We request that you please complete the survey online (https://www.surveymonkey.com/s/2012RedwoodFallsAirport-businesssurvey) by **August 31st, 2012**. If you choose to complete the paper version, please return it Any questions regarding the survey should be directed to:

Jim Doering, Public Works Project Coordinator
City of Redwood Falls
333 Washington Street South; P.O. Box 10
Redwood Falls, MN 56283
Phone: (507) 637-5755
E-mail: jdoering@ci.redwood-falls.mn.us

Does your company have regular business or cargo air transportation needs?

Yes_____ No_____

Please explain your business air transportation needs:

_____

_____

_____

1. General Aviation is defined as aircraft operations for purposes other than military or commercial passenger flights. Does your company currently utilize general aviation for business travel?

   Yes_____ No_____

   If NO, is your company considering utilizing General Aviation aircraft for business travel purposes?

   Yes_____ No_____

   If NO, please explain why.

   _____

   _____

   If YES, do you own/lease a General Aviation aircraft operated for at least partial business use?

   Yes_____ No_____

Please Return by August 31, 2012

What airport do you base your aircraft? _____

Does your company currently utilize the Redwood Falls Municipal Airport for business travel purposes?

Yes_____ No_____ N/A_____

2. If yes, please complete the following table about your aircraft operations to and from the Redwood Falls Municipal Airport. Given the current primary paved runway length of 4,000 feet is maintained, what types of aircraft and number of operations has your firm used or have a high probability of occurring for travel to/from the Redwood Falls area? A takeoff and a landing are 2 operations.

Aircraft Name, Model	Airport	Number of Annual Operations		Projected Number of Annual Operations	
		2008	2011	2014	2017

3. What are you runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, etc) of your aircraft on an 85 degree day, 1023' MSL at your required takeoff weight?

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

Are the airport facilities at Redwood Falls (i.e, runway length, instrument approach procedures, aircraft parking / storage, FBO facilities) adequate to meet your airport needs both now and into the future?

Yes_____ No_____ N/A_____

4. What is your overall impression of the Redwood Falls Municipal Airport?

_____

_____

_____

_____

Please Return by August 31, 2012

5. Would proposed airport development (i.e. runway extension, hangar development etc.) and use of aviation-related travel allow your company to grow/expand operations in Redwood Falls and beyond?

   Yes_____ No_____

   If YES, please explain why.

   _____

   _____

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

   Name: _____

   Company/Affiliation: _____

   Address: _____

   _____

   Phone: _____

   E-mail: _____

7. May we contact you with any specific questions about this user survey? Yes_____ No_____
8. Please provide any additional comments:

   _____

   _____

   _____

If you have specific questions about this survey please contact:

Jim Doering, Public Works Project Coordinator
City of Redwood Falls
(507) 637-5755
-or-
Julie Rath, Redwood Area Development Corporation
(507) 637-4004

The Redwood Falls Municipal Airport Commission and the City of Redwood Falls thank you for completing this Airport User Survey!

Business User Survey-Redwood Falls Municipal Airport (RWF)

1. Does your company have regular business or cargo air transportation needs?

		Response Percent	Response Count
Yes		40.0%	2
No		**60.0%**	**3**
	Please explain your business air transportation needs:		2
		answered question	**5**
		skipped question	**0**

2. General Aviation is defined as aircraft operations for purposes other than military or commercial passenger flights. Does your company currently utilize aviation for business travel?

		Response Percent	Response Count
Yes		**60.0%**	**3**
No		40.0%	2
		answered question	**5**
		skipped question	**0**

3. Is your company considering utilizing General Aviation aircraft for business or travel purposes?

	Response Percent	Response Count
Yes	0.0%	0
No	**100.0%**	**2**
If no, please explain why.		1
answered question		**2**
skipped question		**3**

4. Do you own/lease a General Aviation aircraft operated for at least partial business use?

	Response Percent	Response Count
Yes	40.0%	2
No	**60.0%**	**3**
answered question		**5**
skipped question		**0**

5. If you currently own an aircraft, where is it based?

	Response Count
	2
answered question	**2**
skipped question	**3**

6. Does your company utilize the Redwood Falls Municipal Airport for business travel purposes?

	Response Percent	Response Count
Yes	40.0%	2
No	**60.0%**	**3**
N/A	0.0%	0
	answered question	**5**
	skipped question	**0**

7. Please indicate your aircraft name/make and model as well as location of airport where aircraft is located.

	Response Count
	3
	answered question	**3**
	skipped question	**2**

8. Number of annual operations from Redwood Falls in

	0-1	2-3	4-5	6 or more	Re
2008	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	
2011	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	

	0-1	2-3	4-5	6 or more	Re
2008	**50.0% (1)**	**50.0% (1)**	0.0% (0)	0.0% (0)	
2011	**50.0% (1)**	**50.0% (1)**	0.0% (0)	0.0% (0)	

	answered question
	skipped question

9. Projected Number of Annual Operations

	0-1	2-3	4-5	6 or more	Re
2014	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	
2017	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	

	0-1	2-3	4-5	6 or more	Re
2014	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	
2017	**66.7% (2)**	33.3% (1)	0.0% (0)	0.0% (0)	

	answered question
	skipped question

10. Takeoff weight requirement for your aircraft.

	Response Percent	Response Count
Up to 2,500 pounds	0.0%	0
2,501-5,000 pounds	0.0%	0
5,001-12,500 pounds	0.0%	0
12,501 or greater	**100.0%**	**2**
	answered question	**2**
	skipped question	**3**

11. Runway length requirement for your aircraft.

	Response Percent	Response Count
0-2,000 feet	0.0%	0
2,001-2,912 feet	0.0%	0
2,913-3,500 feet	0.0%	0
3,500 feet or longer	**100.0%**	**2**
	answered question	**2**
	skipped question	**3**

12. Are the airport facilities at Redwood Falls (i.e. runway length, instrument approach procedures, aircraft parking/storage, FBO facilities) adequate to meet your airport needs both now and into the future?

	Response Percent	Response Count
Yes	25.0%	1
No	**50.0%**	**2**
N/A	25.0%	1
answered question		**4**
skipped question		**1**

13. What is your overall impression of the Redwood Falls Municipal Airport?

	Response Count
	3
answered question	**3**
skipped question	**2**

14. Would propose airport development (i.e. runway extension, hangar development, etc.) and use of aviation related travel allow your company to grow/expand operations in Redwood Falls and beyond?

	Response Percent	Response Count
Yes	**75.0%**	**3**
No	25.0%	1
If yes, please explain why		3
answered question		**4**
skipped question		**1**

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

		Response Percent	Response Count
Name:		**100.0%**	**4**
Company:		**100.0%**	**4**
Address:		**100.0%**	**4**
Address 2:		25.0%	1
City/Town:		**100.0%**	**4**
State:		**100.0%**	**4**
ZIP:		**100.0%**	**4**
Country:		**100.0%**	**4**
Email Address:		**100.0%**	**4**
Phone Number:		**100.0%**	**4**
		answered question	**4**
		skipped question	**1**

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

		Response Percent	Response Count
Yes		**100.0%**	**4**
No		0.0%	0
		answered question	**4**
		skipped question	**1**

17. Please provide any additional comments:

	Response Count
	2
answered question	**2**
skipped question	**3**

Page 1, Q1. Does your company have regular business or cargo air transportation needs?		
1	We travel to manufacturing plants and retail locations across the country	Sep 11, 2012 1:28 PM
2	Our sales team often use our own plane, either by charter or leased. Also directors and Shareholders	Sep 11, 2012 1:11 PM

Page 2, Q3. Is your company considering utilizing General Aviation aircraft for business or travel purposes?		
1	Extremely limited air fare costs in our budgeted expenses	Aug 16, 2012 2:00 PM

Page 4, Q5. If you currently own an aircraft, where is it based?		
1	TYS	Sep 11, 2012 1:29 PM
2	currently based outside of MN	Sep 11, 2012 1:12 PM

Page 5, Q7. Please indicate your aircraft name/make and model as well as location of airport where aircraft is located.		
1	Cessna Citation Jet - III, Cessna Encoret	Sep 11, 2012 1:30 PM
2	Challenger 604	Sep 11, 2012 1:13 PM
3	N/A	Aug 17, 2012 7:29 AM

Page 6, Q13. What is your overall impression of the Redwood Falls Municipal Airport?		
1	The staff has always treated us great. Nice folks and a nice facility.	Sep 11, 2012 1:32 PM
2	Need longer runway (5840 feet required of my Challenger 604)	Sep 11, 2012 1:15 PM
3	Looks great, well kept, cooperative employees	Aug 17, 2012 7:30 AM

Page 6, Q14. Would propose airport development (i.e. runway extension, hangar development, etc.) and use of aviation related travel allow your company to grow/expand operations in Redwood Falls and beyond?

1	We could utilize a runway extension to at least 5000'. We can't always land here in the winter or even if it has rained on 4000'. As we consider larger aircraft, we would be forced to use another airport with longer runways if RWF isnt extended.	Sep 11, 2012 1:32 PM
2	We currently use Marshall air strip. Our new facilities on Ponderosa rd, backing onto RWF Airport would be ideal	Sep 11, 2012 1:15 PM
3	maybe, not been pursued because it doesn't exist	Aug 17, 2012 6:15 AM

Page 7, Q15. Please provide the following information pertaining to the individual who completed this survey.

	1	
Name:	Mathew Garner	Sep 11, 2012 1:33 PM
Company:	Clayton Homes	Sep 11, 2012 1:33 PM
Address:	5000 Clayton Rd	Sep 11, 2012 1:33 PM
City/Town:	Maryville	Sep 11, 2012 1:33 PM
State:	TN	Sep 11, 2012 1:33 PM
ZIP:	37804	Sep 11, 2012 1:33 PM
Country:	US	Sep 11, 2012 1:33 PM
Email Address:	mathew.garner@clayton.net	Sep 11, 2012 1:33 PM
Phone Number:	865-80-3000	Sep 11, 2012 1:33 PM
	2	
Name:	Steve Parker	Sep 11, 2012 1:19 PM
Company:	Director of Northstar	Sep 11, 2012 1:19 PM
Address:	Ponderosa Rd	Sep 11, 2012 1:19 PM
City/Town:	Redwood Falls	Sep 11, 2012 1:19 PM
State:	MN	Sep 11, 2012 1:19 PM
ZIP:	56283	Sep 11, 2012 1:19 PM
Country:	United States	Sep 11, 2012 1:19 PM
Email Address:	stephen.parker@northstarsb.com	Sep 11, 2012 1:19 PM

Page 7, Q15. Please provide the following information pertaining to the individual who completed this survey.		
Phone Number:	507-401-7681	Sep 11, 2012 1:19 PM
	3	
Name:	Paul Brezina	Aug 17, 2012 7:31 AM
Company:	Monsanto	Aug 17, 2012 7:31 AM
Address:	1210 E Bridge St	Aug 17, 2012 7:31 AM
Address 2:	P.O.Box 46	Aug 17, 2012 7:31 AM
City/Town:	Redwood Falls	Aug 17, 2012 7:31 AM
State:	MN	Aug 17, 2012 7:31 AM
ZIP:	56283	Aug 17, 2012 7:31 AM
Country:	United States	Aug 17, 2012 7:31 AM
Email Address:	paul.t.brezina@monsanto.com	Aug 17, 2012 7:31 AM
Phone Number:	507-637-2204	Aug 17, 2012 7:31 AM
	4	
Name:	Jim Hanson	Aug 17, 2012 6:16 AM
Company:	Daktronics	Aug 17, 2012 6:16 AM
Address:	1425 E Bridge St	Aug 17, 2012 6:16 AM
City/Town:	Redwood Falls	Aug 17, 2012 6:16 AM
State:	MN	Aug 17, 2012 6:16 AM
ZIP:	56283	Aug 17, 2012 6:16 AM
Country:	USA	Aug 17, 2012 6:16 AM
Email Address:	jim.hanson@daktronics.com	Aug 17, 2012 6:16 AM
Phone Number:	5076442260	Aug 17, 2012 6:16 AM

Page 7, Q17. Please provide any additional comments:		
1	A GPS approach for runway 12 would be a great addition along with public wifi for flight planning	Sep 11, 2012 1:33 PM
2	New address (above) in Jan 2013. We would support a daily flight to MSP if it	Sep 11, 2012 1:19 PM

Page 7, Q17. Please provide any additional comments:
could be arranged commercially.

Appendix B

Redwood Falls Municipal Airport — Airport Layout Plan Update

Aviation Forecasts

Prepared November 8, 2012

A. Forecast Levels and Growth Rates

Specify base year: 2012

	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.	Base Yr.+20yrs.	Average Annual Compound Growth Rates: Base Yr. to +5	Base Yr. to +10	Base Yr. to +15	Base Yr. to +20
Passenger Enplanements									
Air Carrier	0	0	0	0	0	N/A	N/A	N/A	N/A
Commuter	0	0	0	0	0	N/A	N/A	N/A	N/A
TOTAL	0	0	0	0	0	N/A	N/A	N/A	N/A
Operations									
Itinerant									
Air carrier	0	0	0	0	0	N/A	N/A	N/A	N/A
Commuter/air taxi	0	0	0	0	0	N/A	N/A	N/A	N/A
Total Commercial Operations	0	0	0	0	0	N/A	N/A	N/A	N/A
General Aviation - Fixed Wing	2,823	3,158	3,521	3,934	4,405	2.27%	2.23%	2.24%	2.25%
General Aviation - Rotorcraft	1,300	1,352	1,406	1,463	1,522	0.79%	0.79%	0.79%	0.79%
Military	300	283	267	251	237	-1.17%	-1.17%	-1.17%	-1.17%
Total Itinerant Operations	4,423	4,793	5,194	5,648	6,164	1.62%	1.62%	1.64%	1.67%
Local									
General Aviation - Fixed Wing	5,205	5,546	6,054	6,856	7,735	1.28%	1.52%	1.85%	2.00%
General Aviation - Rotorcraft	200	208	216	225	234	0.79%	0.79%	0.79%	0.79%
Military	0	0	0	0	0	N/A	N/A	N/A	N/A
Total Local Operations	5,405	5,754	6,271	7,081	7,969	1.26%	1.50%	1.82%	1.96%
TOTAL OPERATIONS	9,828	10,547	11,464	12,729	14,133	1.42%	1.55%	1.74%	1.83%
Instrument Operations	666	745	843	965	1,113				
Peak Hour Operations	13	14	15	17	19	1.42%	1.55%	1.74%	1.83%
Based Aircraft									
Single Engine (Nonjet)	12	13	14	14	15	1.61%	1.55%	1.03%	1.12%
Multi Engine (Nonjet)	3	3	2	2	2	0.00%	-3.97%	-2.67%	-2.01%
Jet Engine	0	0	0	0	0	N/A	N/A	N/A	N/A
Helicopter	1	1	1	1	1	0.00%	0.00%	0.00%	0.00%
Other	2	2	2	3	3	0.00%	0.00%	2.74%	2.05%
TOTAL	18	19	19	20	21	1.09%	0.54%	0.70%	0.77%

B. Operational Factors

	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.	Base Yr.+20yrs.				
Average aircraft size (seats)									
Air carrier	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commuter	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Average enplaning load factor									
Air carrier	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commuter	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GA operations per based aircraft	546	555	603	636	673	0.33%	1.00%	1.03%	1.05%

Redwood Falls Municipal Airport **Airport Layout Plan Update**

Aviation Forecasts - Aircraft Mix **Prepared November 8, 2012**

Rates

Specify base year: 2012

						Share Percentage				Growth Rate			
	Base Yr. Level	**Base Yr.+5yrs.**	**Base Yr.+10yrs.**	**Base Yr.+15yrs.**	**Base Yr.+20yrs.**	**Base Yr. to +5**	**Base Yr. to +10**	**Base Yr. to +15**	**Base Yr. to +20**	**Base Yr. to +5**	**Base Yr. to +10**	**Base Yr. to +15**	**Base Yr. to +20**
Small Aircraft													
Category A, Group I	7,028	7,558	8,281	9,326	10,481	71.66%	72.23%	73.27%	74.16%	1.46%	1.65%	1.90%	2.02%
Category A, Group II	200	211	223	236	249	2.00%	1.95%	1.85%	1.77%	1.11%	1.11%	1.11%	1.11%
Category B, Group I	800	845	893	944	998	8.02%	7.79%	7.42%	7.06%	1.11%	1.11%	1.11%	1.11%
Category B, Group II	150	159	168	177	187	1.50%	1.46%	1.39%	1.32%	1.11%	1.11%	1.11%	1.11%
TOTAL SMALL AIRCRAFT	8,178	8,773	9,565	10,683	11,915	83.18%	83.43%	83.93%	84.31%	1.41%	1.58%	1.80%	1.90%
Large Aircraft													
Category B, Group II	150	194	251	324	419	1.84%	2.19%	2.55%	2.96%	5.27%	5.27%	5.27%	5.27%
Category C, Group I	0	10	13	17	22	0.09%	0.11%	0.13%	0.15%	N/A	N/A	N/A	N/A
Category C, Group II	0	10	13	17	22	0.09%	0.11%	0.13%	0.15%	N/A	N/A	N/A	N/A
TOTAL LARGE AIRCRAFT	150	214	277	358	462	2.03%	2.41%	2.81%	3.27%	7.36%	6.31%	5.96%	5.79%
Helicopter	1,500	1,560	1,623	1,688	1,756	14.79%	14.16%	13.26%	12.42%	0.79%	0.79%	0.79%	0.79%

Appendix C

CSAH 101
EL. 1001'
CL. = 51'

PONDEROSA RD.
EL. 1007'
CL. = 19'

TREE
EL. 1054'
CL. = -25'

TREE
EL. = 1066'
CL. = -28'

PONDEROSA RD.
EL. 1009'
CL. = 17'

PONDEROSA RD.
EL. 1010'
CL. = 17'

APPROXIMATE OBSTRUCTION
REMOVAL BOUNDARY
(FIELD VERIFY DURING
REMOVAL PROJECT)

CSAH 101
EL. = 1013'
CL. = 34'

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

300'

RUNWAY 12 END
EL. 1017.72'

1010'

700'

TREE
EL. 1064'
CL. = -16'

150'

PONDEROSA RD
EL. 1009'
CL. = 27'

RUNWAY SAFETY AREA (RSA)

TREE
EL. 1061'
CL. = -16'

FUTURE PAVED TAXIWAY

TREE
EL. 1065'
CL. = -16'

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY
PROTECTION ZONE

FAR PART 77 APPROACH SURFACE (34:1)

1700'
MN/DOT RUNWAY CLEAR ZONE

PONDEROSA RD.
EL. 1015'
CL. = 27'

CSAH 101
EL. 1018'
CL. = 27'

TERPS DEPARTURE SURFACE (40:1)

EXISTING AIRPORT PROPERTY LINE

2,667'
SAFETY ZONE A
(4,000' RUNWAY)

0 100 200
SCALE FEET

H:\REDW\T412229B\PLANS\Exhibits\2229B-ApdxF-12.0.dwg 6/22/10 4:09 pm

EXISTING RUNWAY 12 END

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 12: EXISTING RUNWAY END

EXHIBIT
3-1

CSAH 101
EL. 1001'
CL. = 48'

APPROXIMATE OBSTRUCTION REMOVAL BOUNDARY (FIELD VERIFY DURING REMOVAL PROJECT)

TREE
EL. 1064'
CL. = -18'

TREE
EL. 1061'
CL. = -16'

TREE
EL. 1065'
CL. = -20'

TREE
EL. 1054'
CL. = -28'

TREE
EL. = 1066'
CL. = -30'

PONDEROSA RD.
EL. 1007'
CL. = 15'

PONDEROSA RD.
EL. 1009'
CL. = 17'

PONDEROSA RD.
EL. 1010'
CL. = 17'

CSAH 101
EL. = 1013'
CL. = 30'

PONDEROSA RD
EL. 1009'
CL. = 23'

PONDEROSA RD.
EL. 1015'
CL. = 24'

CSAH 101
EL. 1018'
CL. = 24'

1010'

700'

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

300'

100'

RUNWAY 12 END
EL. 1017.26'

450'

RUNWAY SAFETY AREA (RSA)

FUTURE PAVED TAXIWAY

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY
PROTECTION ZONE

1700'
MN/DOT RUNWAY CLEAR ZONE

FAR PART 77 APPROACH SURFACE (34:1)

TERPS DEPARTURE SURFACE (40:1)

EXISTING AIRPORT PROPERTY LINE

2,933'
SAFETY ZONE A
(4,400' RUNWAY)

0 100 200
SCALE FEET

h:\REDW\T4122298\PLANS\Exhibits\22298-ApdxF-12.1.dwg 6/22/10 4:09 pm

RUNWAY 12: 100' EXTENSION

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 12: 100' EXTENSION

EXHIBIT 3-2

REQUIRED 15' ROADWAY CLEARANCE NOT MET

CSAH 101
EL. 1001'
CL. = 44'

PONDEROSA RD.
EL. 1007'
CL. = 12'

TREE
EL. = 1066'
CL. = -32'

PONDEROSA RD.
EL. 1009'
CL. = 17'

PONDEROSA RD.
EL. 1010'
CL. = 17'

TREE
EL. 1054'
CL. = -33'

APPROXIMATE OBSTRUCTION REMOVAL BOUNDARY (FIELD VERIFY DURING REMOVAL PROJECT)

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

300'

200'

RUNWAY 12 END
EL. 1016.79

CSAH 101
EL. = 1013'
CL. = 27'

1010'

700'

150'

TREE
EL. 1064'
CL. = -22'

PONDEROSA RD
EL. 1009'
CL. = 20'

RUNWAY SAFETY AREA (RSA)

TREE
EL. 1061'
CL. = -19'

TREE
EL. 1065'
CL. = -23'

FUTURE PAVED TAXIWAY

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY PROTECTION ZONE

1700'
MN/DOT RUNWAY CLEAR ZONE

FAR PART 77 APPROACH SURFACE (34:1)

PONDEROSA RD.
EL. 1015'
CL. = 20'

CSAH 101
EL. 1018'
CL. = 21'

EXISTING AIRPORT PROPERTY LINE

2,933'
SAFETY ZONE A
(4,400' RUNWAY)

TERPS DEPARTURE SURFACE (40:1)

0 100 200
SCALE FEET

H:\REDW\T412298\PLANS\Exhibits\22298-ApdxF-12.2.dwg 6/22/10 4:09 pm

RUNWAY 12: 200' EXTENSION

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 12: 200' EXTENSION

EXHIBIT 3-3

APPROXIMATE OBSTRUCTION REMOVAL BOUNDARY (FIELD VERIFY DURING REMOVAL PROJECT)

EXISTING AIRPORT PROPERTY LINE

TERPS DEPARTURE SURFACE (40:1)

2,667'
SAFETY ZONE A
(4,000' RUNWAY)

TH 19
EL. 1020'
CL. = 66'

TREE
EL. 1074'
CL. = -42'

TREE
EL. 1044'
CL. = -8'

TREE
EL. 1041'
CL. = 9'

71
19

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

300'

RUNWAY SAFETY AREA (RSA)

150'

700'

1010'

RUNWAY
30 END
EL. 1022.65'

TH 19
EL. 1023'
CL. = 41'

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY
PROTECTION ZONE

TH 19
EL. 1023'
CL. = 26'

1700'
MN/DOT RUNWAY CLEAR ZONE

FAR PART 77 APPROACH SURFACE (34:1)

BUILDING
EL. 1040'
CL. = -2'
(FAA DETERMINATION
RECOMMENDED)

BUILDING
EL. 1052'
CL. = 6'

BUILDING
EL. 1038'
CL. = 17'

TREE
EL. 1041'
CL. = 6'

0 100 200
SCALE FEET

H:\REDW\T4122298\PLANS\Exhibits\22298-ApdxF-30.0.dwg 6/22/10 4:09 pm

EXISTING RUNWAY 30 END

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 30: EXISTING RUNWAY END

EXHIBIT 3-4

APPROXIMATE OBSTRUCTION REMOVAL BOUNDARY (FIELD VERIFY DURING REMOVAL PROJECT)

EXISTING AIRPORT PROPERTY LINE

TERPS DEPARTURE SURFACE (40:1)

2,933'
SAFETY ZONE A
(4,400' RUNWAY)

TH 19
EL. 1020'
CL. = 58'

TREE
EL. 1080'
CL. = -42'

TREE
EL. 1047'
CL. = -8'

TREE
EL. 1041'
CL. = 9'

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

200'

300'

RUNWAY SAFETY AREA (RSA)

RUNWAY
30 END
EL. 1022.56'

150'

700'

1010'

TH 19
EL. 1023'
CL. = 35'

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY
PROTECTION ZONE

TH 19
EL. 1023'
CL. = 21'

1700'
MN/DOT RUNWAY CLEAR ZONE

FAR PART 77 APPROACH SURFACE (34:1)

BUILDING
EL. 1040'
CL. = -3'
(FAA DETERMINATION RECOMMENDED)

BUILDING
EL. 1052'
CL. = 5'

BUILDING
EL. 1038'
CL. = 15'

TREE
EL. 1041'
CL. = 5'

0 100 200
SCALE FEET

h:\REDW\T4122298\PLANS\Exhibits\22298-ApdxF-30.2.dwg 6/22/10 4:09 pm

RUNWAY 30: 200' EXTENSION

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 30: 200' EXTENSION

EXHIBIT 3-5

APPROXIMATE OBSTRUCTION REMOVAL BOUNDARY (FIELD VERIFY DURING REMOVAL PROJECT)

EXISTING AIRPORT PROPERTY LINE

TERPS DEPARTURE SURFACE (40:1)

2,933'
SAFETY ZONE A
(4,400' RUNWAY)

TH 19
EL. 1020'
CL. = 54'

71
MINN
19

TREE
EL. 1080'
CL. = −42

TREE
EL. 1047'
CL. = −8'

TREE
EL. 1041'
CL. = 9'

PRIMARY SURFACE

RUNWAY OBJECT FREE AREA

300'

300'

RUNWAY SAFETY AREA (RSA)

150'

700'

1010'

RUNWAY
30 END
EL. 1022.46

TH 19
EL. 1023'
CL. = 32'

20' AIRSPACE RESTRICTION LINE

1000'
FAA RUNWAY
PROTECTION ZONE

TH 19
EL. 1023'
CL. = 18'

1700'
MN/DOT RUNWAY CLEAR ZONE

FAR PART 77 APPROACH SURFACE (34:1)

BUILDING
EL. 1040'
CL. = −4'
(FAA DETERMINATION RECOMMENDED)

BUILDING
EL. 1052'
CL. = 4'

BUILDING
EL. 1038'
CL. = 14'

TREE
EL. 1041'
CL. = −3

0 100 200
SCALE FEET

H:\REDW\T4122298\PLANS\Exhibits\22298-ApdxF-30.3.dwg 6/22/10 4:09 pm

RUNWAY 30: 300' EXTENSION

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN MAPLEWOOD, MN AMES, IA

REV.	BY	DATE

CITY OF REDWOOD FALLS
AIRPORT MASTER PLAN
RUNWAY 30: 300' EXTENSION

EXHIBIT
3-6

BOLTON & MENK, INC.
Consulting Engineers & Surveyors

Redwood Falls Municipal Airport

Airport Master Plan - Phase I

Secondary Alternative Screening

Runway 30 Approach - Existing Alignment

	NO BUILD	200' Extension	300' Extension
Assumptions			
Approach Type	Non-Precision		
Approach Visibility Minimums	1 mile		
Runway Category	Other-Than-Utility		
Airport Reference Code (ARC)	B-II		
FAR Part 77 Approach Surface Slope	34 to 1		
FAA Runway Protection Zone (RPZ) Dimensions	500' (inner width) x 1,000' (length) x 700' (outer width)		
Mn/DOT Runway Clear Zone (RCZ) Dimensions	500' (inner width) x 1,700' (length) x 1,010' (outer width)		
Objective 1: Safety			
FAR Part 77 Road Clearance over Trunk Highway 19/71 (1)	26'	21'	18'
FAR Part 77 (Transitional) Clearance over Bulding	-2'	-3'	-3'
FAR Part 77 Penetrating Trees	Yes	Yes	Yes
Clear Runway Safety Area (RSA)	Yes	Yes	Yes
Clear Runway Object Free Area (ROFA)	Yes	Yes	Yes
Objective 2: Capacity			
Accommodate parallel taxiway (6)	Yes	Yes	Yes
Accommodate FAA recommended runway length (assume 100' Runway 12 extension)	No	No	Yes
Objective 3: Compatibility			
Total Land Acquisition Recommended for Runway 12 (3)	9.7 acres	13.4 acres	15.1 acres
Mn/DOT Safety Zone A Clear of Objects (2)	Yes	Yes	Yes
Runway Protection Zone Clear of Existing Roadways	No	No	No
Minimize Roadway Impacts (4)	Yes	Yes	Yes
Ability to meet clear FAR Part 77 airspace (5)	Yes	Yes	Yes
Obstruction Removal Area (approx.)	1 acre	1 acre	1 acre
Preferred Runway 30 End Development	**NO**	**NO**	**YES**

(1) Assumes critical roadway clearance
(2) Existing buildings would be affected with a runway extension further to the southeast OR with a overall length greater than 4,400'
(3) Land acquisition recommended includes FAA RPZ, Mn/DOT RCZ, and property within 20' Building Restriction Line
(4) Impacts include roadway relocation or penetration of FAR Part 77 approach surfaces
(5) Assumes non-permanent obstructions (i.e. trees, mounds) are removed, and Obstruction Lighting installed over other permanent obstructions
(6) Parallel taxiway accommodation assumes no impacts to surrounding off-airport development

BOLTON & MENK, INC.
Consulting Engineers & Surveyors

Redwood Falls Municipal Airport

Airport Master Plan - Phase I

Secondary Alternative Screening

Runway 12 Approach - Existing Alignment

	NO BUILD	100' Extension	200' Extension
Assumptions			
Approach Type	Non-Precision		
Approach Visibility Minimums	1 mile		
Runway Category	Other-Than-Utility		
Airport Reference Code (ARC)	B-II		
FAR Part 77 Approach Surface Slope	34 to 1		
FAA Runway Protection Zone (RPZ) Dimensions	500' (inner width) x 1,000' (length) x 700' (outer width)		
Mn/DOT Runway Clear Zone (RCZ) Dimensions	500' (inner width) x 1,700' (length) x 1,010' (outer width)		
Objective 1: Safety			
FAR Part 77 (Approach) Road Clearance over Ponderosa Road (1)	19'	15'	12'
FAR Part 77 (Transitional) Road Clearance over Ponderosa Road (1)	17'	17'	17'
FAR Part 77 Road Clearance over CSAH 101 (1)	27'	24'	21'
FAR Part 77 Penetrating Trees	Yes	Yes	Yes
Clear Runway Safety Area (RSA)	Yes	Yes	Yes
Clear Runway Object Free Area (ROFA)	Yes	Yes	Yes
Objective 2: Capacity			
Maximize Available Runway Length (without displaced thresholds) (6)	No	Yes	No
Objective 3: Compatibility			
Total Land Acquisition Recommended for Runway 12 (3)	20.0 acres	21.8 acres	23.5 acres
Mn/DOT Safety Zone A Clear of Objects (2)	No	No	No
Runway Protection Zone Clear of Existing Roadways	No	No	No
Minimize Roadway Impacts (4)	Yes	Yes	Yes
Ability to meet clear FAR Part 77 airspace (5)	Yes	Yes	No
Obstruction Removal Area (approx.)	2 acres	2 acres	2 acres
Preferred Runway 12 End Development	**NO**	**YES**	**NO**

(1) Assumes critical roadway clearance
(2) Existing zoning does not meet other-than-utility approach width standards. Two (2) existing objects noted to be inside minimum Safety Zone A.
(3) Land acquisition recommended includes FAA RPZ, Mn/DOT RCZ, and property within 20' Building Restriction Line
(4) Impacts include roadway relocation or penetration of FAR Part 77 approach surfaces
(5) Assumes non-permanent obstructions (i.e. trees, mounds) are removed
(6) Reflects Mn/DOT Aeronautics policy of discouraging the use of displaced thresholds when possible

Appendix D

(RWF) - Redwood Falls Municipal Airport

AIRPORT LAYOUT PLAN - IMPLEMENTATION

Federal Entitlement Balance FY 2013: $296,539

****ALL COSTS BASED ON ESTIMATES, MAJOR CAPITAL IMPROVEMENTS SHOWN****

Sequence	Description	Funding Participation FAA %	State %	Local %	Project Cost	Federal Entitlement Funding	Additional Federal Funding	State Funding	Local Funding	Other Programs	Federal Entitlement Balance
SHORT TERM IMPLEMENTATION PLAN (0 TO 5 YEARS)											
A1	UPDATE JOINT AIRPORT ZONING ORDINANCE	0%	PR	PR	$ 54,000	$ -	$ -	$ 29,700	$ 24,300	$ -	$296,539
A2	INSTALL A/D BUIDLING ELEVATOR	0%	70%	30%	$ 275,000	$ -	$ -	$ 192,500	$ 82,500	$ -	$296,539
A3	ACQUIRE LAND FOR RPZ, CLEAR ZONE FOR RWY 23, BRL FOR RWY 12/30	90%	0%	10%	$ 356,000	$ 320,400	$ -	$ -	$ 35,600	$ -	$126,139
A4	REMOVE & MITIGATE RWY 5/23, OTHER TRANSITIONAL FAR PART 77 OBSTRUCTIONS	90%	0%	10%	$ 256,000	$ 230,400	$ -	$ -	$ 25,600	$ -	-$104,261
A5	COMPLETE FAA AGIS SURVEY FOR RUNWAY 5/23	90%	0%	10%	$ 15,000	$ 13,500	$ -	$ -	$ 1,500	$ -	-$117,761
A6	CRACK SEAL AIRPORT PAVEMENTS	0%	70%	30%	$ 54,000	$ -	$ -	$ 37,800	$ 16,200	$ -	-$117,761
A7	ACQUIRE LAND FOR FAA RPZ, OBSTRUCTION REMOVAL FOR RWY 12	90%	0%	10%	$ 409,000	$ 182,239	$ 185,861	$ -	$ 40,900	$ -	$0
A8	REMOVE & MITIGATE RWY 12/30 FAR PART 77 OBSTRUCTIONS	90%	0%	10%	$ 165,000	$ -	$ 148,500	$ -	$ 16,500	$ -	$0
A9	REHABILITATE RUNWAY 12/30, TAXIWAY, SECONDARY APRON (CRACK FILL & SURFACE TREATMENT)	90%	0%	10%	$ 268,000	$ 150,000	$ 91,200	$ -	$ 26,800	$ -	$0
A10	GROOVE RUNWAY 12/30	90%	0%	10%	$ 132,000	$ -	$ 125,400	$ -	$ 13,200	$ -	$0
A11	CONSTRUCT PARALLEL TAXIWAY, SOUTH WATERSHED DRAINAGE IMPROVEMENTS	90%	0%	10%	$ 3,466,000	$ -	$ 3,119,400	$ -	$ 346,600	$ -	$0
A12	REHABILITATE PRIMARY APRON (MILL & OVERLAY), RECONFIGURE TIE-DOWNS	90%	0%	10%	$ 325,000	$ -	$ 292,500	$ -	$ 32,500	$ -	$0
A13	REHABILITATE HANGAR AREA PAVEMENT (CRACK FILL & SURFACE TREATMENT)	PR	PR	PR	$ 103,000	$ -	$ 20,394	$ 40,170	$ 42,436	$ -	$0
SHORT TERM IMPLEMENTATION PLAN (0 TO 5 YEARS)				**TOTAL:**	**$ 5,775,000**	**$ 896,539**	**$ 3,962,861**	**$ 260,000**	**$ 662,200**	**$ -**	

(RWF) - Redwood Falls Municipal Airport

AIRPORT LAYOUT PLAN - IMPLEMENTATION

Federal Entitlement Balance FY 2013: $296,539

****ALL COSTS BASED ON ESTIMATES, MAJOR CAPITAL IMPROVEMENTS SHOWN****

Sequence	Description	Funding Participation FAA %	State %	Local %	Project Cost	Federal Entitlement Funding	Additional Federal Funding	State Funding	Local Funding	Other Programs	Federal Entitlement Balance
MID TERM IMPLEMENTATION PLAN (6 YEARS TO 10 YEARS)											
B1	CONDUCT WILDLIFE HAZARD SITE VISIT	90%	0%	10%	$ 35,000	$ 31,500	$ -	$ 19,250	$ 15,750	$ -	-$31,500
B2	CONSTRUCT TERMINAL AREA FENCING & CONTROLLED ACCESS GATES	90%	0%	10%	$ 175,000	$ 157,500	$ -	$ -	$ 17,500	$ -	-$39,000
B3	COMPLETE RUNWAY LENGTH JUSTIFICATION REPORT FOR 4,400 FEET	0%	0%	100%	$ 23,000	$ -	$ -	$ -	$ 23,000	$ -	-$39,000
B4	CONDUCT ENVIRONMENTAL ASSESSMENT STUDY FOR RUNWAY 12/30 & TAXIWAY EXTENSION (400'), RUNWAY 5/23 EXTENSION (300), WEST HANGAR DEVELOPMENT	90%	0%	10%	$ 154,000	$ 138,600	$ -	$ -	$ 15,400	$ -	-$27,600
B5	CONSTRUCT EAST TAXILANE WIDENING	90%	0%	10%	$ 162,000	$ 145,800	$ -	$ -	$ 16,200	$ -	-$23,400
B6	EAST HANGAR SITE PREPARATION	0%	50%	50%	$ 40,000	$ -	$ -	$ 20,000	$ 20,000	$ -	-$23,400
B7	ACQUIRE LAND FOR RUNWAY 12/30 EXTENSION (FAA RPZ, BRL)	90%	0%	10%	$ 577,000	$ 126,600	$ 392,700	$ -	$ 57,700	$ -	$0
B8	ACQUIRE LAND FOR RUNWAY 5/23 EXTENSION (FAA RPZ, BRL)	90%	0%	10%	$ 244,000	$ -	$ 219,600	$ -	$ 24,400	$ -	$0
MID TERM IMPLEMENTATION PLAN (6 YEARS TO 10 YEARS)				**TOTAL:**	**$ 1,166,000**	**$ 600,000**	**$ 392,700**	**$ 39,250**	**$ 165,550**	**$ -**	

(RWF) - Redwood Falls Municipal Airport

AIRPORT LAYOUT PLAN - IMPLEMENTATION

Federal Entitlement Balance FY 2013: $296,539

****ALL COSTS BASED ON ESTIMATES, MAJOR CAPITAL IMPROVEMENTS SHOWN****

Sequence	Description	Funding Participation FAA %	State %	Local %	Project Cost	Federal Entitlement Funding	Additional Federal Funding	State Funding	Local Funding	Other Programs	Federal Entitlement Balance
LONG TERM IMPLEMENTATION PLAN (11 YEARS TO 20+ YEARS)											
C1	DESIGN RUNWAY 12/30, TAXIWAY EXTENSION (400'), LIGHTING, RUNWAY 5/23 EXTENSION	90%	0%	10%	$ 180,000	$ 162,000	$ -	$ -	$ 18,000	$ -	-$12,000
C2	COMPLETE FAA AGIS SURVEY FOR RUNWAY APPROACHES	90%	0%	10%	$ 114,000	$ 102,600	$ -	$ -	$ 11,400	$ -	-$114,600
C3	CONDUCT RUNWAY LENGTH JUSTIFICATION STUDY (REIMBURSEMENT)	90%	0%	10%	$ -	$ 20,700	$ -	$ -	$ -	$ -	$117,300
C4	CONSTRUCT RUNWAY 12/30 EXTENSION (400')	90%	0%	10%	$ 387,000	$ 117,300	$ 231,000	$ -	$ 38,700	$ -	$0
C5	CONSTRUCT TAXIWAY EXTENSION (400'), LIGHTING	90%	0%	10%	$ 279,000	$ -	$ 251,100	$ -	$ 27,900	$ -	$0
C6	REPLACE AIRFIELD LIGHTING (MIRL, REIL, PAPI, BEACON)	90%	0%	10%	$ 424,000	$ -	$ 381,600	$ -	$ 42,400	$ -	$0
C7	CONSTRUCT RUNWAY 5/23 EXTENSION	90%	0%	10%	$ 204,000	$ -	$ 183,600	$ -	$ 20,400	$ -	$0
C8	REHABILITATE RUNWAY 12/30, TAXIWAY, APRON (CRACK FILL & SURFACE TREATMENT)	90%	0%	10%	$ 333,000	$ -	$ 299,700	$ -	$ 33,300	$ -	$0
C9	REHABILITATE HANGAR AREA PAVEMENT (CRACK FILL & SURFACE TREATMENT)	PR	PR	PR	$ 109,000	$ -	$ 20,394	$ 42,510	$ 44,908	$ -	$0
C10	UPDATE AIRPORT MASTER PLAN	90%	0%	10%	$ 86,000	$ 77,400	$ -	$ -	$ 8,600	$ -	$72,600
C11	CONSTRUCT WEST HANGAR SITE TAXILANE	90%	0%	10%	$ 304,000	$ 273,600	$ -	$ -	$ 30,400	$ -	-$51,000
C12	WEST HANGAR SITE PREPARATION	0%	50%	50%	$ 123,000	$ -	$ -	$ 61,500	$ 61,500	$ -	-$51,000

(RWF) - Redwood Falls Municipal Airport

AIRPORT LAYOUT PLAN - IMPLEMENTATION

Federal Entitlement Balance FY 2013: $296,539

****ALL COSTS BASED ON ESTIMATES, MAJOR CAPITAL IMPROVEMENTS SHOWN****

Sequence	Description	Funding Participation FAA %	State %	Local %	Project Cost	Federal Entitlement Funding	Additional Federal Funding	State Funding	Local Funding	Other Programs	Federal Entitlement Balance
C13	CONSTRUCT NEW AIRPORT ENTRANCE ROAD, PUBLIC PARKING LOT EXPANSION, DRAINAGE IMPROVEMENTS	90%	0%	10%	$ 508,000	$ 457,200	$ -	$ -	$ 50,800	$ -	-$58,200
C14	PUBLIC 10-UNIT HANGAR SITE PREPARATION - WEST HANGAR AREA	0%	50%	50%	$ 324,000	$ -	$ -	$ 162,000	$ 162,000	$ -	-$58,200
C15	CONSTRUCT 10-UNIT T-HANGAR - STATE HANGAR LOAN PROGRAM	0%	80%	20%	$ 50,000	$ -	$ -	$ 40,000	$ 10,000	$ -	$91,800
C16	DEMOLISH 8-UNIT T-HANGAR	90%	0%	10%	$ 58,000	$ 52,200	$ -	$ -	$ 5,800	$ -	$189,600
C17	RECONSTRUCT HANGAR AREA PAVEMENT	90%	0%	10%	$ 832,000	$ 189,600	$ 559,200	$ -	$ 83,200	$ -	$0
C18	CONSTRUCT 10-UNIT T-HANGAR BUILDING	0%	80%	20%	$ 900,000	$ -	$ -	$ 720,000	$ 180,000	$ -	$0
C19	CONSTRUCT APRON EXPANSION	90%	0%	10%	$ 166,000	$ 149,400	$ -	$ -	$ 16,600	$ -	$600
C20	REHABILITATE RUNWAY 12/30, PARTIAL PARALLEL TAXIWAY, APRON (MILL & OVERLAY)	90%	0%	10%	$ 1,348,000	$ 600	$ 1,212,600	$ -	$ 134,800	$ -	$0
LONG TERM IMPLEMENTATION PLAN (11 YEARS TO 20+ YEARS)				**TOTAL:**	**$ 6,729,000**	**$ 1,602,600**	**$ 3,139,194**	**$ 1,026,010**	**$ 980,708**	**$ -**	
TOTAL THROUGH 20+ YEAR PLANNING PERIOD				**TOTAL:**	**$ 13,670,000**	**$ 3,099,139**	**$ 7,494,755**	**$ 1,325,260**	**$ 1,808,458**	**$ -**	

ASSUMPTIONS:

(1) GENERAL AVIATION, NON-PRIMARY AIRPORT ELIGIBLE FOR $150,000 PER FEDERAL FISCAL YEAR IN AIRPORT IMPROVEMENT PROGRAM (AIP) FUNDS AT 90% FEDERAL SHARE. MULTI-YEAR GRANTS AVAILABLE

(2) MULTI-YEAR AIP GRANTS AVAILABLE.

NOTE: THIS DOCUMENT IS FOR PLANNING PURPOSES ONLY. PROJECT COST ESTIMATES AND FUNDING PLAN SHOULD BE UPDATED PRIOR TO PROGRAMMING PROJECT FOR FUNDING.

Appendix E

FAA-approved Airport Layout Plan to be inserted into Appendix in Final Document