Sidney-Richland Regional Airport

2015 Airport Master Plan Update



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Chapter 1: Introduction

Purpose and Scope

The information presented in this report represent the study findings for the 2014 Sidney-Richland Regional Airport Master Plan Update prepared for the Sidney-Richland Regional Airport Authority. Airport Master Plans are prepared in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, Airport Master Plans. This project was funded in part by the Federal Aviation Administration (FAA) through grant number AIP 21 and complies with Federal requirements.

This Airport Master Plan Update for the Sidney-Richland Regional Airport will serve as an updated guide for identifying future development necessary to accommodate existing and future aviation demand. The airport's current and forecast safety, capacity and compatibility needs are addressed in this study. Many projects have been completed and new planning considerations have developed since the previous Master Plan study in 1996.

The scope of the study was developed by the Airport Authority and Kadrmas, Lee & Jackson (KLJ) in cooperation with FAA officials to identify the specific needs and objectives of the airport owner. The scope includes work tasks with the purpose of documenting existing conditions, forecasting future aviation activity levels, identifying future facility requirements, formulating and evaluating airfield alternatives, and preparing implementation plans. Recommendations will be made for improvements that are triggered by safety requirements or demand thresholds.

The project received notice to proceed in March 2014. The baseline project data is from inventory efforts completed in March 2014. Baseline airport operational data is from Federal fiscal year 2013 (October 2012 – September 2013) as this time period aligns with the Federal fiscal year time period aligns directly with the FAA Terminal Area Forecast. Discrepancies in historical data will be noted throughout the document.

This Master Plan was adopted by the Sidney-Richland Regional Airport Authority on January 14, 2016.

Airport Master Plan Format

The required and recommended contents of Airport Master Plans are detailed per FAA standards. Effective airport master plans are based on the analysis of significant amounts of data, and many airport master plans typically present not only the planning conclusions, but all data and accompanying analysis in considerable detail.

This Master Plan presents extensive data to support the plan in a series of appendices. As the reader moves through the narrative descriptions, there are frequent references to specific appendices to provide additional details and information. In addition, internet hyperlinks are included to reference documents that are current as of the time of this report.

Master Plan Process

Guidelines for completing a Master Plan are set forth in FAA Advisory Circular 150/5070-6B. Each master plan study scope and level of effort is customized to fit each individual airport's needs and address critical issues. The recommendations made in the study allow airports to address key issues to allow for safety, capacity and compatibility to meet airport demands and community needs. Plans are flexible to provide demand-driven triggers for improvements.

The Airport Master Planning process involves several coordinated steps. The master plan study for Sidney-Richland Regional Airport consists of the following elements:

- **Pre-Planning** – Airport development concerns are identified and planning objectives prepared to address these issues. An overall vision for the study is formulated that will guide the process.
- **Inventory of Existing Conditions** – Overview of airport setting, infrastructure and assets which includes airside, landside and support facilities; airspace, navigational aids and airport access.
- **Forecast of Aviation Demand** – Using established forecasting methods, estimate current and project future airport activity for general aviation, air cargo, and passenger enplanements.
- **Demand/Capacity Analysis and Facility Requirements** – Compare the existing capacity with the future demand and identify the facility requirements to satisfy the aviation safety, capacity and compatibility needs.
- **Alternatives Development and Evaluation** – Identify and evaluates options considering both on-airport and off-airport impacts consistent with the study goals and objectives. A preferred alternative is selected.
- **Environmental Overview** – Provide an overview of anticipated environmental impacts as part of the development of alternatives.
- **Implementation Plan** – Provide a comprehensive plan for implementation of the preferred alternative including project triggers, sequencing, and cost estimates.
- **Land Use Compatibility** – Complete a comprehensive review of land surrounding the airport for potential uses that are incompatible with safe airport operations and provide mitigation recommendations.
- **Airport Layout Plan** – Document the existing and planned airport facilities through a set of drawings approved by the airport sponsor, state and FAA.
- **Stakeholder and Public Involvement** – Prepare and execute a plan to engage important airport stakeholder and the public throughout the study to gather their input and address their concerns.

Planning Objectives

With the completed Master Plan projects, continued increase in activity, and constraints on airport development, the Sidney-Richland Regional Airport Authority authorized an update to the Master Plan. The Airport Authority contracted with KLJ to prepare an update to the Airport Master Plan to examine options for the airport to address the planning considerations, including developing and analyzing alternatives and recommending a course of action.

Based on the background and planning considerations, the planning objectives for this study identify the methods used to meet the airport development goals outlined by the Sidney-Richland Regional Airport Authority. The objectives are identified as follows:

- Explore existing north side development opportunities
- Determine how the area south of Runway 11-29 (Mid-Field) should be develop
- Determine the correct vehicular access point into the airport when the Mid-Field is developed,
- Address existing and future vehicle parking based
- Determine air cargo requirements based on current and forecasted need,
- Evaluate how the new Williston, ND Airport could affect Sidney-Richland Airport,
- Provide guidance to the airport in capturing all enplanements (air carrier, commuter, and air taxi),
- Explore pros and cons of FAR Part 139 Certification,
- Evaluate the possibility of another air carrier (United, Sky West, other)
- Perform runway length analysis to ensure that the current runway lengths will meet the forecasted need.
- Justify the proposed development through the technical, economic, and environmental investigation of concepts and
- Provide an Airport Layout Plan identifying existing and proposed airport development.
- Establish a realistic schedule for the implementation of the development proposed in the plan, particularly the short-term capital improvement program.
- Propose an achievable financial plan to support the implementation schedule.
- Identify subsequent environmental evaluations that may be required before a proposed project is approved.

Formulate a clear understanding of the airport's role and the types of aircraft and aviation activities it is expected to serve.

Study Documentation & Approvals

The Master Plan Update was divided into chapters of information to document airport planning data, analysis, findings and recommendation of the study. The chapters included in the narrative report are the following:

- Chapter 1 – Introduction
- Chapter 2 – Existing Conditions
- Chapter 3 – Forecasts
- Chapter 4 – Facility Requirements
- Chapter 5 – Alternatives Development and Evaluation
- Chapter 6 – Implementation
- Chapter 7 – Environmental Review and Solid Waste Plan

Each narrative report chapter was prepared separately and distributed to the Technical Advisory Committee (TAC) for review[1]. After TAC review, each draft chapter was made available to the Sidney-Richland Regional Airport Authority Board for review and approval.

The Master Plan Update was adopted by the Sidney-Richland Regional Airport Authority on January 14, 2016. The Airport Layout Plan was submitted to FAA for review and approval on May 27, 2016.

Public Involvement

Public involvement is a key component to the successful development of an Airport Master Plan study. The purpose is to encourage information sharing and feedback from airport stakeholders including the airport owner, airport users/tenants, local government officials, resource agencies, elected and appointed officials and the general public. Public involvement provides valuable input to assist the airport owner in decision making and develop consensus on study conclusions.

As mentioned above the Airport Authority developed a Technical Advisory Committee (TAC) which served as a liaison throughout the master planning process, reviewing and providing input into the chapters and layouts contained in the report. The TAC was comprised of local community leaders from various sectors of the economic engine with the Sidney area.

Public meetings were held at three points during the master plan study; forecasts (June 17, 2014), recommendations (June 18, 2015), and ALP Review (June 18, 2015). An Open House provided a forum for the Airport to share information on the study and solicit feedback from the public. The public was also invited to Airport Authority Board meetings to provide feedback progressively during this public forum. Draft documents on the study were posted progressively for public review.

[1] The TAC was comprised of seven community members (including the airport manager) picked by the Airport Authority to serve as a mechanism for document review and community input.

Study meetings with the Airport staff were held at key stages throughout the project to facilitate small group collaboration and feedback on study elements.

Conclusion

This Airport Master Plan Update study for the Sidney-Richland Regional Airport provides the Airport Authority with a usable guidance document to assist with decision making with airport capital improvements to meet aviation demands for the foreseeable future. As with any planning study, assumptions made are subject to change due to unpredictable internal and external events. For this reason, this study should be reviewed periodically to verify project scope and triggering events are still valid to meet the airport needs.

Chapter 2: Existing Conditions

The Existing Conditions chapter of the Airport Master Plan for Sidney-Richland Regional Airport provides the baseline framework to evaluate the airport facility. This review will be used to compare the existing facilities to the airport needs determined in future sections of the plan. This will lead to a plan developed for the future of the airport. Background information and data is gathered from various sources and compiled into this chapter and appendices. Please refer to the various appendices referenced within this narrative for more detailed information.

Background

General

Sidney-Richland Regional Airport (FAA ID: SDY), is located in Richland County in north eastern Montana. The airport is a commercial service airport providing scheduled passenger service, air cargo, and complete general aviation services. The airport served roughly 4,700 operations, enplaned 9,560 passengers and served nearly 12 arrivals of landed freight and mail in Federal fiscal year 2013 (Oct 2012-Sept 2013).

Location

Sidney is a city in and the county seat of Richland County, Montana, United States, less than 10 mi away from the North Dakota border. The population was 5,191 at the 2010 census. The city lies along the Yellowstone River and is in proximity to the badlands of the Dakotas. Sidney is approximately 270 miles northeast of Billings, MT and 240 miles northwest of Bismarck, ND.

The airport is located approximately one mile west of the Sidney central business district. From the downtown district the airport is access via Route 16. Please refer to **Figure 2-1: Airport Location Map**.

Setting and History

Sidney-Richland Regional Airport is located adjacent to a golf course to the north and near urban expansion areas to the north and residential development to the west. The remainder of the airport is surrounded by farmland and steep terrain to the west of the airfield. **Figure 2-2: Surrounding Land Use** and **Figure 2-3: Airport Setting** depict to the airport's local environment.

The airport was established in 1951, and has two paved runways and provides commercial service through the FAA's Essential Air-Service (EAS) program. Sidney-Richland Regional Airport has two Fixed-Base Operators (FBO's) that provide service to the general public. Some of these services include fuel, aircraft charters or rentals, flight instruction, aircraft storage, maintenance, aerial tours, pilot lounges, internet, and restrooms.

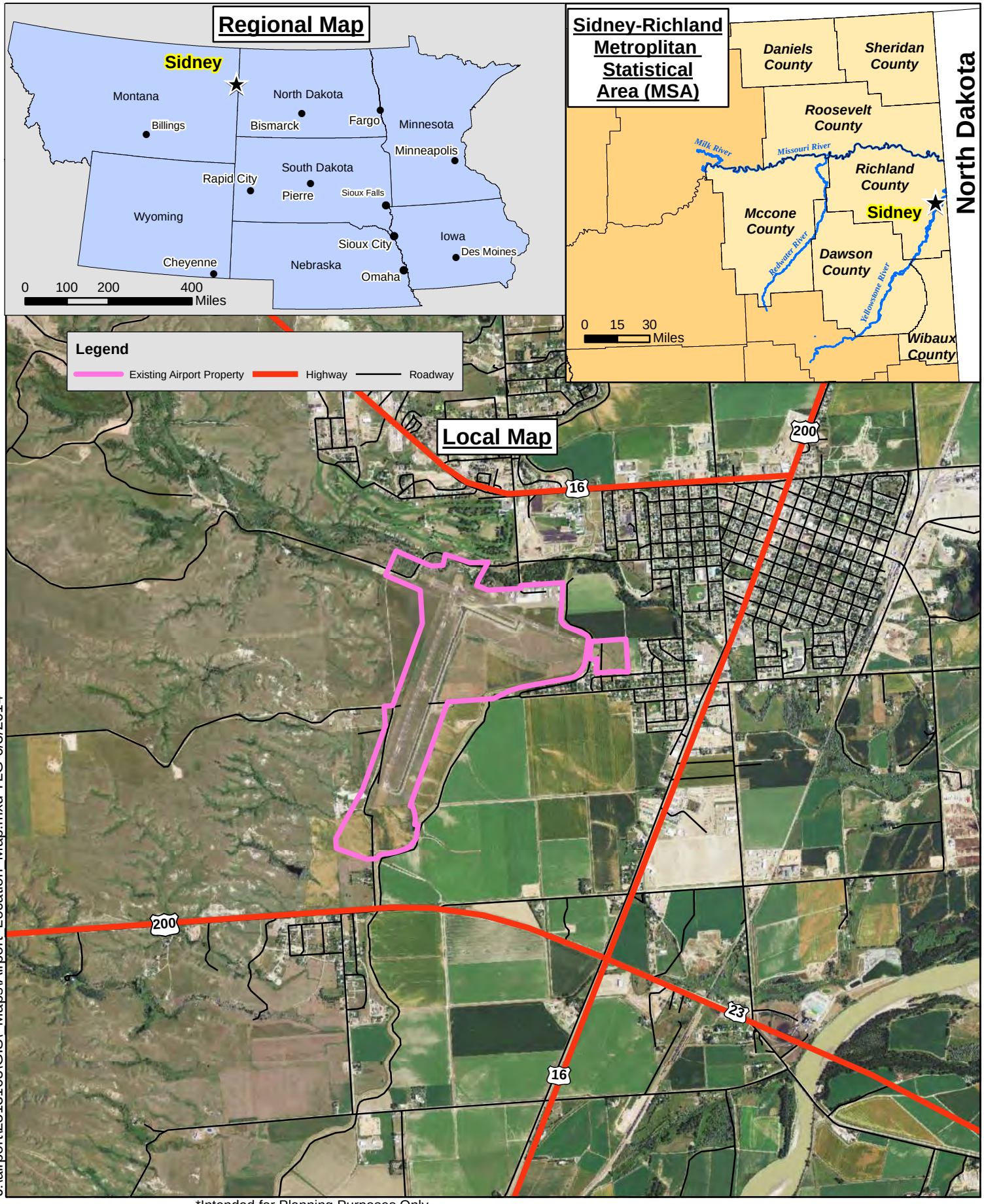
Climate

Generally, the climate within the vicinity of Richland County follows the typical eastern Montana patterns. Average highs in the summer months will reach 70-80 degrees, while average lows in winter months tend to stay below 20 degrees. Average annual precipitation consists of 12.4 inches of rainfall and 24.3 inches of snowfall.

Exhibit 2-1 – Wind Analysis

All-Weather Wind Coverage				
Runway	**Crosswind Component (Wind Speed)**			
	10.5 knots	**13.0 knots**	**16.0 knots**	**20.0 knots**
Runway 01/19	85.47%	90.89%	96.10%	98.77%
Runway 11/29	91.43%	95.43%	98.80%	99.74%
Combined*	98.42%	99.55%	99.90%	99.99%
IFR Wind Coverage				
Runway	**Crosswind Component (Wind Speed)**			
	10.5 knots	**13.0 knots**	**16.0 knots**	**20.0 knots**
Runway 01/19	89.67%	93.10%	96.37%	98.41%
Runway 11/29	85.47%	91.40%	96.97%	99.07%
Combined*	96.93%	98.77%	99.59%	99.90%

**Combined assumes up to maximum design aircraft crosswind component for each runway*
Source: National Climatic Data Center data from Sidney-Richland Regional Airport AWOS (2004-2014)



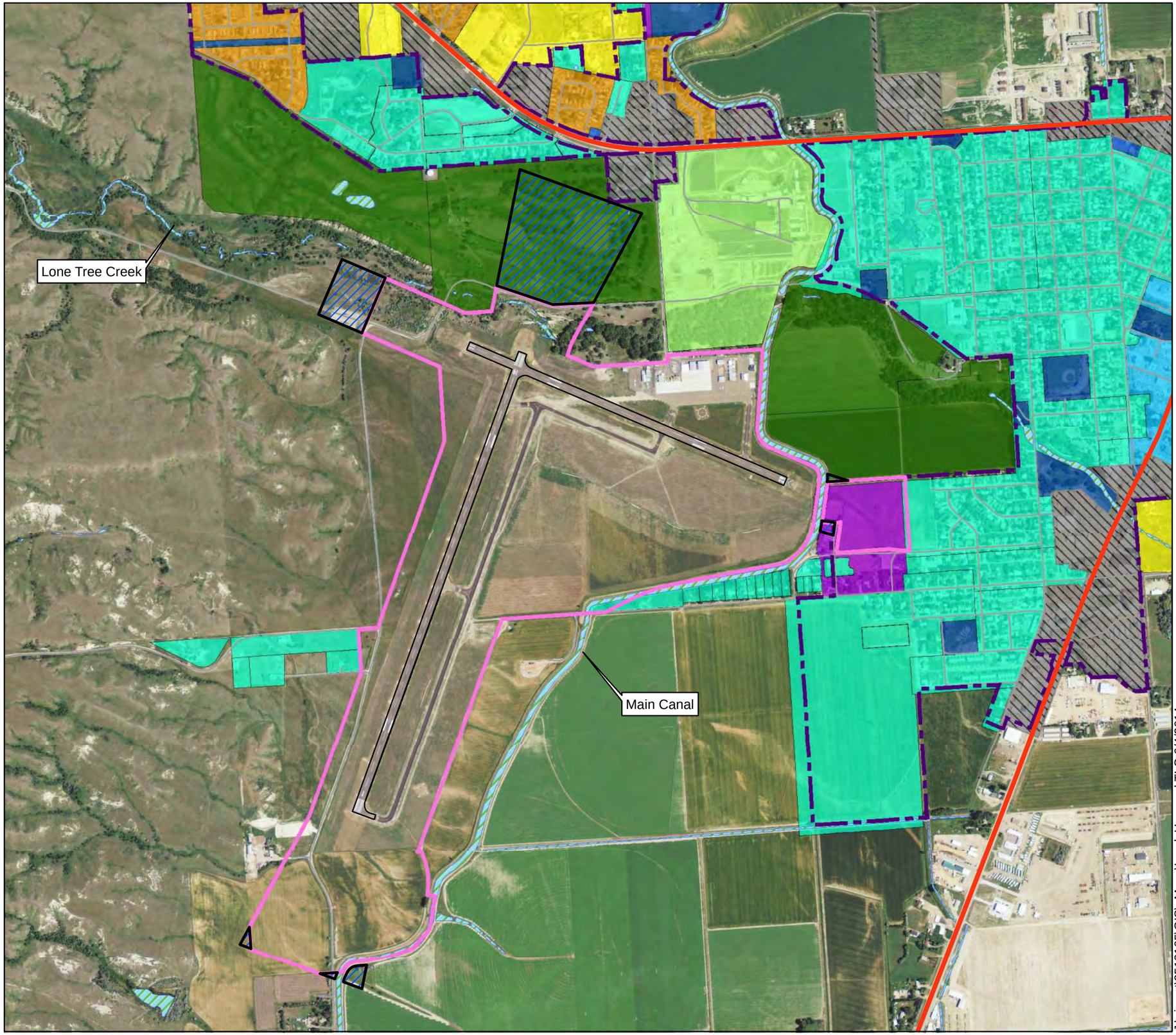
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*Intended for Planning Purposes Only

N

0 0.5 1 2
Miles

Sidney-Richland Municipal Airport
Airport Location Map
Figure 2-1



Land Use

- CENTRAL BUSINESS
- CITY PARK
- COMMUNITY HIGHWAY BUSINESS
- MOBLE HOME PARK/SINGLE RESIDENTS
- NEIGHBORHOOD BUSINESS
- PLANNED UNIT DEVELOPMENT
- SINGLE/MULTIPLE FAMILY RESIDENTIAL
- UN-INCORPORATED AREA
- AGRICULTURE
- EXEMPT PROPERTY

Legend

- Highway
- Existing Airport Easement
- FAA Runway Protection Zone
- Existing Airport Property
- City Boundary
- National Wetland Inventory

N

0 750 1,500 3,000 Feet

*Intended for Planning Purposes Only

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KLJ

Sidney-Richland Municipal Airport
Airport Land Use Map
Figure 2-2



Ground Contours

Elevation (ft)

- 1950 - 1980
- 1981 - 2010
- 2011 - 2040
- 2041 - 2070
- 2071 - 2100
- 2101 - 2130
- 2131 - 2160
- 2161 - 2190

Legend

- City Boundary
- National Wetland Inventory
- Runway
- Existing Airport Property
- Highway

N

0 750 1,500 3,000 Feet

*Intended for Planning Purposes Only

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KLJ

Sidney-Richland Municipal Airport
Airport Setting Map
Figure 2-3

Demographics

The Sidney-Richland area has various employers in the area. Per the Richland Economic Development Corp, the top ten employers in the area include: Agri Industries, Franz Construction, Hurley Ent., Mitchell's Oil Field Service, Pauper Industries, Reynolds Warehouse Grocery, Sidney Health Center, Sidney Sugars, South 40, and Valley View IGA.

Chapter 3 - Forecasts contains demographic and socioeconomic data, estimates, and forecasts.

Airport Management

The Sidney-Richland Regional Airport Authority, an independent governing body created in 1951, is responsible for the overall administrative, development and operations of the Airport. The authority is made up of five members appointed by the governing body of Sidney. The Authority receives funding from both the city and the county. Presently, the airport gets a base amount of roughly $18-20000 annually from the City. The County has expressed commitment to the development of the airport, and is contributing approximately $250,000 annually for the next several years to assist in construction expenses.

Airport Role & Design

The Sidney-Richland Airport provides scheduled passenger service, air cargo, and complete general aviation services. The airport serves northeastern Montana.

The airport is part of the National Plan of Integrated Airport Systems (NPIAS) as classified by the Federal Aviation Administration (FAA). NPIAS airports are vital to the national air transportation system. According to FAA standards, the airport is classified as a nonhub commercial service airport as it enplanes over 10,000 passengers a year. **Appendix C - Airport Classification** contains more information on this topic. The airport is certificated under FAR Part 139 guidelines as a Class III airport certificated to serve scheduled operations of small air carrier aircraft. This class may not serve scheduled or unscheduled large air carrier aircraft.

Airports are designed to regularly accommodate aircraft up to certain wingspan, tail height, and approach speed parameters. The last Airport Master Plan prepared for Sidney-Richland Regional Airport in 1996 has a FAA Airport Reference Code (ARC) of B-II for a Beech 1900.

See **Appendix C, Airport Classification** for more details on FAA design classifications.

Airport Operators

Scheduled Passenger Airlines

Through the FAA's Essential Air Service (EAS) Program, Sidney provides scheduled flight service to Billings, MT with Cape Air. EAS is a program put in place to guarantee smaller communities airline service. This is accomplished by providing subsidies to airlines to help offset the cost of providing service to these outlying communities. It should be noted that, if the airport were to ever lose EAS service, they would not be eligible to enter back into the program at a later date.

Scheduled Cargo Carriers

Periodically, the Sidney-Richland Regional Airport caters to cargo service operations. FedEx has expressed an interest in leasing a hangar on the east-side of the airfield. Richland Aviation has an existing contract with UPS to deliver parcels. Richland Aviation moves UPS parcels/packages with one daily flight.

General Aviation

The general aviation operations at Sidney-Richland Regional Airport vary from corporations, aerial application, flight instruction, and the leisure fliers. These types of operations are supported by two Fixed-Base Operators (FBOs) located on the airfield (Richland Aviation and Sidney Air Service).

Existing Facilities

An inventory of Sidney-Richland Regional Airport facilities was performed to establish a baseline for determining required future improvements. As discussed in the following sections, airport facilities are grouped into three categories: airside facilities, airspace and navigation aids (NAVAIDs) and landside facilities.

Land

As of March 2014, the Sidney-Richland Regional Airport owns approximately 338 acres of property fee simple and controls another 74(+/-) acres in aviation easement for land use and/or airspace control.

Airside Facilities

Airside facilities are those that are necessary for aircraft surface movement, such as runways, taxiways, aprons and associated lighting, marking and signage systems. A map depicting existing airport airside components is included in **Figure 2-4: Airside Facilities Map**. Information on design codes is contained in **Appendix E – Airfield Design**.

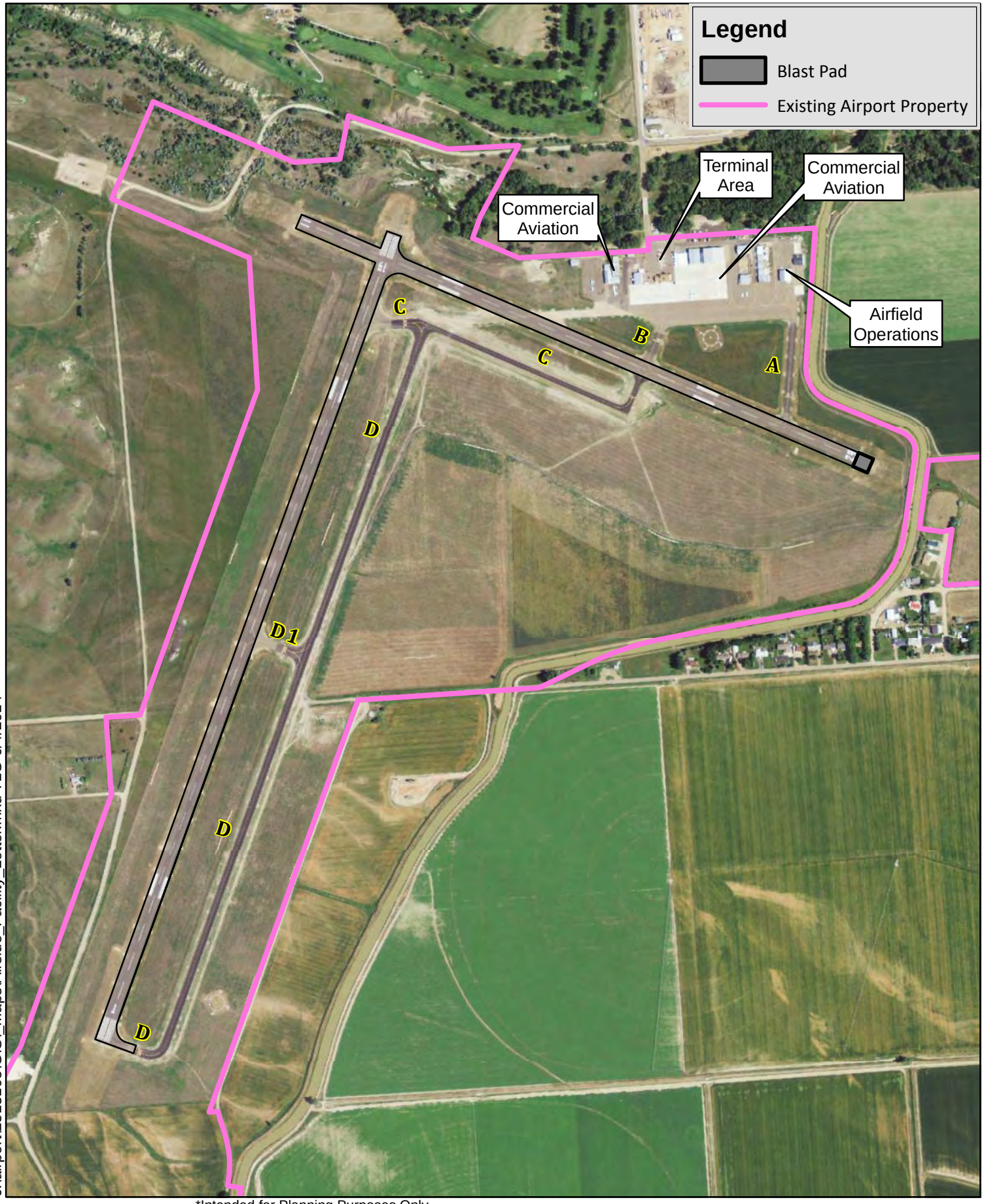
Runway 1/19

Runway 1/19, the longest air carrier and general aviation runway at Sidney-Richland Regional Airport, is 5,705 feet long and 100 feet wide. The runway is designed to meet FAA Runway Design Code (RDC) B-II design standards with approach minimums not lower than ¾ mile. The runway pavement surface is asphalt. The pavement is designed to accommodate regular use of up to 40,000 pound aircraft in a single wheel main landing gear configuration, 55,000 pound aircraft in a double-wheel main landing gear configuration and 85,000 pound aircraft in a double tandem main landing gear wheel and strut configuration. The runway's Pavement Classification Number is _____

Runway 11/29

Runway 11/29 is 4,023 feet long and 100 feet wide. The runway is designed to meet FAA Runway Design Code (RDC) B-II design standards with approach minimums not lower than ¾ mile. The runway pavement surface is asphalt. The pavement is designed to accommodate

regular use of up to 12,000 pound aircraft in a single wheel main landing gear configuration, and 18,000 pound aircraft in a double-wheel main landing gear configuration.



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*Intended for Planning Purposes Only

N

0 500 1,000 2,000 Feet

Sidney-Richland Municipal Airport
Airside Facility Map
Figure 2-4

Exhibit 2-2 – Runway Facility Summary

Runway Facility Summary		
Component	**Runway 1/19**	**Runway 11/29**
Runway Length (feet)	5,705	4,023
Runway Width (feet)	100	100
Runway Surface Material	Asphalt	Asphalt
Runway Surface Treatment	--	--
Runway Pavement Strength (lbs.)		
Single Wheel	40,000	12,000
Dual Wheel	55,000	18,000
Dual Tandem Wheel	85,000	--
Pavement Classification Number (PCN)	18/F/D/X/T	N/A

R = Rigid Concrete Pavement, B = Subgrade Category (Medium Strength), W = Unrestricted Tire Pressure, T = Technical Analysis
Source: Airnav.com, FAA Airport Master Record Form 5010 Report

Taxiways

Sidney-Richland Regional Airport is served by a system of taxiways to facilitate the movement of aircraft from the runway environment to other airport facilities including hangars, parking aprons and hangars. Locations are identified in **Figure 2-4: Airside Facilities Map**. Runway 1/19 has a full length parallel taxiway located on the eastside of the runway and Runway 11/29 has a partial parallel taxiway located on the south side of the runway.

Aprons

The airport is served by one long linear apron on the north side of the airfield. The Apron is approximately 42,500 square yards in size and serves commercial service activity as well as general aviation activity. Commercial service is conducted on Portland concrete in front of the terminal building. A map depicting existing apron area is included in **Figure 2-4.**

Pavement Condition

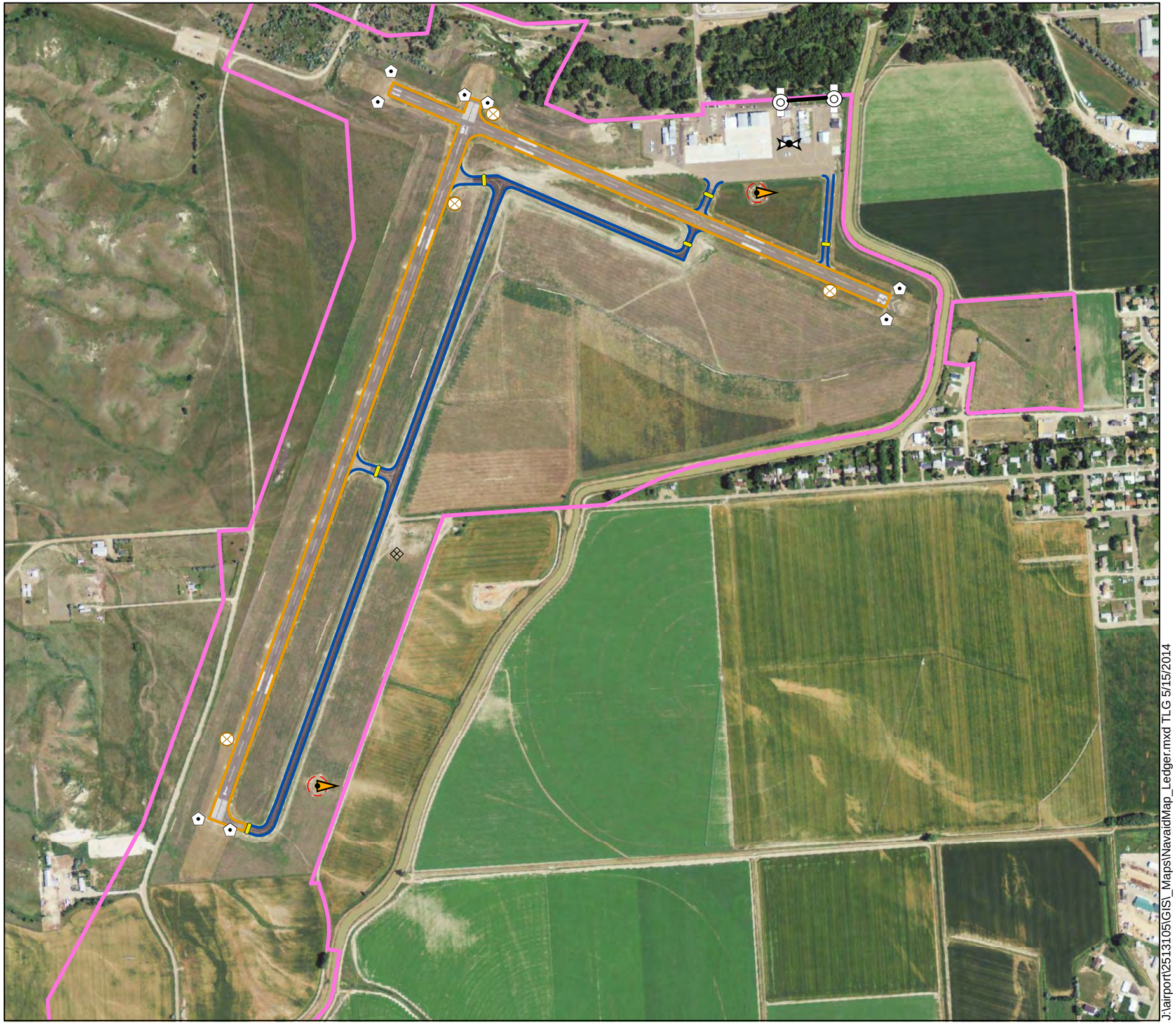
Airport pavements are basic infrastructure components at airports. Airfield pavements should be maintained in a safe and operable condition for aircraft operations. Pavement condition is comprehensively evaluated by the State every three years and measured on a 0 to 100 scale known as the Pavement Condition Index rating. Pavement evaluation includes runway, taxiway, and apron pavement. A copy of the latest pavement evaluation study is contained in **Appendix D – Airfield Pavements.**

Overall, the airfield was rated between 82-66 from the samples taken, with portions of the pavement in good condition and fair or good condition, throughout the airport. A portion of the Runway 1/19 parallel Taxiway near the center is in poor condition.

Navigation Aids & Airspace

Navigational aids (NAVAIDs) provide visual and electronic guidance to pilots enabling the airport to safely, efficiently and effectively accommodate arriving and departing flights. Airspace is a resource that is necessary to allow flights to safely operate and maneuver in the

airport environment. **Figure 2-5: Navigational Aids Map** identifies visual and electronic navigational aids and weather facilities graphically.



Legend

- Automated Weather Observing System
- Airport Beacon
- Non-Directional Beacon
- Precision Approach Path Indicator
- Runway End Identifier Lights
- Segmented Circle
- Windcone
- Hold Line
- Medium Intensity Runway Lighting
- Medium Intensity Taxiway Lighting
- Existing Airport Property

N

0 500 1,000 2,000 Feet

*Intended for Planning Purposes Only

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KLJ

Sidney-Richland Municipal Airport
Navigational Aids Map
Figure 2-5

Visual Navigation Aids

Visual aids are installed to provide airport usability during periods of darkness and/or low visibility. Pavement markings and lighting systems available at Sidney-Richland Regional Airport are summarized in the following sections.

Identification Lighting

A white-green rotating beacon is a two-sided light used to assist pilots in the visual identification of a civilian airport. The rotating airport beacon for Sidney-Richland Regional Airport is located near the center of the airfield.

Pavement Edge Lighting

Pavement edge lighting fixtures are installed off the edges of runway and taxiway pavement to help pilots identify the edge and ends pavement to facilitate safe operations in darkness and/or low visibility environments. Runway edge lights are white, except for the final 3,000 feet of runway where the lights change color to yellow then red to warn pilots of the end of the runway. The runway end threshold lights are green viewing down the runway and red viewing at the end of the runway. Taxiway edge lights are blue. Runway 1/19 and Runway 11/29 are equipped with Medium Intensity Runway Lighting (MIRL). The taxiways are equipped with Medium Intensity Taxiway Lighting (MITL).

Visual Approach Lighting

Visual approach lighting provides vertical guidance to pilots. This navigational aid is used by the pilot to acquire and maintain the correct glide path for landing. The red and white lights emitted are interpreted by the pilot to indicate whether they are too high, too low, or on glidepath. Precision Approach Path Indicator Lights (PAPI) are the current standard equipment installed for this purpose. All four (4) runway ends are equipped with a two-box Precision Approach Path Indicator (PAPI-2L) lights installed on the left side of each runway end.

Runway End Identification Lighting

Runway End Identifier Lights (REILs) are a set of synchronized flashing white strobe lights installed on each side of the runway to provide rapid and positive identification of the approach end of a runway without complex visual approach lighting. The system can be unidirectional toward the runway approach or omnidirectional. All four (4) runway ends are equipped with REILs.

Pilot-Controlled Lighting

At non-towered airports, or when tower operations are closed, pilot-controlled lighting is utilized during adverse weather conditions and night operations. Airfield lighting systems allow for pilots to control the complexity and intensity of lights. Typically, pilot controlled lighting is controlled through the airports UNICOM frequency, and activated by the pilot clicking their aircraft MIC. Sidney-Richland Regional Airport's UNICOM frequency is 122.800.

Pavement Markings

Pavement markings provide visual guidance to aircraft to critical areas on the runway and taxiway surface. Runway markings vary in complexity depending on the type of approach. Runway 1/19 is equipped with non-precision runway markings identifying the runway

designation, threshold, centerline and aiming point. Runway 11/29 is equipped with visual runway markings identifying the runway designation and, centerline, and aiming point. Moreover, on the Runway 29 approach, a relocated threshold has been identified with a threshold bar and yellow chevrons.

Taxiway markings include centerline striping to provide proper clearance from pavement edges and fixed objects. Additional visual cues, such as enhanced centerlines and location markings, are in place near intersections with runways. Runway hold position markings identify the safety setback from active runways in association with airfield guidance signs. Other markings include pavement edge and object free area striping on the apron areas.

Airfield Guidance Signs

Guidance signs provide location, direction, and guidance information to pilots on the ground to enhance awareness. Lighted signs are placed around the airfield to identify runway and taxiway intersections, runway hold positions, and other guidance. Mandatory signs are red and identify an intersection with a runway or critical safety area. Location signs are black with yellow lettering and identify the taxiway or runway the aircraft is located. Directional signs are yellow with black letters and provide guidance to other taxiways from an intersection. Distance remaining signs are offset from runway centerline and provide the pilot with information about runway length remaining in intervals of 1,000 feet. An array of airfield guidance signs are installed at the airport. Runway distance remaining signs are installed on both runways.

Electronic Navigation Aids

Electronic navigational aids are installed to provide critical guidance information when operating in the airport environment. These navigational aids often provide horizontal and/or vertical guidance in conjunction with published navigation procedures. Electronic navigation aids available at Sidney-Richland Regional Airport are summarized below:

Global Positioning System (GPS)

GPS is a satellite-based navigation system that allows location to be triangulated from space-based satellites. Equipped aircraft can navigate between user-defined or FAA waypoints with lateral and vertical guidance. With ground-based transmitters known as Wide Area Augmentation System (WAAS) the system can provide accuracy down to a few feet. GPS is widely becoming the preferred aircraft navigation system and FAA is establishing en-route and approach procedures using this satellite-based technology. GPS is used at Sidney-Richland Regional Airport in the establishment of instrument approach procedures to Runway 1/19 ends. Runway 11/29 is a visual-only runway.

Non Directional Beacon (NDB)

The non-directional beacon (NDB) is a navigational system that transmits low or medium frequency radio signals received by aircraft instrumentation. This instrumentation indicated the direction to the NDB, allowing the pilot to fly a homing bearing to the NDB. Sidney-Richland Regional Airport has an NDB and is located in the northeastern corner of the airfield.

Meteorological Facilities

Metrological facilities provide users with up-to-date weather information at the airport to aid in pilot decision making for safe flight operations.

Wind direction indicators provide immediate visual indication of the wind direction and general velocity. A segmented circle provides a visual indication of the wind cone area together with runway alignment and/or traffic pattern information. A lighted windcone and segmented circle are located near the center of the airfield.

An Automated Weather Observation System (AWOS) units are design to give pilots crucial weather information to pilots. AWOS systems can vary in the types of weather conditions that can be reported, from wind direction to freezing rain or thunderstorms. The type of AWOS installed at Sidney-Richland Regional Airport is an AWOS III. This model provides continuous weather observations every minute. Observations include cloud ceiling, visibility, barometric pressure, precipitation, temperature and dew point. The AWOS is located east of the midpoint of Runway 1/19.

A recording of weather observations and other pertinant airport information is available on the Automatic Terminal Information Service (ATIS) frequency of 119.275 MHz.

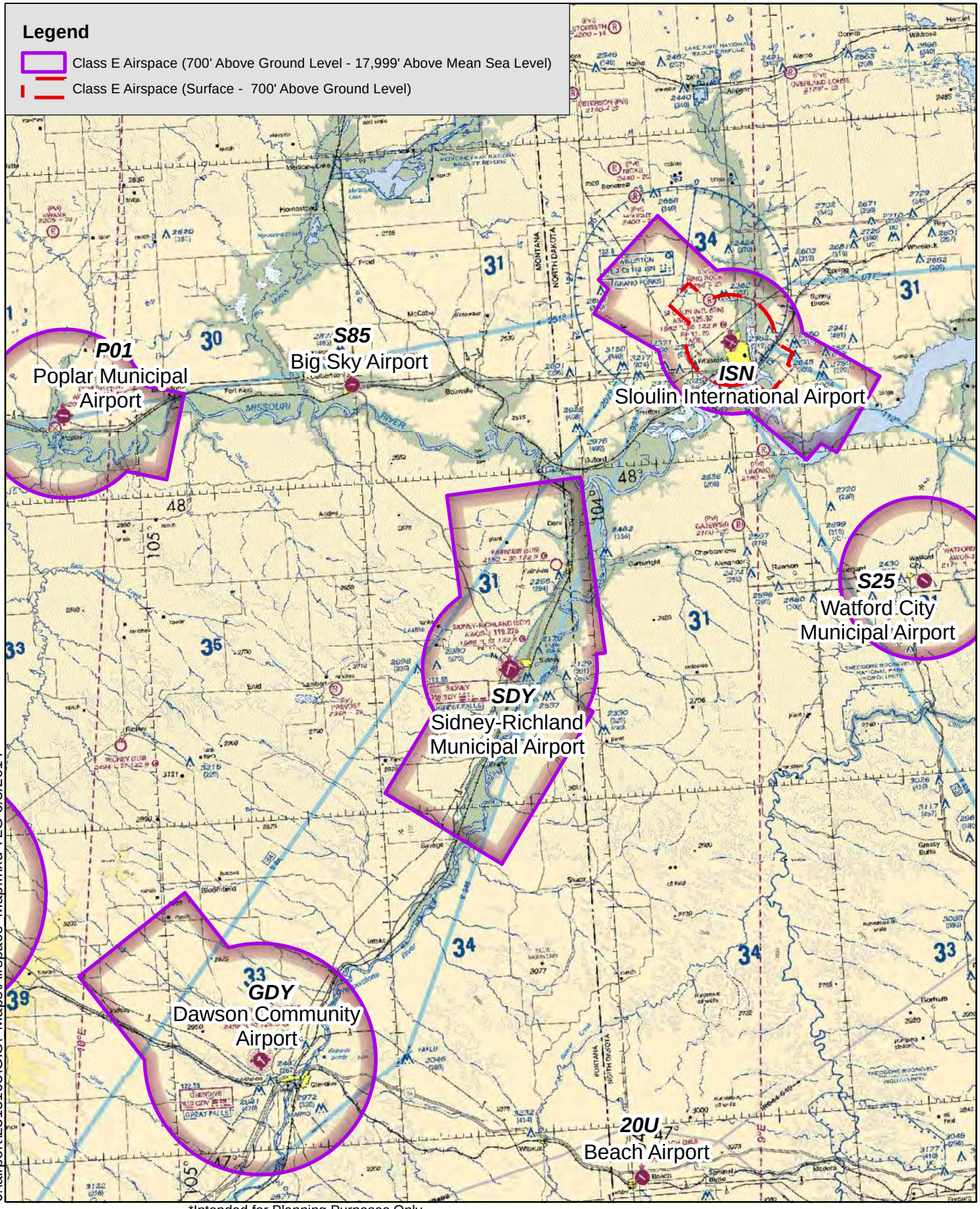
Exhibit 2-3 – Navigational Aid Summary

Navigational Aid Summary Table		
Component	**Runway 1/19**	**Runway 11/29**
Runway Length (feet)	*5,705*	*4,023*
Runway Width (feet)	*100*	*100*
Pavement Markings	Non-Precision	Visual
Runway Lighting	MIRL	MIRL
Taxiway Lighting	MITL	
Instrument Approach Procedures	RNAV (GPS) (1,19)	--
Airport Navigation	NDB	
Meteorological Facilities	AWOS	

Source: Airnav.com, FAA Airport Master Record Form 5010 Report

Airspace

Currently, air traffic at Sidney-Richland Regional Airport is classified as Class E controlled airspace beginning 700 feet above the ground; the airspace from the surface of the airport to 700 feet above the ground is considered Class G uncontrolled, meaning that FAA air traffic does not control aircraft is this area. Airspace and surrounding airport features are depicted on **Figure 2-5: Airspace & Surrounding Airports Map**.



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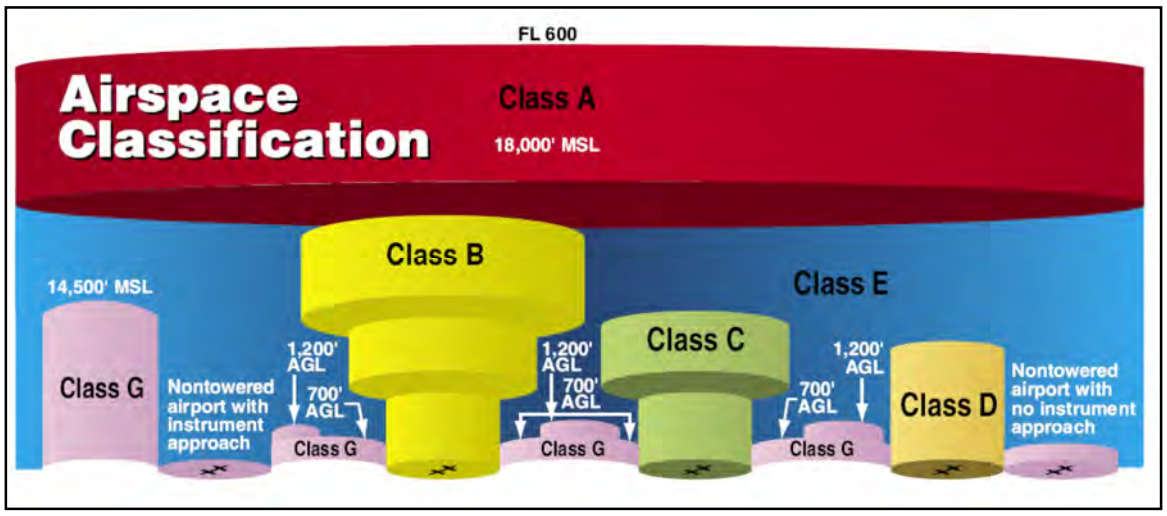
*Intended for Planning Purposes Only

N

0 10 20 40 Miles

Sidney-Richland Municipal Airport
Airspace & Surrounding Airports Map
Figure 2-6

Exhibit 2-4 – FAA Airspace Classifications



Source: Federal Aviation Administration (FAA) Pilot's Handbook of Aeronautical Knowledge (2007)

Instrument Approach Procedures

Instrument approach procedures are developed to assist the pilot in aligning themselves with a runway. Presently, there are instrument approach procedures for Runway 1 and 19 approaches.

Airspace Obstructions

Airspace obstructions can vary from natural terrain, growth vegetation, or man-made objects. An object is deemed an obstruction when it penetrates imaginary surfaces that surround an airport. Known as Part 77, these surfaces are used as tools to identify possible hazards to flight. Other surfaces that are used to identify obstructions include, but are not limited to, TERPS departure surfaces, and Threshold Siting Surfaces.

Surrounding Airports

Public use airports within 100 nautical miles of Sidney-Richland Regional Airport were reviewed to provide background into the other area airports. **Figure 2-5** has been prepared to provide a visual indication of these airports.

Exhibit 2-5 – List of Surrounding Airports

Airport (FAA Code) & Driving Distance from 7K5	County, State	Primary Rwy Length	Annual Operations	Based Aircraft
Sidney-Richland (SDY)	**Richland, MT**	**5,705'**	**13,315**	**42**
**Williston (ISN) – 48 mi.	Williams, ND	6,650'	39,877	46
Watford City (S25) – 54 mi.	McKenzie, ND	4,402'	5,750	29
Dawson (GDV) – 55 mi.	Dawson, MT	5,704'	5,815	15
Poplar (PO1) – 69 mi.	Roosevelt, MT	4,403'	11,400	7
Beach (20U) – 92 mi.	Golden Valley, ND	4,200'	1,170	8

Source: FAA Airport 5010 Report
***Nearest commercial service airport*

Landside Facilities

Landside facilities consist of areas of the Sidney-Richland Regional Airport necessary for the movement of passengers and automobiles, and parking and storage of aircraft. Examples of these facilities include the passenger terminal building, public parking lots, access roads, hangars and airport support facilities. A map depicting components of the landside facilities is shown on **Figure 2-7: Landside Facilities Map**.

Passenger Terminal Building

The terminal building is single level structure containing one passenger holdroom and gate area. The terminal supports commercial service operations with an airline ticket counter, office and baggage area. Other facilities include airport management office, mechanical/janitorial area, concessions, a joint use pilot lounge/conference room, and restrooms. The total square footage of the existing terminal building is roughly 3,600 square feet. A map depicting components of the landside facilities is shown on **Figure 2-7: Landside Facilities Map**.

Ground Access, Circulation and Parking

The Sidney-Richland Airport is accessible via a two-lane, paved road, (22nd Avenue) and connects the Airport to State Route 16. Highway 16 provides a north/south route through Richland County and access to State Highway 200 and 23, the other state highways in Richland County. The nearest interstate highway is I-94, which is 50 miles south of the City of Sidney via State Highway 16.

22nd Avenue is in fair condition. A bridge exists on this road near the entrance to the airport automobile parking area. Once in the automobile parking lot the terminal building is located directly in front. A single curb, which is approximately 80 feet long is available for passenger loading and unloading. Passengers enter the terminal building by a single entrance on the north side of the terminal. Passengers then proceed directly to the ticket counter.

Automobile parking is provided in the automobile parking area located on the north side of the terminal building. It is divided north and south by the continuation of 22nd Avenue. In the lot on the south side (closest to the terminal) there are approximately 75 parking spots, all of which are paved. On the north side of the parking lot most spots are unpaved and unmarked; there are approximately 150 parking spaces available. There is also an overflow area reserved for airport parking. This area is located at the intersection of 22nd Avenue and 5th St. This space can hold approximately 30 automobiles and is less than a quarter of a mile to the terminal. In the past, this lot has had a history of being at capacity for long periods of time.

A single parking space near the east end of the terminal building is reserved for the airport manager. A map depicting components of the landside facilities is shown on **Figure 2-7: Landside Facilities Map**.



Existing Buildings/Facilities

1. Terminal
1C. FBO/Hangar
2C. Hangar
3C. Hangar
1E. Hangar
7E. Hangar
8E. Hangar
9E. Hangar
10E. Hangar
11E. Hangar
12E. Hangar
14E. Hangar
16E. Hangar
17E. Hangar
18E. SRE Building
19E. Hangar
1W. Hangar
2W. Hangar
3W. Hangar
4W. Hangar
6W. Hangar
9W. Hangar
10W. Hangar
11W. Hangar
14W. Hangar

Legend

- City Boundary
- Existing Airport Property
- Roads

N

0 100 200 400 Feet

*Intended for Planning Purposes Only

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KLJ

Sidney-Richland Municipal Airport
Landside Facilities Map
Figure 2-7

Air Cargo

Airports provide a vital link to smaller communities when considering incoming/outgoing parcels and packages. Currently, FedEx operates air cargo service at the Sidney-Richland Regional Airport. The type of aircraft typically utilized by FedEx, at smaller airport destinations, is a Cessna Grand Caravan (Cessna 208). This aircraft is a single-engine turbo-prop, and can handle a maximum useful load of roughly 4,000 pounds.

General Aviation

There are two general aviation areas at Sidney-Richland Regional Airport. They are located east and west of the commercial service facilities. **Figure 2-7: Landside Facilities Map** depicts this area graphically.

General aviation facilities directly east of the commercial service terminal area include a Fixed-Base Operator (Richland Aviation), apron/tiedown space, private aircraft storage, cargo operations, a snow removal equipment (SRE) building, and aircraft maintenance facilities (through the FBO).

The west general aviation area includes Sidney Air Service FBO, apron/tiedown space, and private aircraft storage.

Fixed-Base Operators

There are two separate Fixed-Base Operators (FBOs) that provide aeronautical services to the public at Sidney, Richland Aviation and Sidney Air Service. FBOs are a commercial business providing aviation services to the public, primarily for general aviation. **Figure 2-7: Landside Facilities Map** depicts this area graphically

Richland Aviation owns several buildings, hangars, and office space to the northeast of the terminal building. Richland Aviation provides full FBO services including fuel sales (100LL and Jet-A) with mobile fueling, aircraft parking, aircraft charter, aircraft sales, aircraft maintenance, and there is a crew car available upon request.

Sidney Air Service is a specialty aviation service providing, flight training, air patrol and other aviation services. Sidney Air Service occupies the hangar immediately west of the passenger terminal building. The total area of this hangar is 4,500 square feet. Sidney Air Service also does a fair amount of aircraft sales through independent (broker) sales.

Fuel Facilities

There is one fuel farm located on the airport for aircraft fuel storage. The facility owned and operated by Richland Aviation is located adjacent to the FBO building.

The fuel facility stores 10,000 gallons of Jet-A fuel and 22,000 gallons of 100LL fuel. Richland Aviation provides fuel service from fuel-trucks. **Figure 2-6: Landside Facilities Map** depicts this area graphically. Sidney Air Service also provides 100LL (12,000 gallon tank), but is an underground system.

Airport Maintenance & Fire Fighting

Currently, the Sidney-Richland Regional Airport utilizes the Snow Removal Equipment (SRE) building as maintenance and SRE storage. This building is located on the east side of the airfield.

Aircraft Rescue and FireFighting (ARFF) first responders are provided through the Sidney Volunteer Fire Department These first responders would respond using the airport's ARFF truck (2008 Rosenbauer Airwolf Class II ARFF) stationed in the airfield's maintenance facilities. Based on aircraft length, the Sidney-Richland Regional Airport is required to provide Index A ARFF support. Index A ARFF requires one vehicle carrying at least:

- 500 pounds of sodium-based dry chemical, Halon 1211, or clean agent; or
- 450 pounds of potassium-based dry chemical and water with a commensurate quantity of Aquious Film Forming Foam (AFFF) to total 100 gallons for simultaneous AFFF and dry chemical application

The Sidney Volunteer Fire Department trains regularly and in accordance with the airport's most current Airport Certification Manual (ACM).

Fencing & Security

The air operations area at is encompassed by a security fence to prevent unauthorized access to the active airport environment. The fence is six feet high with wire barbed security top. Access is granted around the airfield through keypads and electronic gates.

Land Use Compatibility

Compatible land uses are defined as those uses that can coexist with a nearby airport without either constraining the safe and efficient operation of the airport or exposing people working or living nearby to unacceptable levels of noise or safety hazards. Incompatible land use is a large issue facing airports today, often resulting in conflicts between airports and communities. Typical airport land use compatibility elements include:

- FAA land use compatibility based on day-night average sound level (DNL) noise exposure contours. For example, densely-populated areas within the 65 decibel contour are deemed incompatible land-uses.
- FAA airspace standards for airport safety and operational capability.
- FAA land use compatibility near runway ends associated with the Runway Protection Zone (RPZ) for the safety of people and property on the ground.
- State or local airport land use standards, if applicable.
- FAA wildlife hazard mitigation plans for aircraft operational safety.

Airports have a responsibility to constantly work together with local governments to identify, control and prevent the creation of potential incompatibilities. This section is an introduction to this topic; a more comprehensive evaluation in relation to existing and planned airport development is prepared in Chapter 8.

Jurisdictions

Existing Land Uses

The existing land uses within the airport environs is depicted on a map in **Figure 2-1.**

Airport Zoning

Currently, the Sidney-Richland Regional Airport has an existing airport zoning ordinance that was signed on January 19, 2000. A copy of the existing airport zoning ordinance can be found in ***Appendix K***.

Environmental Overview

The purpose of this section is to provide a general overview of environmental features which should be considered in the alternatives analysis. The intent is not to perform detailed analysis, but rather to assemble readily available information in a systematic manner. A review of National Environmental Policy Act (NEPA) criteria relative to development alternatives considered and the NEPA approval process is discussed in Chapter 6 of this Master Plan.

Conclusion

The information collected and documented in this Existing Conditions chapter provides a baseline foundation to update the Sidney-Richland Regional Airport long-range plan. This information will feed into future sections including developing aviation activity forecasts and determining how facilities will meet the projected airport needs.

Chapter 3: Forecasts

Forecasting provides an airport with a general idea of the magnitude of growth, as well as fluctuations in activity anticipated, over a 20-year forecast period. Forecasting helps determine facility needs based on future growth projections.

Forecast Rationale

General

Forecasting the demand for airport services is a critical step in the development of an airport. It allows an airport to examine its ability to satisfy the needs of the aircraft and people it serves, and to determine the approximate timing of necessary improvements by projecting airport user activity levels.

Forecasts developed for airport master plans and/or federal grants must be approved by the Federal Aviation Administration (FAA). It is the FAA's policy, listed in AC 150/5070-6B, Airport Master Plans, that FAA approval of forecasts at non-hub airports with commercial service should be consistent with the Terminal Area Forecasts (TAF). Master plan forecasts for operations, based aircraft and enplanements are considered to be consistent with the TAF if they meet the following criteria:

a) Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10-year or 20-year period, or

b) Forecasts do not affect the timing or scale of an airport project, or

c) Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, Field Formulation of the National Plan of Integrated Airport Systems.

Furthermore, in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS), states forecasts should be:

(1) Realistic

(2) Based on the latest available data

(3) Reflect the current conditions at the airport

(4) Supported by information in the study

(5) Provide an adequate justification for the airport planning and development

Factors Affecting Forecasts

The FAA AC 150-5070-6B, Airport Master Plans, states:

Planners preparing forecasts of demand or updating existing forecasts should consider socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation.

For purposes of this forecast, the following defining factors have been used to develop the forecast:

1. Federal Fiscal year 2013 has been used as the base year for aviation forecast projection; this is in accordance with the Terminal Area Forecasts (TAF).
2. The most recent projections of population and economic growth for Richland County have been utilized.
3. An independent consultant (Trillion Aviation) was utilized to determine future air-carrier service and demand. Trillion's report can be found in ***Appendix M, Trillion Report***.

Forecasting Methods

Forecasts should not be considered predictions of the future, but rather an educated guess of future activity. Some of the following forecasting methods were applied for this analysis, including regression analysis, market share, and professional judgment.

Regression Analysis

Regression analysis is a statistical technique for estimating the relationships among variables. It identifies correlations between known independent variables (e.g., population, per capita income and employment) and dependent variables (e.g., passengers and operations).

Market Share Analysis

Market share analysis assumes a relationship between local and national/regional forecasts. The market share approach to forecasting is a top-down method where activity at an airport is assumed to be tied to growth in some external measure (typically a regional, state, or national forecast).

Professional Judgment

Judgmental methods are educated estimations of future events based on the personal knowledge, experience and intuition of the forecaster. This method permits the inclusion of a broad range of relevant information into the forecasting process, and is usually used to refine the results of the other methods.

Local Information Used in developing the forecasts

The population of Sidney and Richland County has been stable over the last couple decades, but recently due to the oil/gas developments in North Dakota the population has experienced an uptick in growth. According to State of Montana Department of Commerce demographic data, the population of the area is expected to grow at an average annual growth rate of 1.03

percent over the next 20 years (2013-2035)-please refer to **Table 3-1** below. A population increase or decrease by itself does not directly correlate with an increase or decrease in based aircraft, operations or enplanements, but it is a fair assumption that significant increases in population in the county would result in increases in these categories.

Table 3-1: Historic and Forecasted Population Projections

Year	Richland County Population
2000	10,380
2010	10,540
2020	11,214
2025	12,294
2030	13357
2035	13,389

Source: US Census Bureau, 2010, State of Montana Department of Commerce, 2014

Richland County employment projections were also reviewed, please see **Table 3-2**. According to Woods and Poole data, the employment in Richland County is anticipated to grow at an average annual growth rate of 1.07 percent from 2013-2033.

According to the population forecasts and the employment forecasts, employment will slightly outgrow population, resulting in a very competitive environment for employees. While this does not necessarily translate into more based aircraft, operations or enplanements growth in both sectors is a good sign for increased needs at SDY.

Table 3-2: Historic and Forecasted Employment Projections

Year	Richland County Employment
2002	6,172
2012	7,270
2013	8,238
2018	8,792
2023	9,275
2028	9,779
2035	103,07

Source: Woods and Poole 2014

Commercial Service and nonscheduled (Charter/Air Taxi) Enplanements

Enplanements are defined as the activity of passengers boarding commercial service aircraft that depart an airport. Enplanements include passengers on scheduled commercial service aircraft or unscheduled charter aircraft, but not the airline crew. Passenger enplanement data is provided to airport management by commercial service carriers.

Sidney has been part of the Essential Air Service (EAS) program since its inception in 1978. The Airline Deregulation Act, passed in 1978, gave airlines almost total freedom to determine which markets to serve domestically and what fares to charge for that service. The Essential Air Service (EAS) program was put into place to guarantee that small communities, like Sidney, that were served by certificated air carriers before deregulation would maintain a level of scheduled air service. Through the EAS program, SDY has been served by several airlines including Big Sky Airlines, Great Lakes Aviation, Silver Airways, and now Cape Air. Big Sky Airlines, Great Lakes Aviation and Silver Airways all operated 19 seat aircraft (BeechCraft 1900); Cape Air operates a 9 seat Cessna 402 aircraft.

Cape Air started service is December 2013, and is currently operating 5 flights per day to Billings, MT. To-date, Cape Air has averaged a 68% load factor, which coupled with its good operational performance and low air fares ($49 one-way) expected to increase based on happy customers who continue to use its service.

As mentioned above the last several years of the Essential Air Service program at SDY were marked by multiple changes in service as can be seen in **Table3-3** below. Disruptions in service, and changes in aircraft contributed to lack of enplanements until 2012-2013, when Silver and subsequently Cape Air provided a level of service which customers could rely on.

Table 3-3: Historic Scheduled Airline Enplanements			
Year	Air Carrier	Regional/Commuter	Total
2000	0	2,789	2,789
2001	0	2,779	2,779
2002	0	2,202	2,202
2003	0	1,968	1,968
2004	0	2,134	2,134
2005	0	3,680	3,680
2006	0	3,346	3,346
2007	0	3,255	3,255
2008[2] [3]	0	1,525	1,525
2009	0	2,669	2,669
2010	0	3,274	3,274
2011[4]	0	4,104	4,104
2012	0	11,582	11,582
2013[5]	0	10,371	10,371

Source: FAA TAF 2014, KLJ

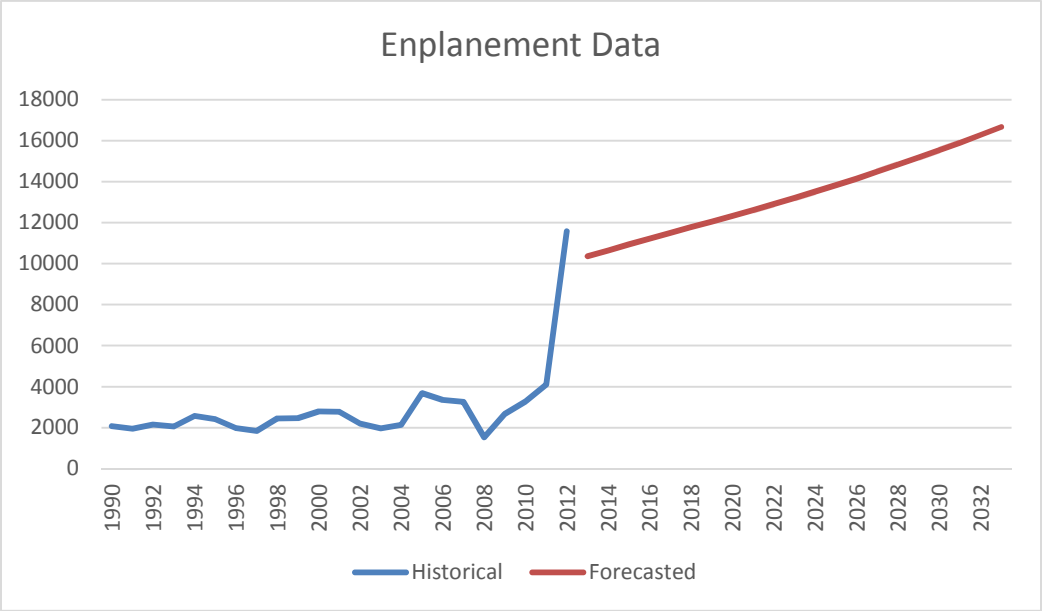
Proposed Enplanement Forecast

Several statistically valid methods (regression based on employment and population, and constant share based on national FAA data, employment, and population) were developed to analyze enplanement forecasts for SDY. The enplanement forecasts for SDY, which were the most valid based on statistics and local knowledge, are based on SDY receiving a constant share of the national enplanements. With population and employment anticipated to continue to growth throughout the planning period (Tables 3-1 and3-2), coupled with the Essential Air Service contract which stipulates 5 departures per day (potential for 14,600 enplanements if all flights all full) with Cape Air the forecasts depicted in **Exhibit 3-1** are attainable if not conservative. To supplement the enplanement forecast data, an

[2] Big Sky Airlines ended service on March 8, 2008 (bankruptcy)
[3] Great Lakes Airlines from 2008-2010
[4] Silver Airways provided service from 2011-July 15, 2013
[5] Cape Air started service in December 2013; 2013 numbers are estimates based on the TAF

independent consultant (Trillion Aviation) was utilized to gain a better understanding of future air-carrier demand at Sidney-Richland Regional Airport. A copy of their report is included in ***Appendix M, Trillion Report*** for reference.

Exhibit 3-2 – Enplanement Forecast



Source: KLJ 2014

Based Aircraft

A based aircraft is an operational and air worthy aircraft based at the airport for a majority of the year. According to the FAA's National Based Aircraft Inventory, there are currently 35 single-engine and 7 multi-engine aircraft for a total of 42 aircraft based at SDY. This information was confirmed by discussions with the SDY Airport Manager in February 2014.

The FAA Terminal Area Forecast (TAF) for SDY shows no growth in based aircraft over the planning period. TAFs for airports the size of MLS typically do not receive FAA analysis and show based aircraft and operations numbers remaining constant throughout a 20+ year forecast. Historical and forecast based aircraft numbers based on the FAA TAF are shown in **Exhibit 3-2: Based Aircraft Forecast.**

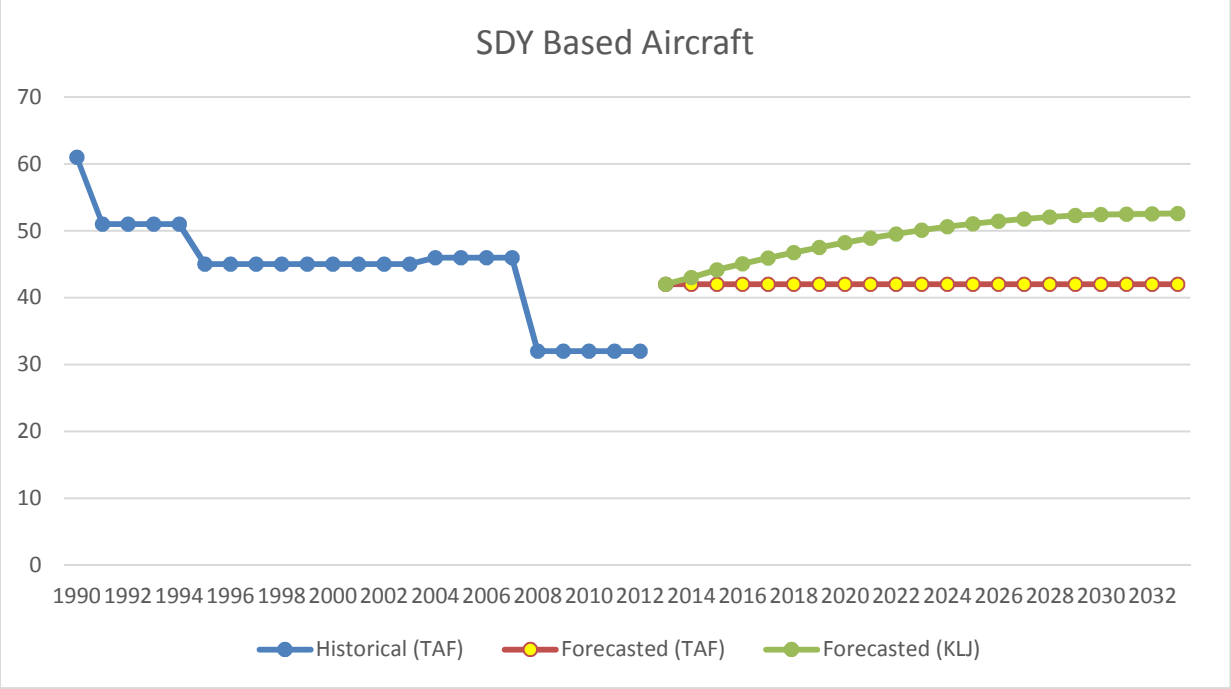
Based on discussions with the sponsor (February – June 2014) there are several individuals/businesses interested in aircraft hangar space for aircraft currently not based at SDY. The airport has received letters of interest, attached to this master plan in ***Appendix L - Letters of Interest***, showing the need for two (2) large hangars. If these hangar needs are met in the near-term, a jump in based aircraft is likely to follow.

Proposed Based Aircraft Forecast

Forecasts developed were based on national based aircraft growth projections, population projections, and judgmental methods that combined knowledge gained from the airport manager for short-term growth expectations combined with national growth projections for long-term expectations.

The proposed forecast assumed based aircraft growth at SDY would mirror growth the expected based on the increase in population and employment from 2013-2033 at an annual average growth rate of 1.03 percent/1.07 respectively. The proposed forecast projects and increase in based aircraft from 42 to 53 aircraft over the 20-year planning period. The proposed forecast, along with other forecasts considered are shown on **Exhibit 3-2: Based Aircraft Forecast**.

Exhibit 3-2 – Based Aircraft Forecast



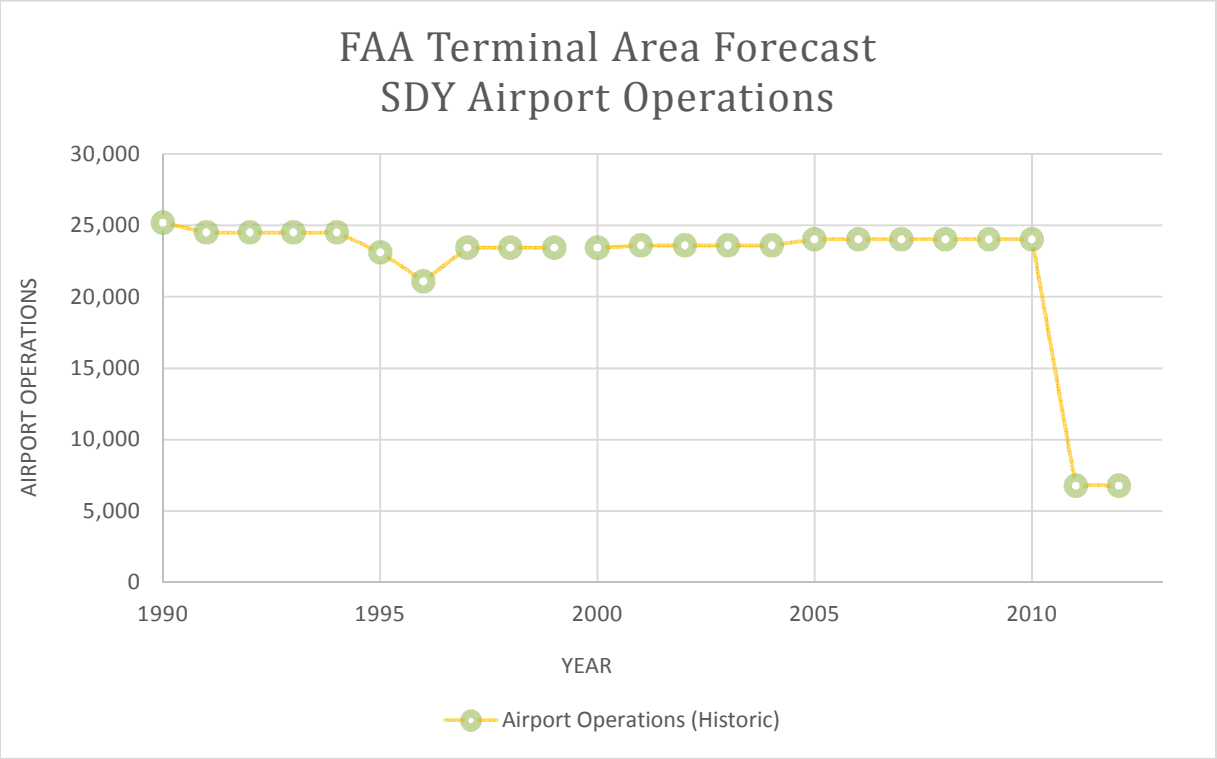
Source: KLJ 2014

Operations

An operation consists of either a takeoff or a landing at an airport and is split into two categories: local and itinerant. Local operations are performed by aircraft that remain in the airport traffic pattern and/or stay within a 20–mile radius. Itinerant operations are performed by a landing aircraft arriving from outside the airport area, or a departing aircraft that leaves

the airport area. Historic local and itinerant operations based on the FAA TAF are shown in **Exhibit 3-3: Historic Operation Numbers**. The FAA has typically relied on either airport management, FBO personnel, state system planning efforts, or FAA inspectors to determine local and itinerant operations at airports like SDY, since SDY is a non-air traffic control towered (ATCT) airport. As can be seen in **Exhibit 3-3: Historic Operation Numbers,** there was a large decrease in total operations in 2010, based on one of the above mentioned factors. KLJ believes that this change more accurately reflects total operations at SDY, and will use the total operations (local and itinerant) as a basis for the forecasts.

Exhibit 3-3 TAF Historic Airport Operations



Source: FAA TAF 2014

Local Operations

Local operations typically include practice landings, touch-and-go's, practice approaches and maneuvering in the local area and are usually coincide with recreational and flight training purposes.

The FAA TAF shows local operations remaining stagnant at 3,000 annual operations[6] throughout the planning period.

Proposed Forecast

Local operations at an airport are often proportional to the number of based aircraft. In creating the preferred forecast of local operations, the 3,000 annual local operations shown

[6] There are no local military operations forecasted at SDY.

in the most up-to-date TAF for SDY was considered the baseline for 2013. The baseline number of local operations (3,000) was divided by the current based aircraft (42) to determine the average annual number of local operations per based aircraft at SDY (71). This number was then multiplied by the forecasted number of based aircraft throughout the duration of the planning period to determine the preferred local operation forecast.

The proposed forecast, along with other forecasts considered are shown on **Exhibit 3-4: Local Operations Forecast**.

Exhibit 3-4 Local Operations Forecast



Source: KLJ 2014

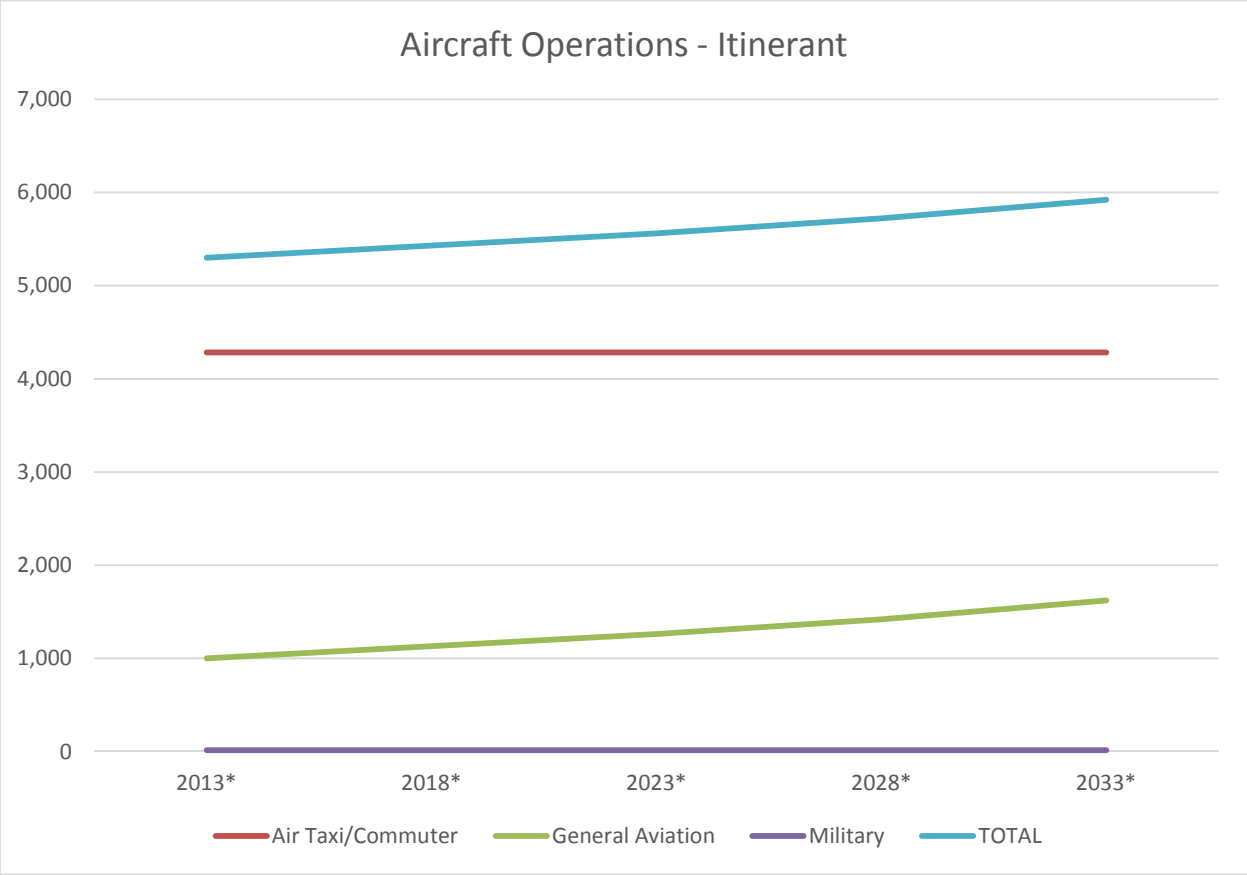
Itinerant Operations

Itinerant operations are those involving aircraft departing one airport and arriving at another airport. The FAA TAF shows itinerant operations remaining stagnant at 3,815 annual operations throughout the planning period. When developing the master plan forecast we noticed an error with the TAF, as the TAF depicts 1,800 air carrier operations, but SDY receives no air carrier flights. For purposes of the master plan these operations we moved from the air carrier section of the forecast and placed in the commuter/air taxi section.

Proposed Forecast

This section is broken into commercial itinerant operations (commuter/air taxi), general aviation, and military. Commercial service is currently handled by Cape Air which operates 9 flights a day at SDY. This service, coupled with the nonscheduled (air taxi) flights is currently is expected to remain at 4,285 operations throughout the planning period, as long as Cape Air has the EAS contract. General aviation itinerant operations is expected to grow at modest rates throughout the planning period, ranging from 2.35 to 2.47 percent. General aviation itinerant growth is based on FAA Total GA Hours Flown growth rates as published in the **2013 APO Terminal Area Forecasts Summary Report.** This growth rate coupled with population and employment growth provided statistically valid numbers of GA itinerate operations as shown in **Exhibit 3-5: Itinerant Operations Forecast.** Military itinerant operations are expected to remain flat at 15 operations per year, per the FAAs TAF.

Exhibit 3-5 Itinerant Operations Forecast

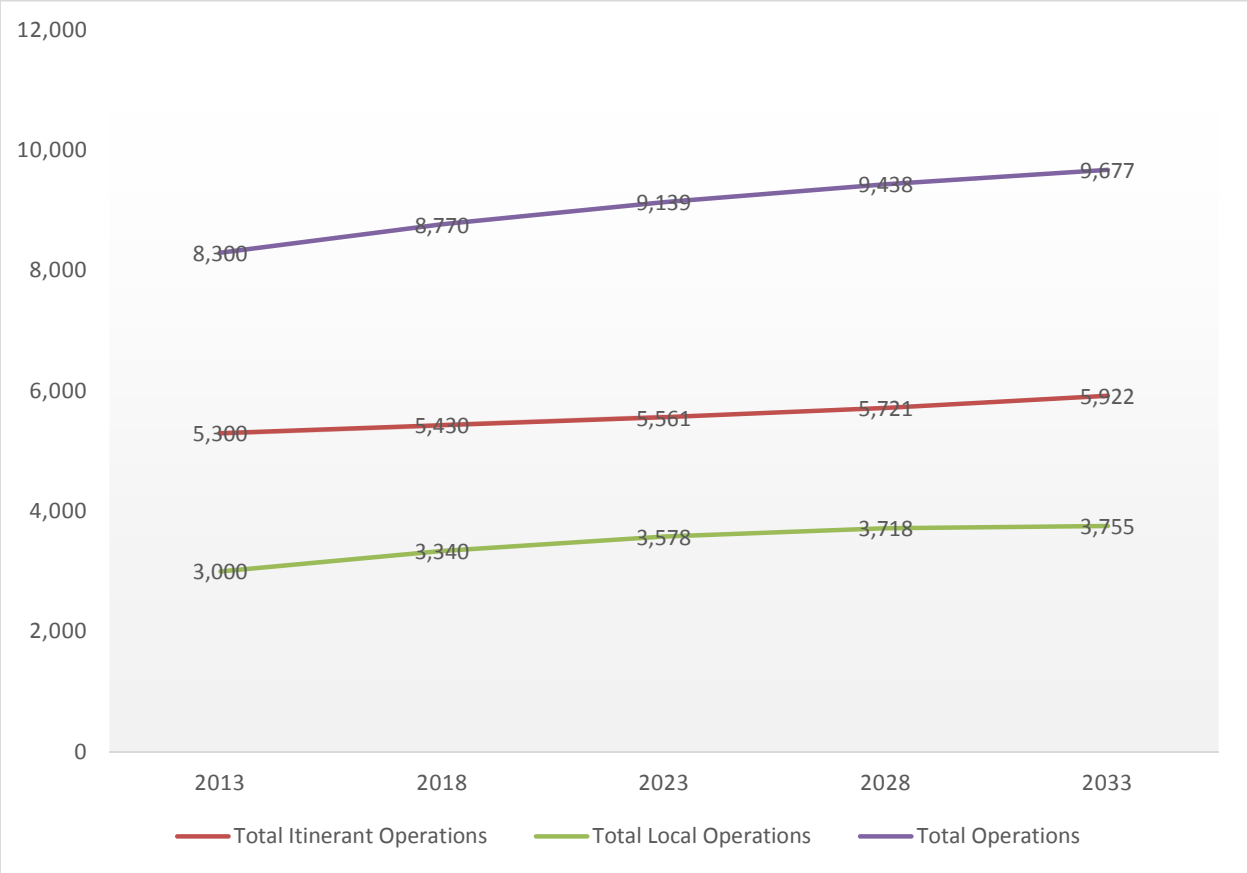


Source: KLJ 2014

Total Operations

Total operations forecast for SDY are shown on **Exhibit 3-6: SDY Operations Forecast.**

Exhibit 3-6 Total Operations Forecast



Source: KLJ 2014

A summary of based aircraft and operations forecast for SDY is displayed in **Table3-4: Based Aircraft & Operations Forecast**. A more detailed summary is provided at the end of this chapter in **Table 3-5: Forecast Summary**.

Table 3-4: Based Aircraft & Operations Forecast

Year	Based Aircraft	Operations		
		Local	Itinerant	Total
2013	42	3,000	5,300	8,300
2018	47	3,340	5,430	8,770
2023	50	3,578	5,561	9,139
2028	52	3,718	5,721	9,438
2033	53	3,755	5,922	9,677

Source: KLJ 2014

Summary

Table 3-5: Forecast Summary depicts the proposed forecasts for SDY throughout the planning period.

Table 3-5: Forecasts Summary					
	2013	**2018**	**2023**	**2028**	**2033**
Enplanements					
Commuter	10,371	11,777	13,206	14,822	16,666
Total Enplanements	**10,371**	**11,777**	**13,206**	**14,822**	**16,666**
Operations					
Itinerant					
Commuter/Air Taxi	4,285	4,285	4,285	4,285	4,285
General aviation	1,000	1,000	1,000	1,000	1,000
Military	15	15	15	15	15
Local					
General aviation	3,000	3,340	3,578	3,718	3,755
Military	0	0	0	0	0
TOTAL OPERATIONS	**8,300**	**8,770**	**9,139**	**9,438**	**9,677**
Based Aircraft					
Single Engine	35	37	40	40	40
Multi Engine	7	9	10	11	11
Jet Engine	0	0	0	1	2
Helicopter	0	0	0	0	0
Other	0	0	0	0	0
TOTAL BASED AIRCRAFT	**42**	**47**	**50**	**52**	**53**

Source: KLJ 2014

Table 3-6: Operation Forecast Comparison provides a comparison of FAA TAF operations and the proposed master plan forecast for SDY.

Table 3-6: Operation Forecast Comparison				
Sindey-Richland Regional Airport				**Master Plan Forecast**
Comparing Airport Planning and FAA TAF Forecasts				**8-1-2014**
	Year	**Airport Forecast**	**FAA Terminal Area Forecast (TAF)**	**AF/TAF (% Difference)**
Passenger Enplanements				
Base yr.	2013	10,371	10,371	0.00%
Base yr. + 5yrs.	2018	11,777	10,371	13.55%
Base yr. + 10yrs.	2023	13,206	10,371	27.33%
Base yr. + 15yrs.	2028	14,822	10,371	42.91%
Base yr. + 20yrs.	2033	16,666	10,371	60.70%
Growth Rate		*2.40%*	*0.00%*	
Commercial Operations				
Base yr.	2013	4,285	2,800	53.04%
Base yr. + 5yrs.	2018	4,285	2,800	53.04%
Base yr. + 10yrs.	2023	4,285	2,800	53.04%
Base yr. + 15yrs.	2028	4,285	2,800	53.04%
Base yr. + 20yrs.	2033	4,285	2,800	53.04%
Growth Rate		*0.00%*	*0.00%*	
Total Operations				
Base yr.	2013	8,300	6,815	21.79%
Base yr. + 5yrs.	2018	8,770	6,815	28.68%
Base yr. + 10yrs.	2023	9,139	6,815	34.10%
Base yr. + 15yrs.	2028	9,438	6,815	38.50%
Base yr. + 20yrs.	2033	9,677	6,815	42.00%
Growth Rate		*0.77%*	*0.00%*	

Source: KLJ, FAA

Because the TAF shows no growth in all facets (enplanements, commercial operations and total operations) the forecasts presented in this report fall outside of the limits, as described in AC 150/5070-6B, but we feel that our forecasts present valid growth based on current local information and statistically valid growth trends from reputable sources (FAA TAF, Montana Chamber of Commerce, Woods and Poole, US DOT).

Chapter 4: Requirements & Concepts

This section evaluates existing landside and airside facilities at Sidney-Richland Regional Airport, as well as airport needs over the next 20-year forecast. The recommendations in this chapter are not intended to be definitive, but rather a guideline for the airport to identify possible deficiencies and future possible solutions.

Key elements of the chapter are outlined below:

Airside Requirements:

- Design Aircraft
- Airport and Runway Classifications
  - Airport Reference Code (ARC)
- Runway Design Standards
  - Approach and Departure Reference Codes (APRC/DPRC)
  - Runway Design Code (RDC)
  - Length
  - Width
  - Pavement Conditions
  - Lighting
- Taxiway Design Standards
  - Pavement Conditions
- Apron
  - Pavement Conditions
- Airport Signage
- Instrument Approach Procedures

Landside Requirements:

- Hangars
- Commercial Airline Building(s)
- Support Facilities
  - (Pilot Services, Fixed-Base Operators, Fuel, ARFF, etc.)

Safety Critical Design Standards:

- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)

Summary

At the end of this chapter, a summary will highlight Airside Requirements, Landside Requirements, and any associated Safety Critical Design Standards identified as a part of this study. The goal of this chapter is to guide the airport with realistic recommendations through this planning period (2013-2033). Throughout this chapter, **bold** text has been used to assist the reader in identifying future elements of each facility.

Airside Requirements

Airport design is typically driven by the most demanding aircraft operating at an airport, either existing or based off of anticipated future-use. Certain elements of an aircraft drive different design standards around the airfield. Some of these include:

- Aircraft approach speeds and safety critical elements surrounding the runway surfaces
- Wingspans and associated standards from runways and taxiways, which drives spacing requirements from permanent structures on the airfield
- Aircraft weights and relevant pavement strengths on the airfield

Additional information regarding design standards can be found in Advisory Circular 150/5300-13A, Change 1 – *Airport Design*. By establishing design aircraft for an airport, these standards are applied to evaluate existing capacity and future elements to be planned for at an airport.

Design Aircraft

Identifying existing design standards is accomplished through establishing existing and planned design aircraft. Often called a "critical aircraft", the design aircraft can be one or a combination of similar aircraft. The design aircraft typically has the most annual operations among those using an airport. However, the FAA usually expect the design aircraft to have a minimum of 500 annual operations. As a result, combining similar aircraft can be used to reach this requirement at smaller airports. For additional information on design aircraft, see ***Appendix E – Airfield Design***. To establish the existing design aircraft, FlightAware[7] Data was purchased. This data contains information on flight plans filed either to or from the Sidney-Richland Regional Airport.

The existing design aircraft at Sidney-Richland Regional Airport is the King-Air B200 (or similar). In the FFY 2013, the King-Air B200 had over 300 annual operations. Other aircraft, in the same category as the B200, include the Cessna 402 (the current commercial aircraft providing service to SDY) cumulatively exceed 500 annual operations.

The planned design aircraft for SDY is Cessna Citation 5 Ultra (Cessna 560). Although FlightAware data only shows 65 annual operations with this aircraft, planning for this aircraft is the next step in airport design. Based on projections in the forecast section, coupled with FlightAware data and current/projected oilfield development, it is estimated that SDY may experience 500 annual Cessna 560 operations (or similar aircraft) over the planning period.

Airport and Runway Classifications

When a design aircraft has been determined, it is then used to identify existing and future airport classifications. These classifications are used to determine the specific design standards for runways,

[7] Flight Aware Data is information regarding aircraft instrument flight plans.

taxiways, aprons, and other miscellaneous facilities on the airfield as defined in *FAA AC 150/5300-13A, Change 1 – Airport Design*. A design aircraft is used to define the following:

- **Aircraft Approach Category (AAC)** – Based on aircraft approach speeds
  - Categories labeled A through E
- **Airplane Design Group (ADG)** – Based on aircraft wingspans
  - Categories labeled with roman numerals I through VI
- **Taxiway Design Group (TDG)** – Based on the distance from cockpit to main gear, as well as the width of the main gear
  - Categories labeled with roman numerals I through VI
  - TDG is independently calculated, and does not necessarily always match the ADG

Airport Reference code (ARC)

The Airport Reference Code (ARC) is an airport designation that represents the summation of the AAC and the ADG. This code indicates the maximum capable service level at the airport for the existing airport, as well as planned development. **The existing ARC at Sidney-Richland Regional Airport is B-II.** Moreover, because the future design aircraft (or mix of aircraft) have a slightly faster approach speed, **the future ARC at SDY is C-II**. These represent overall planning considerations at the airport and are intended to provide a general idea of the existing and future airport elements. However, planning efforts may vary based on the type of aircraft utilizing specific areas of the airfield. ***Appendix E – Airfield Design*** goes further into detail on Airport Reference Codes and associated Design Standards.

Runway Design Standards

Approach and Departure Reference Codes (APRC & DPRC)

- **Approach Reference Code (APRC)** – Based on AAC, ADG, and Runway Visual Range (RVR)
- **Departure Reference Code (DPRC)** – Comprised of the AAC and ADG only

The APRC and DPRC are assigned to each runway end, and indicate current operational capabilities. The APRC takes approach minimums into consideration, while the DPRC accounts for aircraft on adjacent taxiways from the designated runway. These identification tools are used for evaluating existing runway conditions, and can change as airport improvement projects are completed. A summary table of the existing Approach and Departure Reference Codes at Sidney-Richland Regional Airport can be found below.

Exhibit 4-3 – Existing Approach and Departure Reference Codes

Approach Reference Code (APRC)			
Runway 1	**Runway 19**	**Runway 11**	**Runway 29**
B-II-5000	B-II-5000	B-II-VIS	B-II-VIS
Departure Reference Code (DPRC)			
Runway 1	**Runway 19**	**Runway 11**	**Runway 29**
B-II	B-II	B-II	B-II

Runway Design Code (RDC)

- **Runway Design Code (RDC)** – Similar to the APRC, but is used for future runway design standards.

The RDC is used for future planning efforts of runways, taxiway setbacks from runways, and anticipated approach minimums on runway ends. Based on current analysis, the following table depicts the anticipated Runway Design Codes for each runway end.

Exhibit 4-2 – Runway Design Codes

Future Runway Design Code			
Runway 1	**Runway 19**	**Runway 11**	**Runway 29**
B-II-5000	B-II-5000	B-II-VIS	B-II-VIS
Ultimate Runway Design Code			
Runway 1	**Runway 19**	**Runway 11**	**Runway 29**
C-II-4000	C-II-5000	B-II-5000	B-II-5000

Further explanation of these design codes, as well as rationale, can be found in ***Appendix E – Airfield Design***. These design codes also dictate the appropriate setback requirements from taxiway/taxilane centerline to fixed or movable objects. When designing a hangar area, the critical aircraft wingspan (ADG) is used to give adequate wingtip clearance from hangars and taxiing aircraft.

Runway Length

Runway 1/19 is the existing primary runway at Sidney-Richland Regional Airport. It is 5,705 feet long by 100 feet wide. Runway 11/29 is the existing crosswind runway and is 4,023 feet long by 100 feet wide. FAA Advisory Circular *150/5325-4B* provides guidance on runway length requirements. The AC uses a five-step process to determine runway length requirements for a selected list of design aircraft. These steps, as well as conditions used for runway calculations, are included in ***Appendix E – Airfield Design***.

Based on calculations, from AC *150/5325-4B*, the existing Runway 1/19 meets the design criteria of large aircraft (60,000 pounds or less) runway length recommendation of 5,500 feet (75 percent of aircraft at 60 percent useful load). As a result, the next step of runway length planning for Runway 1/19 would be 75 percent of aircraft at 90 percent useful load.

Runway calculations indicate this next step in runway length to be 7,000 feet in length for Runway 1/19 and will be planned for in the ultimate configuration.

Runway length calculations for Runway 11/29 indicated recommended runway length to be 3,700 feet.

Due to land-use constraints in the vicinity, a runway extension was not identified in the 20-year planning period for Runway 11/29. However, the existing runway length of 4,023 feet is adequate length and meets the needs of the airport. This length will be planned for through the planning cycle.

Runway Width

Runway width is determined by the design aircraft, as well as the approach minimums of a runway. Additional information regarding runway width can be found in ***Appendix E – Airfield Design***.

Both Runway 1/19 and Runway 11/29 are 100 feet wide and are sufficient widths for the 20-year planning cycle.

Pavement Conditions

Periodically, airports go through a pavement evaluation that identifies distressed pavement and benchmarks the overall pavement quality. These evaluations are commonly known as Pavement Condition Index (PCI) Reports, and are usually conducted on a state-wide basis. The finished product gives the reader details on cross-sections of pavement, as well as a numerical value (0-100) to pavement sections. These numerical values place pavement sections in varying categories, and help the airport plan for different types of pavement maintenance (according to their numerical values). Additional information regarding pavement at Sidney-Richland Regional Airport can be found in ***Appendix D – Airfield Pavements***.

Per the most recent PCI Report conducted in 2012, both Runway 1/19 and Runway 11/29 have PCI values greater than 80 (82 and 81, respectively). These values place both runway pavements in good condition, but preventative maintenance is recommended.

Runway Lighting

Both Runways are equipped with Medium Intensity Runway Lighting (MIRL).

The runway lighting systems meet the existing and ultimate needs of the airport.

Taxiway Design Standards

Similar to RRC and RDC, Taxiway Design is driven by critical aircraft specifications. The critical aircraft dictates what is known as the Taxiway Design Group (TDG) and drives the width of the taxiway and associated fillets. The TDG is determined by the distance of the cockpit to the main landing gear in conjunction with the width of the main landing gear. Depending on airport usage, it is possible to have varying TDG design standards among taxiway pavements. A table depicting the existing and future TDG design standards can be found below.

Exhibit 4-3 – Taxiway/Taxilane Design Standards

Existing Taxiway Design Group					
Hangar Area	**Apron Area**	**Taxiway A**	**Taxiway B**	**Taxiway C**	**Taxiway D**
TDG-1A	TDG-2	TDG-2	TDG-3	TDG-2	TDG-3
Ultimate Taxiway Design Group					
Hangar Area*	**Apron Area**	**Taxiway A**	**Taxiway B**	**Taxiway C**	**Taxiway D**
TDG-2	TDG-2	TDG-2	TDG-3	TDG-3	TDG-3

**For future construction only – Existing area to maintain existing standard*

It should be noted that the existing hangar area is limited in developable space. Due to this constraint, the existing TDG-1A standard will remain over the forecasted 20-year timeframe. Any new development in the center of the airfield will be planned to TDG-2 standards.

Pavement Conditions

Like runway pavement, taxiway pavement is monitored through the Pavement Condition Index (PCI) report, and is updated every few years. Below is a table of the various taxiways and associated pavement information obtained from the most recent PCI report conducted at SDY (2012).

Exhibit 4-4 – Taxiway/Taxilane Pavement Conditions

Taxiway Pavement Characteristics*				
Item	Taxiway A	Taxiway B	Taxiway C	Taxiway D
PCI Value	66	N/A	Exempt	N/A
Pavement Strength	40 SW 55 DW 85 DTW	40 SW 55 DW 85 DTW	40 SW 55 DW 85 DTW	40 SW 55 DW 85 DTW

**Data based on the most recent PCI Report completed in 2012*

Taxiways B, and D did not have pavement information available (per the 2012 PCI Report). Additional information regarding pavement at Sidney-Richland Regional Airport can be found in ***Appendix D – Airfield Pavements***.

Over the course of the planning period, it is recommended the airport construct additional parallel taxiway to Runway 11/29. Additional length, to the existing partial parallel, will reduce Runway Occupancy Time (ROT) and increase the safety of aircraft.

Apron

The central portion of the existing apron space is primarily used for commercial operations, while western and eastern apron spaces are used by general aviation. Moreover, both western and eastern portions of apron space have a Fixed-Base Operator (FBO) adjacent to them.

Long-term planning indicates this space will remain. However, relocating commercial aircraft operations to the central portion of the airfield has been identified within the 20-year planning cycle. Enough apron space to accommodate one commercial aircraft (Group II design standards) in the near-term, and roughly two to three commercial aircraft would be recommended through the planning cycle. This recommendation is a product of the airports existing commercial service aircraft type (Cessna 402), the number of daily flights and lack of apron congestion, and also because Cape Air does not leave aircraft on the apron over-night.

Additional planned apron space in the central portion of the airfield includes an area for a relocated FBO and dedicated air-cargo operations facility. Existing apron space for cargo operations can accommodate a minimum of one Cessna 208 (Group II design standards, and is typical aircraft for FedEx operations). In the event cargo operations are relocated to the central-portion of the airfield, two to three spaces should be planned for to accommodate additional growth. Should a Fixed-Base Operator choose to be located in the central-portion of the airfield, apron should be developed that could accommodate roughly the same amount of tiedowns that exist today (20 spaces). Space should also be left for a second FBO, as well as space for additional apron frontage.

<u>Pavement Conditions</u>

Like other airfield pavements, apron pavement is monitored through the Pavement Condition Index (PCI) report, and is updated every few years. Below is a table of the various apron areas and associated pavement information obtained from the most recent PCI report conducted at SDY (2012).

Exhibit 4-4 – Taxiway/Taxilane Pavement Conditions

Apron Pavement Characteristics*			
Item	Commercial Apron	Richland Aviation	Sidney Air Service
PCI Value	72	72	67
Pavement Strength	40 SW 55 DW 85 DTW	40 SW 55 DW 85 DTW	40 SW 55 DW 85 DTW

Airport Signage

Sidney Richland Regional Airport has lighted airfield signage that meets FAA requirements per Advisory Circular 150/5340-18F. The airport signage plan is part of the current Airport's Certification Manual (ACM).

Instrument Approach Procedures

SDY has existing instrument approaches to Runway 1/19, and visual approaches to Runway 11/29. Existing approaches to Runway 1/19 are GPS, and have vertical guidance with 1 mile visibility minimums.

It is recommended the airport plan for ultimate Runway 1/19 approach minimums of ¾ mile. This would improve upon existing minimums with little to no impact on the need for additional infrastructure to obtain these minimums. Moreover, within the 20-year planning cycle, development of basic GPS (with vertical guidance) approaches on Runway 11/29 is recommended.

Landside Requirements

Hangars

The existing hangars at SDY vary in size ranging from roughly 30' x 40' to 100' x 130' and are known to be filled with aircraft. Moreover, the existing footprint of the airport is extremely limited on developable space. As a result, a 20-year plan to develop the central portion of the airfield was evaluated. This central development space will accommodate corporate hangars, leisure flyers, and a potential-relocation of an FBO. If an FBO relocated to the central portion of the airfield, additional space would be available for additional hangar development on the north portion of the airfield (the existing terminal area).

Sidney-Richland Regional Airport currently has two letters of interest, from private aircraft owners, to construct relatively large hangars on the airfield. As a result, there is existing demand to complete initial construction for the central-portion of the airfield. The interested developers would be considered corporate-type hangars and would be larger in size (100' x 120'). Additionally, allotted hangar space in the center of the airfield will have lots from small (70' x 70'), medium (80' x 80') and large (100' x 120') available for development. 100' x 120' lots are identified as "corporate lots" and will have extra space available in front of the hangar for apron space to be privately developed (if so desired).

Commercial Airline Building(s)

Though the existing commercial terminal building (est. 3,600 SF) adequately seats passengers as they wait for their flights (after TSA clearance), there is limited space for passengers prior to TSA security clearance and limited area to expand the building.

In order to accommodate any additional growth, it is recommended the airport look into long-term relocation of commercial service facilities in the central portion of the airfield. This would give the airport the ability to react to any type of growth through the 20-year planning cycle and beyond. While 3,600 SF of terminal facilities may meet the needs of the airport in the future, it is recommended the efficiencies of the space used be evaluated (during design phase).

Support Facilities

The existing terminal/hangar facilities are accessed by 22nd Ave SW, and connects to Highway 16 (W Holly St.). From the access road, airport users have access to free airport parking. However, parking is limited and is often at capacity (around 100 parking spaces). The airport is unable to expand their parking due to limiting factors such as floodplain issues and surrounding buildings/hangars. Currently, SDY conducts snow removal operations with a 2005 Caterpillar Loader, and a 2005 Case International Ag Tractor 210. Each piece of equipment has both a blade and broom attachment. Moreover, the airport fulfills Aircraft Rescue and Fire Fighting (ARFF) requirements with a 2008 Rosenbauer Airwolf Class II ARFF vehicle. This ARFF vehicle is equipped with dry chemical agent, foam, and water. The equipment is staffed through the city's local fire department.

Existing fuel facilities are provided through Fixed-Base Operator (FBO) services on the airfield. Both Richland Aviation and Sidney Air Service provide 100LL, while Richland Aviation also provides Jet-A fuel service. Existing fuel facilities are located near Sidney Air Service. Richland Aviation utilizes fuel trucks for their fuel sales. The fuel capacities at SDY for 100LL and Jet-A are 22,000 gallons and 10,000 gallons, respectively.

When the central portion of the airfield is developed, an existing access road will be used for airport access. This existing access road currently provides access to an oil-well site for the county. Future parking in the midfield area will be planned to accommodate over 300 spaces. The airport has expressed an interest in utilizing an existing county road as their access point for the central development area. This county road currently provides access to an oil rig on county property. In the event an FBO relocates to the center airfield development area, a fuel facility should be planned for. The existing size of Jet-A and 100LL tanks are adequate for the foreseeable future.

Safety Critical Design Standards

Runway Safety Area (RSA)

A Runway Safety Area is defined as a rectangular area centered about the runway that is cleared, drained, and graded to be capable of supporting aircraft overruns and snow removal equipment. Existing RSA dimensions for both runways are 150 feet wide (centered on runway centerline) and extend 300 feet beyond each runway threshold.

Based on Runway 1/19 becoming a C-II runway during the planning period, the RSA would increase to 500 feet wide (centered on runway centerline) and would extend 1000 feet beyond runway thresholds. This increase in dimensions would trigger the evaluation of whether or not surrounding land/grading meets RSA requirements. From initial review, adjacent land may require grading. Additionally, declared distances may be required to accommodate the additional RSA length off of Runway 19 (Due to changes in terrain, the creek, and the golf course off of airport property).

it is not anticipated that Runway 11/29 will experience a change in RSA requirements.

Runway Protection Zone (RPZ)

The Runway Protection Zone is a trapezoidal shape off the end of each runway and is intended to provide protection to people and structures on the ground. It also keeps an area close in-proximity to the runway clear in case of aircraft overruns/undershooting. FAA AC 150/5300-13A, Change 1 outlines incompatible land uses within RPZs. The FAA has also issued an interim RPZ land use guidance letter. This letter adds clarification to the guidance prescribed in 150/5300-13A, Change 1 on permissible land uses within an RPZ. In general terms, the guidance letter indicates that modifications to runways would trigger mitigation of improper land uses within either RPZ of the affected runway. However, coordination with the FAA is recommended.

Runway 1 has an existing roadway (County Road 124) located in the RPZ.

Runway 19 has an existing roadway (5th St SW), a creek, and a golf course located in the RPZ.

Runway 11 has two existing roadways (County Road 124 & 5th St SW) located in the RPZ.

Runway 29 has an irrigation ditch and portions of a residential dwelling (located on 16th Ave SW) in the RPZ.

Runway Object Free Area (ROFA)

The Object Free Area is a two dimensional ground area surrounding the runway and its clearing standard precludes parked aircraft and objects, except those essential for air navigation or aircraft ground maneuvering. It is also acceptable for aircraft to taxi and hold in the ROFA. To the extent practical, objects in the ROFA should be on frangible couplings. Existing ROFA dimensions for both runways are 500 feet wide (centered on center line) and extend 300 feet beyond runway thresholds.

Over the course of the 20-year planning period, the ROFA dimensions for Runway 1/19 could change. In the event that Runway 1/19 consistently serves "C" category aircraft, ROFA grading would increase to 800 feet wide (centered on runway centerline) and would extend 1000 feet beyond runway thresholds.

Over the 20-year planning period, it is not anticipated that Runway 11/29 would experience a change in ROFA requirements.

Runway Obstacle Free Zone (ROFZ)

The Runway Obstacle Free Zone is a defined volume of airspace centered on runway centerline and extends 200 feet beyond runway centerline. This length beyond runway end does not change from varying runway types. Only objects essential for air navigation (on frangible couplings) are allowed in this surface. The width of this surface is determined by the weight of aircraft, approach speed, or visibility minimums. As a result of serving large aircraft, existing ROFZ widths for both Runway 1/19 and 11/29 are 400 feet.

It is not anticipated that SDY's Obstacle Free Zones will change through the 20-year planning period.

Summary

The Sidney-Richland Regional Airport has various short-term and long-term facility needs. This section summarizes the existing and future needs of the Sidney-Richland Regional Airport.

- Airside Requirements
  - Design Aircraft
    - The planned design aircraft for SDY is Cessna Citation 5 Ultra (Cessna 560) or similar
  - Airport and Runway Classifications
    - The Ultimate ARC is C-II
  - Runway Design Standards
    - Runway 1/19
      - Ultimate RDC is C-II
      - Ultimate extension to 7,000 (Runway 1 end)
      - Enhance existing approaches to ¾ minimums
    - Runway 11/29
      - Ultimate RDC is B-II
      - Extending/lengthening runway not recommended through ultimate development (due to land use constraints)
      - Ultimate development of GPS approaches to both runway ends (with vertical-guidance)
  - Taxiway Design Standards
    - Maintaining Group I design where airport facilities and hangars exist today
    - Ultimate development in central-portion of airfield to be designed as TDG 2 standards, as well as Group II clearance standards
  - Apron
    - Maintaining Group I design where airport facilities and hangars exist today
    - Ultimate development in central-portion of airfield to be designed as Group II clearance standards
- Landside Requirements
  - Hangars
    - Maintain existing hangars
    - Develop hangar area in central-portion of the airfield. hangar sizes will vary from small (70x70), medium (80x80), and large corporate hangars (100x120)
  - Commercial Airline Buildings
    - Ultimate relocation/development of commercial facilities in central portion of the airfield
    - Terminal building of roughly 3,600 SF would be adequate.
  - Support Facilities
    - Utilization of existing oil-well access road (owned by the county) for airport access of central development area

        - Ultimate relocation of ARFF and SRE buildings to the central airfield development area
        - Ultimate development of FBO in the central airfield development area (anticipated as a relocated FBO from existing footprint)
- Safety Critical Design
    - Runway Safety Area (RSA)
        - Ultimate development of Runway 1/19 to C-II standards would increase RSA dimensions and, as a result, may require modifications to meet RSA requirements. These requirements could include RSA grading, and declared distances due to incompatible land uses within the RSA
    - Runway Protection Zone (RPZ)
        - Runway 1 – Due to FAA interim RPZ land use guidance, relocation of County Road 124 may be required (in the event that Runway 1 is extended)
        - Runway 19 – Due to FAA interim RPZ land use guidance, relocation/mitigation of existing roadway (5th St SW), the creek, and golf course may be necessary (in the event that Runway 1/19 is modified)
        - Runway 11/29 – Ultimate modifications are not anticipated for Runway 11/29
    - Runway Object Free Area (ROFA)
        - Runway 1/19 – Ultimate RDC C-II would increase ROFA dimensions. Any ROFA issues would need to be mitigated, or declared distances would need to be used
    - Runway Obstacle Free Zone (ROFZ)
        - No long-term planning elements are anticipated to change the ROFZ dimensions at SDY

Chapter 5: Alternatives Analysis

This section identifies future layouts for both landside and airside facilities at the Sidney-Richland Regional Airport over the next 20 years. Based on chapters 3 (Forecasting) and 4 (Facility Requirements), alternatives were created and presented to the airport sponsor. From the initial alternatives, the sponsor selected a couple of the alternatives for further review and comment. The final product was an alternative that meets FAA landside and airside design requirements, accommodates the existing needs and future needs of the airport, and maintains the vision the airport board members have for their development.

Key elements of the chapter are outlined below:

Alternatives Development/Evaluation:
- Summary of Requirements
- Development of Alternatives

Landside Alternatives:
- Landside Alternative 1
- Landside Alternative 2
- Landside Alternative 3
- Landside Alternative 4

Airside Alternatives:
- Airside Alternative 1
- Airside Alternative 2
- Airside Alternative 3
- Airside Alternative 4
- Airside Alternative 4A
- Airside Alternative 4B
- Runway Alternative 1

Evaluation of Alternatives
- Process

Preferred Alternatives
- Summary

At the end of this chapter, a summary in the preferred alternatives section will highlight the preferred Airside Alternatives and Landside Alternatives. The goal of this chapter is to provide the sponsor with a set of alternatives that will assist the airport in deciding what is best for the future of the Sidney-Richland Regional Airport through the planning period (2013-2033).

Alternatives Development and Evaluation

Airport alternatives are developed from key elements like existing conditions, forecasting, facility requirements, and ultimately what the sponsor feels is best for their airport. By combining these elements, alternatives are then developed and presented for further consideration. The end result should be a solid preferred alternative, and a guide for the airport on how to achieve their goals.

Summary of Requirements

As noted in *Chapter 4 - Facility Requirements*, the airport has an existing footprint that allows little to no growth for hangar/facilities development. As a result, options were explored to find a solution for sustainable growth over the next 20 years and beyond. The existing design aircraft (Pilatus PC-12 or similar) is also driving a different type of design standards for airside requirements. This design standard (Group II wingspan) demands wider taxiway and taxilane setbacks to fixed or movable objects than the Airport was previously designed for. The Group II setback, known as the Taxiway/Taxilane Object Free Area, cannot be accommodated in the existing hangar footprint. Since the existing design standards

cannot be met (TOFA) the pavement (apron and taxiway) is not eligible for FAA dollars. When the existing buildings reach there useful life, an effort should be made to relocate them to appropriate separation distances (shown by the red lines). A graphic depicting these imaginary setbacks can be seen below in Exhibit 5-1 and 5-2. It should be noted the ultimate design aircraft (Cessna 560 or similar) is in the same Group II wingspan category, and as a result did not affect setbacks from taxiway/taxilane centerlines.

Exhibit 5-4 – Existing Design Aircraft Setback Requirements (West Airfield)

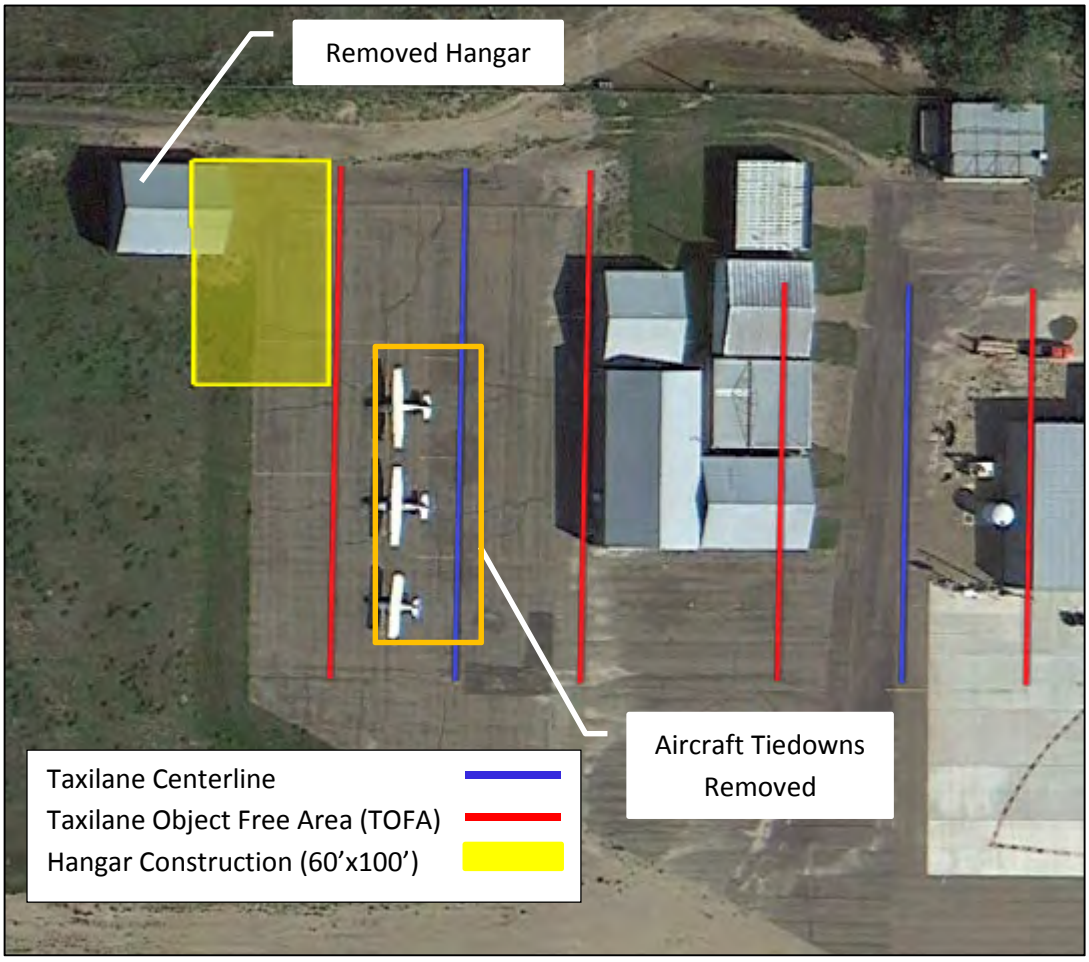
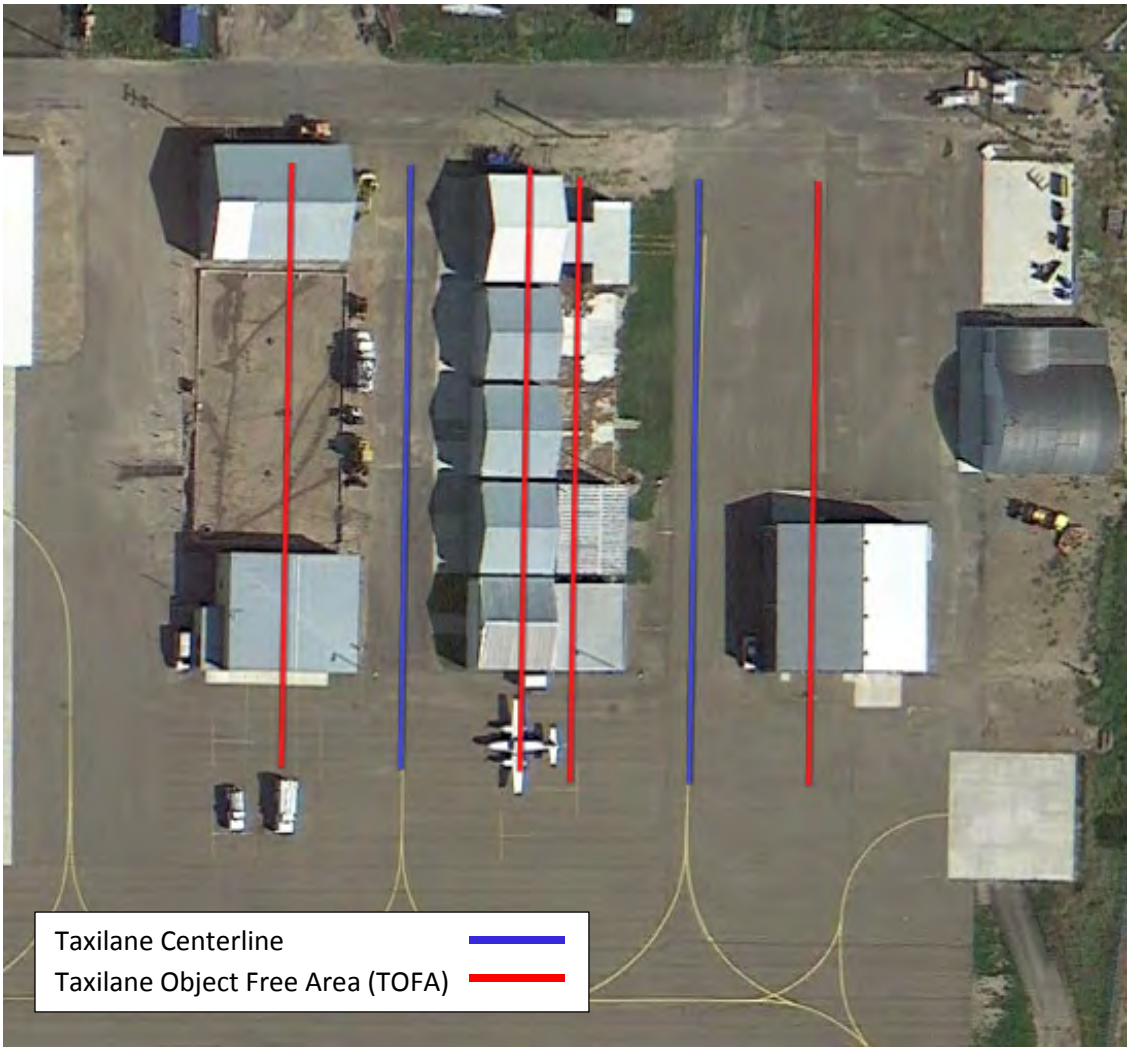


Exhibit 5-2 – Existing Design Aircraft Setback Requirements (East Airfield)



Other constraints noted in the existing footprint are the commercial service terminal area, as well as the two Fixed-Base Operators (FBOs) on the airfield. As noted through conversations with the sponsor, the existing holding area has limited space for seating passengers prior to clearing security. Currently, Cape-Air provides commercial service with five daily flights in a Cessna 402. If the airport were to add an additional carrier to provide service, the terminal area would not be able to accommodate the additional passenger flow. The sponsor also noted that the automobile parking area also becomes constrained during the spring, summer months, and holiday events, since both FBOs, the rental car agency and the commercial service passengers share the parking lot. Also, both FBO's have expressed an interest in more hangar and apron space, but the existing developed area cannot accommodate additional development.

Development of Alternatives

Options were explored on how future development will meet the existing and projected needs. Since several buildings have been constructed in the past 10 years, it did not make

financial sense to demolish existing buildings to make a more efficient layout, so options were explored in the currently vacant land to the central portion of the airfield. Also the existing developed area is constrained by a floodplain to the north, an irrigation canal to the east, the building restriction line (BRL) to the west and the runway system immediately to the south, so expansion of the existing footprint is not feasible.

As a result of the items mentioned above, future planning for additional growth was identified in the central portion of the airfield. This area was identified as the most feasible area to explore development opportunities for a few reasons. One of these reasons is because it is the only area on airport property that has a large amount of open and flat terrain. Moreover, the central portion of the airfield has no known environmental issues/hurdles to overcome (an environmental report was completed in conjunction with this master plan and found no environmental concerns). Finally, there is an existing airport access point as a result of a county road that provides access to an oil well site. By developing the central location of the airfield, the airport also has the flexibility to accommodate any type of facility expansion in the near-term and long-term growth outlook.

Landside/Access Alternatives

Landside alternatives were evaluated in conjunction with airside alternatives. This is due to the early identification of planning for centrally-developed airside facilities. In order to gain access to future airside development, entirely new landside development will be necessary. However, the short-term needs are met with regards to an airport access point. Richland County has agreed to let the Sidney-Richland Regional Airport use the existing public gravel road that is adjacent to airport property, depicted in Exhibit 5-3 and Exhibit 5-5. This gravel road provides access to an oil-well site. Long term alternatives which were reviewed included paving the existing gravel road (two access options off of State Route 16, shown in Exhibit 5-5 and 5-6), and providing access off of 14th Street (shown in Exhibit 5-4). Landside development items included parking, access to hangars/buildings, and supporting facilities.

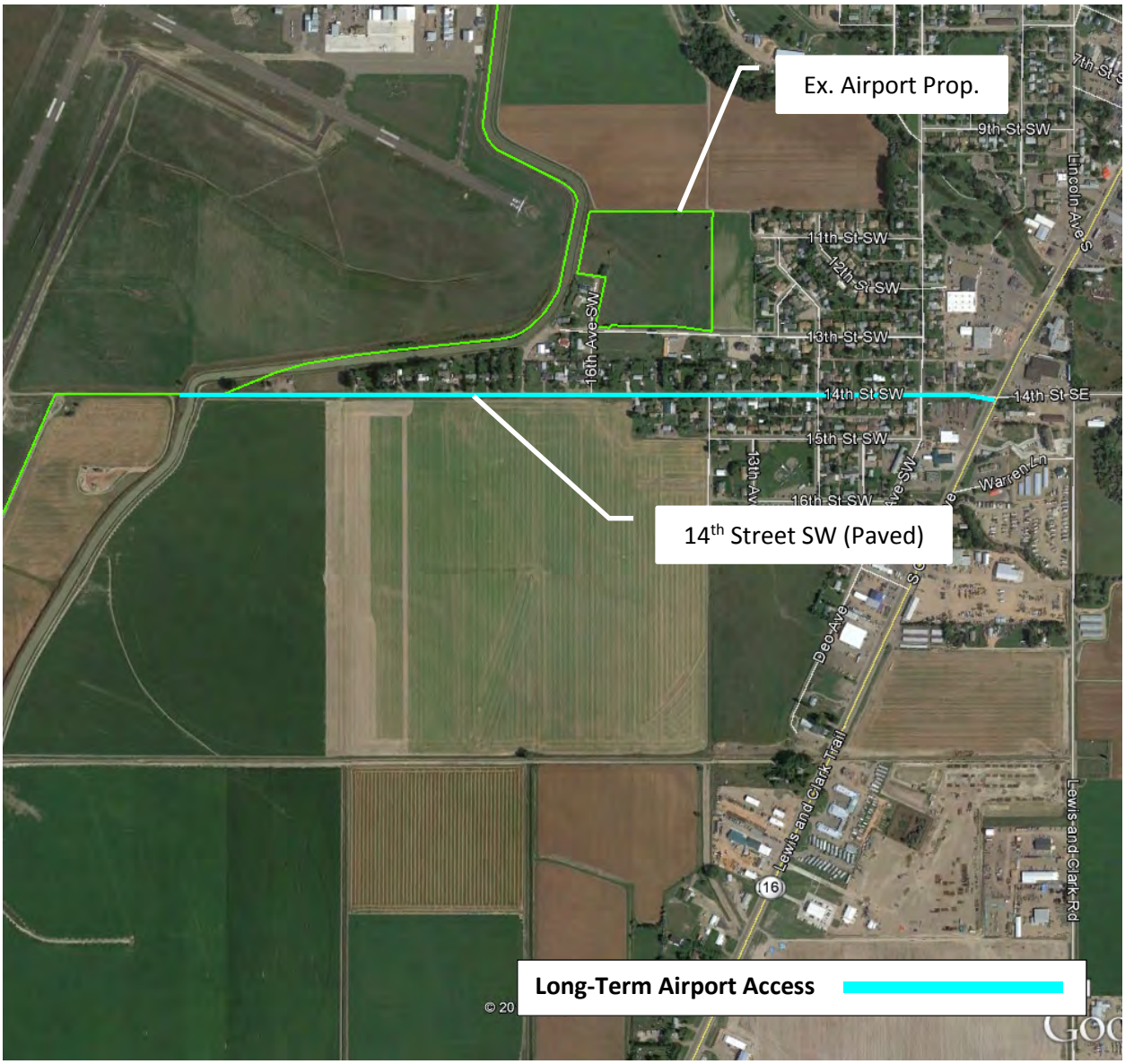
Landside/Access Alternative 1

Exhibit 5-3 – Landside/Access Alternative 1



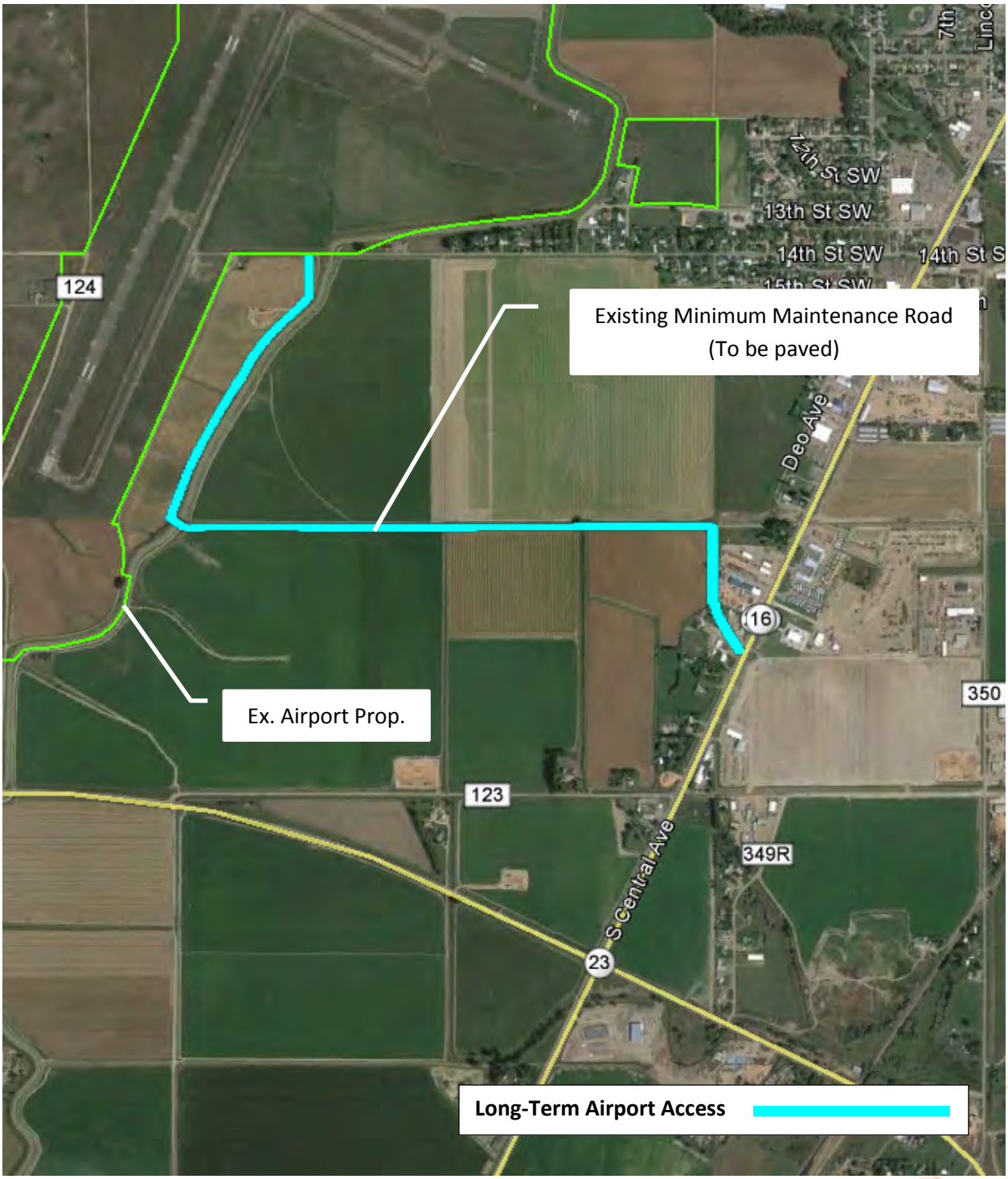
Landside/Access Alternative 2

Exhibit 5-4 – Landside/Access Alternative 2



Landside/Access Alternative 3

Exhibit 5-5 – Landside/Access Alternative 3



Landside/Access Alternative 4

Exhibit 5-6 – Landside/Access Alternative 4



Airside Alternatives

Initial analysis of the airside facilities indicated the existing footprint is developed at capacity. The existing footprint is developed to less than the existing critical aircraft's design standards (Group II setback requirements). As a result, airside alternatives were explored in the central area of the airfield. This area gives the airport flexibility to accommodate any type of growth, for both the near-term and ultimate goals of the airport. Moreover, these alternatives were developed with phasing and flexibility in mind. Each alternative has a "Phase 1" developed to meet the immediate needs of the airport, as discussed in the Facility Requirements Chapter[8]. As the airport grows, phasing of infrastructure builds off of this initial phase and becomes the "Ultimate" phase of the alternative. These alternatives are depicted, along with the pros and cones on the following pages in Airside Alternatives 1- 4B. The existing developed area buildings should be re-evaluted as they reach their useful life expectancy and as users change. An example would be when the terminal area is relocated to the central area of the airfield (mid to long range project depending on the nature of commercial operations). At this time the airport will need to re-evaluate the existing terminal and support facilities to determine if they can be repurposed or if they should be demolished.

The existing runway length of Runway 1-19 was reviewed in the Facility Requirements Chapter and it was found that the Airport should plan to accommodate a longer runway in the future. Runway Alternative 1 provides the only alternative to extending the airports runway, as Runway end 19 is constrained by terrain, a road and a golf course and Runway 11-29 is constrained by a canal on Runway end 29 and by a road and terrain on Runway end 11.

[8] It should be noted that Phase 1 development scenarios do not depict the terminal, cargo or FBOs being constructed. This is strictly a result of the Facility Requirements Chapter. If demand warrants construction of additional buildings the alternatives are flexible.

Airside Alternative 1

Exhibit 5-7 – Airside Alternative 1 (Phase 1)

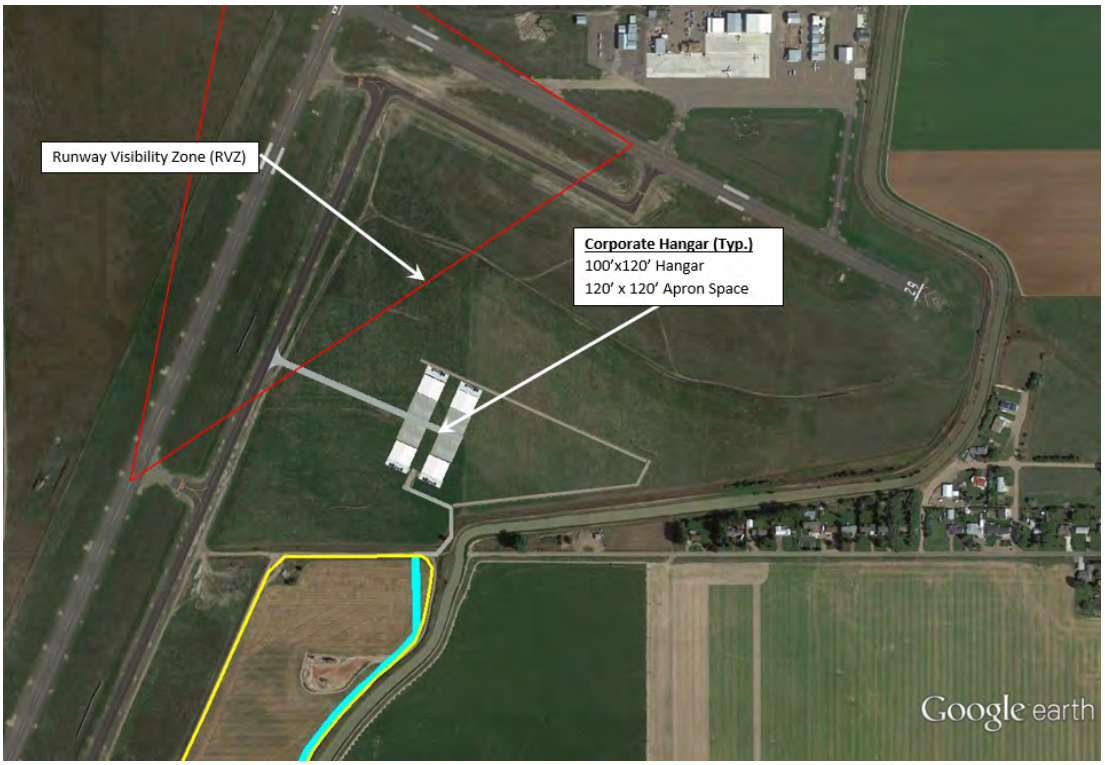
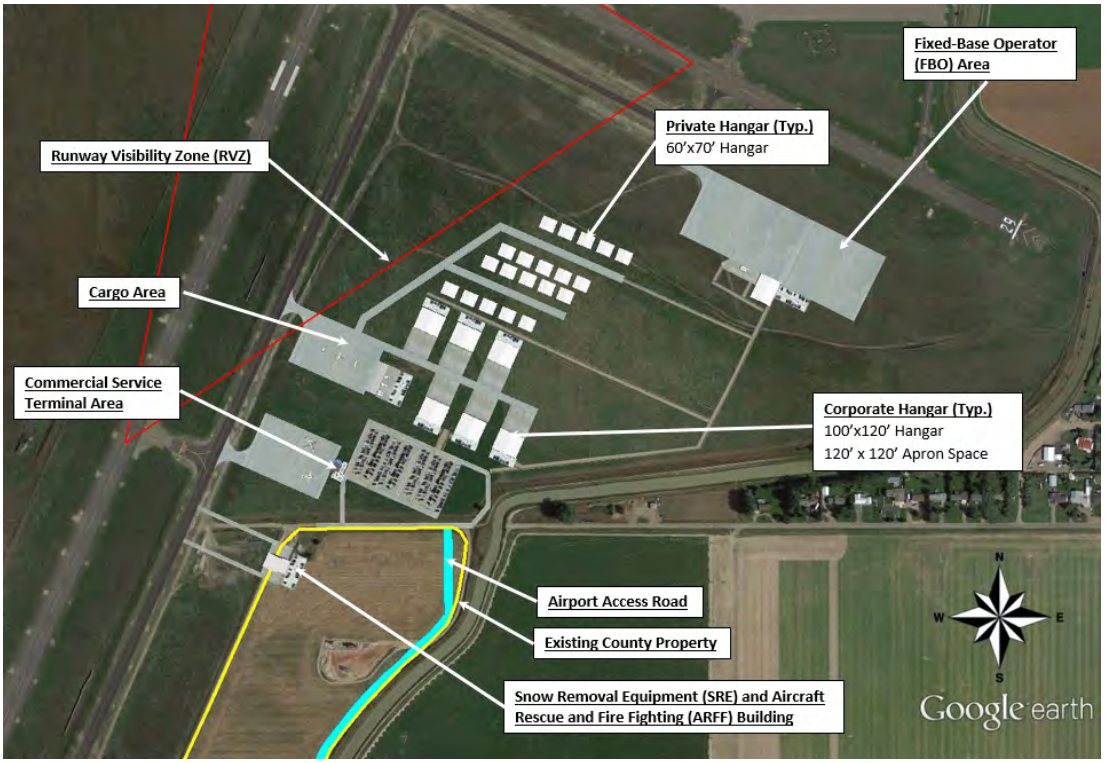


Exhibit 5-8 – Airside Alternative 1 (Ultimate)



Pros

- Accommodates existing demand for corporate hangar development in Phase 1
- Allows flexibility for future development needs
- Fixed-Base Operators (FBO's) are in the same general area on the airfield
- Nearly all development can occur on existing airport property
- Near-term access to this alternative is available today

Cons

- Ultimate Snow Removal Equipment (SRE) Building/Aircraft Rescue & Fire Fighting (ARFF) Building development relies on the purchase of County property
- Potential cargo development area may have limitations on expansion beyond the 20-year planning period

Airside Alternative 2

Exhibit 5-9 – Airside Alternative 2 (Phase 1)

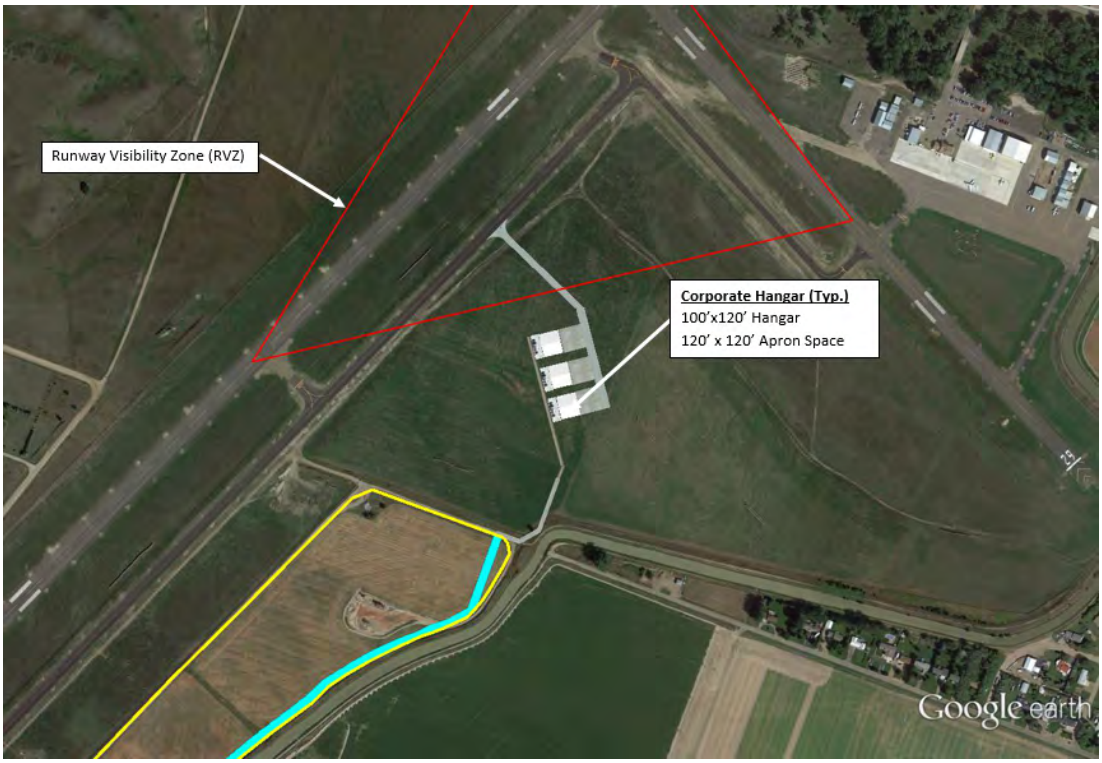
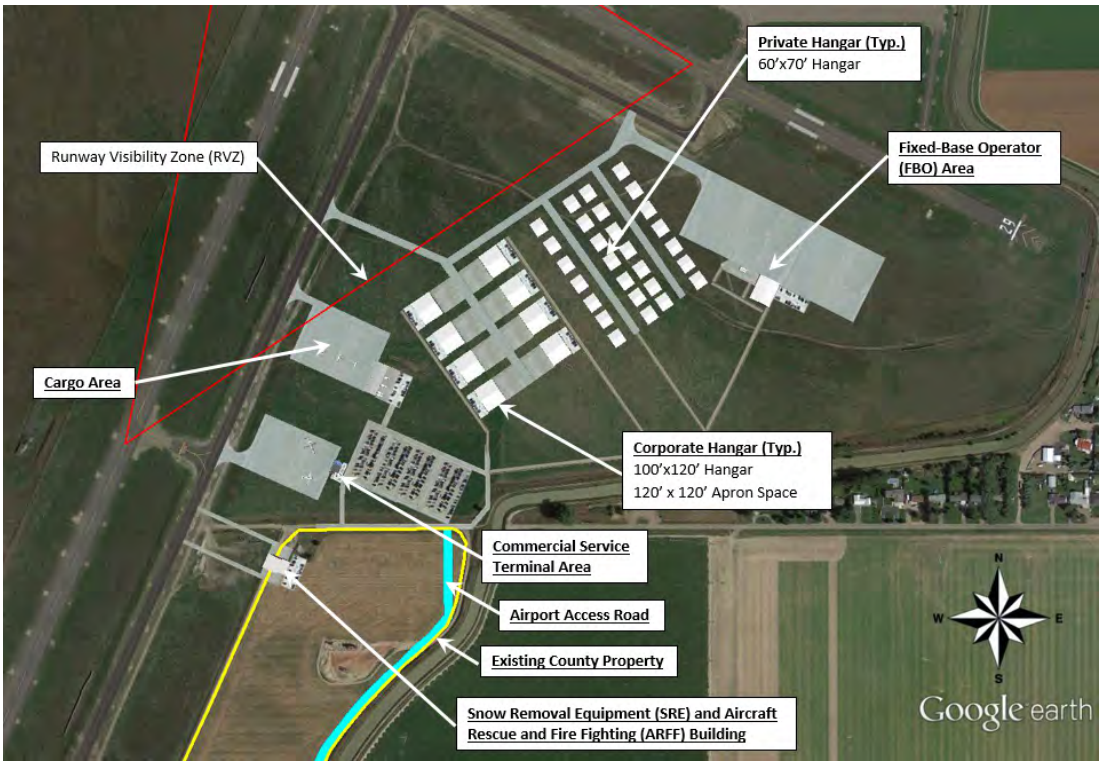


Exhibit 5-10 – Airside Alternative 2 (Ultimate)



Pros

- Accommodates existing demand for corporate hangar development in Phase 1
- Allows flexibility for future development needs
- Fixed-Base Operators (FBO's) are in the same general area on the airfield
- Nearly all development can occur on existing airport property
- Near-term access to this alternative is available today
- Cargo Facilities have room to expand beyond the 20-year planning cycle

Cons

- Ultimate Snow Removal Equipment (SRE) Building/Aircraft Rescue & Fire Fighting (ARFF) Building development relies on the purchase of County property

Airside Alternative 3

Exhibit 5-11 – Airside Alternative 3 (Phase 1)

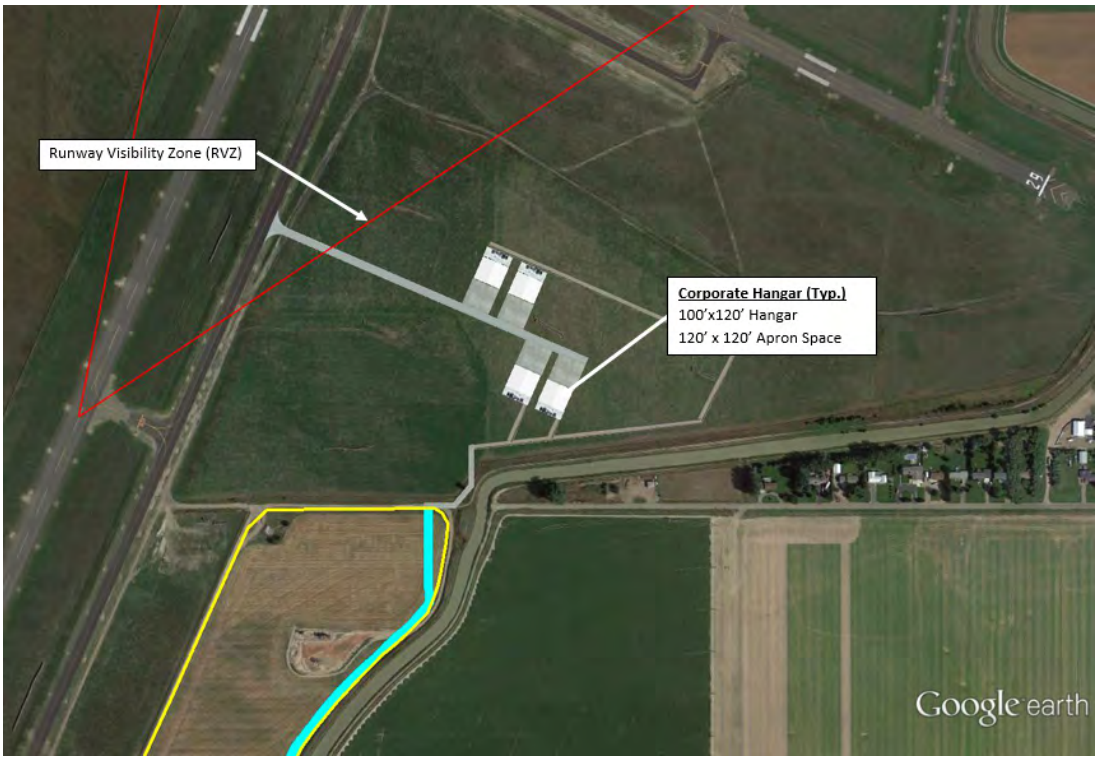
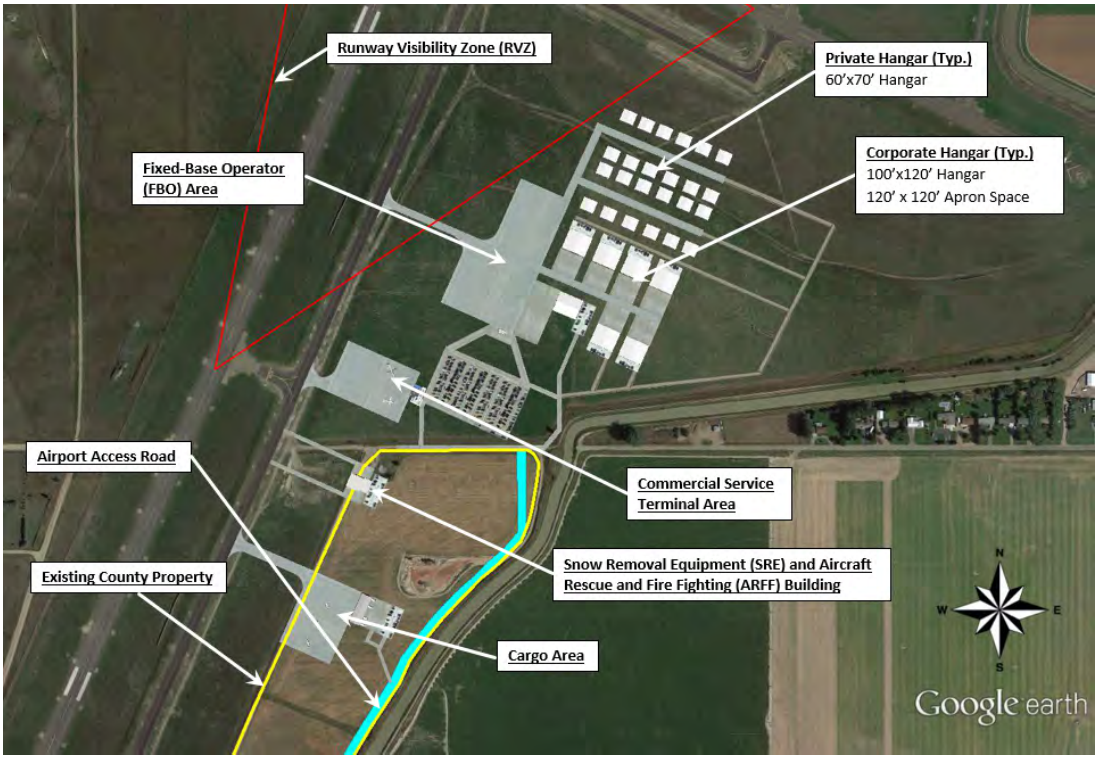


Exhibit 5-12 – Airside Alternative 3 (Ultimate)



Pros

- Accommodates existing demand for corporate hangar development in Phase 1
- Allows flexibility for future development needs
- Nearly all development can occur on existing airport property
- Near-term access to this alternative is available today
- Cargo Facilities have room to expand beyond the 20-year planning cycle
- Fixed-Base Operator (FBO) Facilities are close to corporate hangar development

Cons

- Development of Cargo Facilities is dependent on the purchase of adjacent county land
- Ultimate Snow Removal Equipment (SRE) Building/Aircraft Rescue & Fire Fighting (ARFF) Building development relies on the purchase of County property

Airside Alternative 4A

Exhibit 5-13 – Airside Alternative 4A (Phase 1)

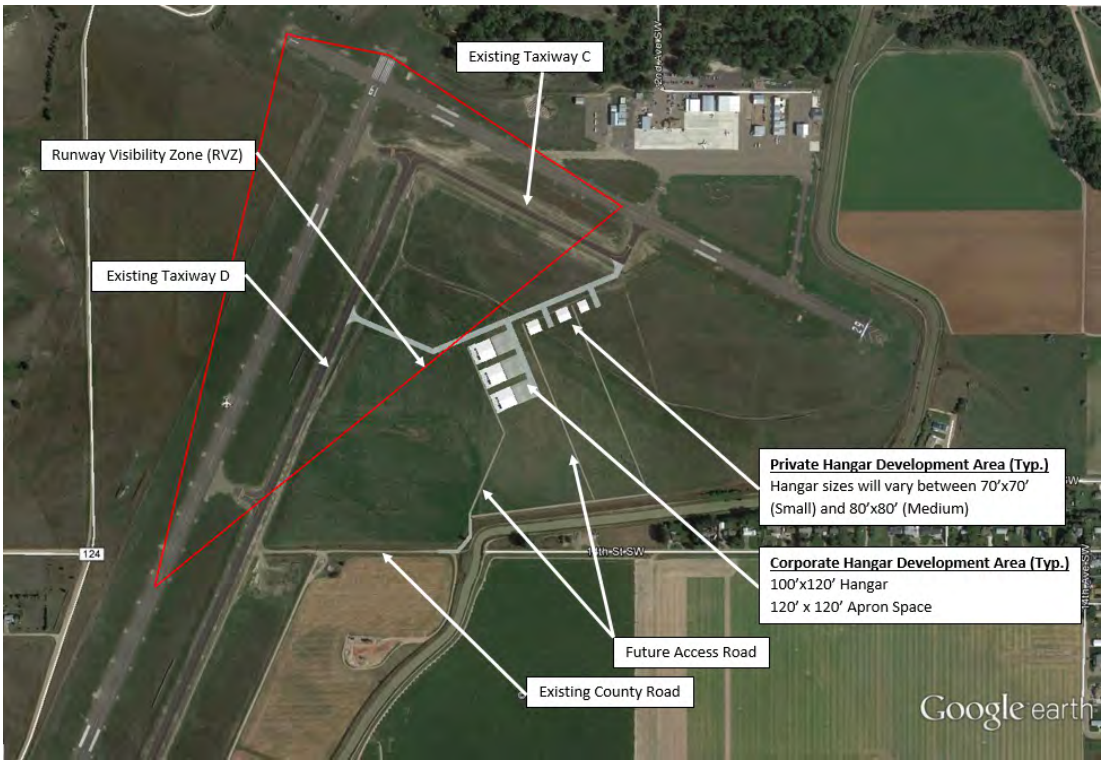
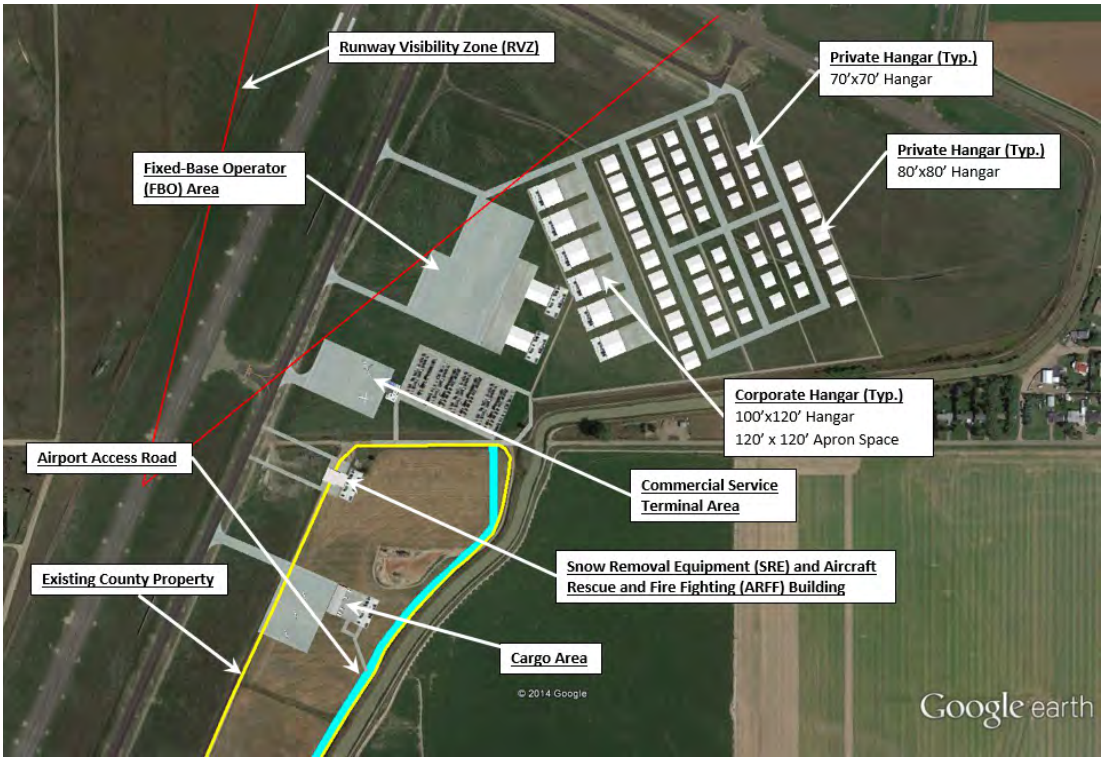


Exhibit 5-14- Airside Alternative 4A (Ultimate)



Pros

- Private hangar access areas have access roads behind every hangar lot, allowing vehicle access without driving on taxilanes
- Apron space accommodates two FBO lots
- Accommodates existing demand for corporate hangar development and small hangar development in Phase 1
- Allows flexibility for future development needs
- Nearly all development can occur on existing airport property
- Near-term access to this alternative is available today
- Cargo Facilities have room to expand beyond the 20-year planning cycle
- Fixed-Base Operator (FBO) Facilities are close to corporate hangar development

Cons

- Development of Cargo Facilities is dependent on the purchase of adjacent county land
- Ultimate Snow Removal Equipment (SRE) Building/Aircraft Rescue & Fire Fighting (ARFF) Building development relies on the purchase of County property

Airside Alternative 4B

Exhibit 5-15 – Airside Alternative 4B (Phase 1)

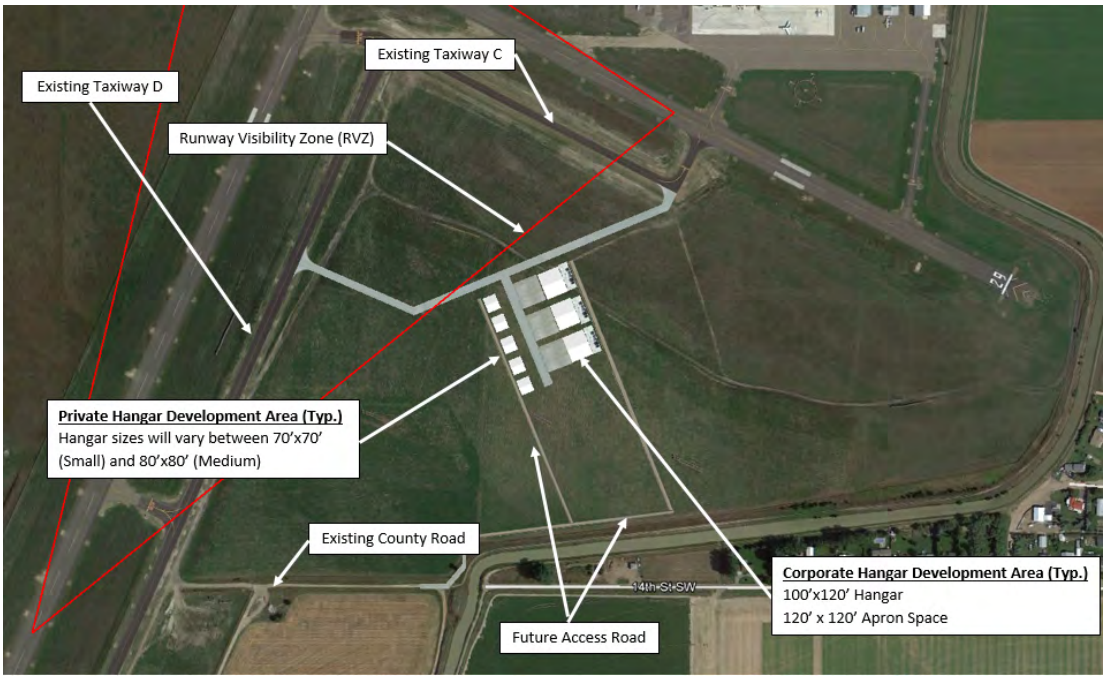
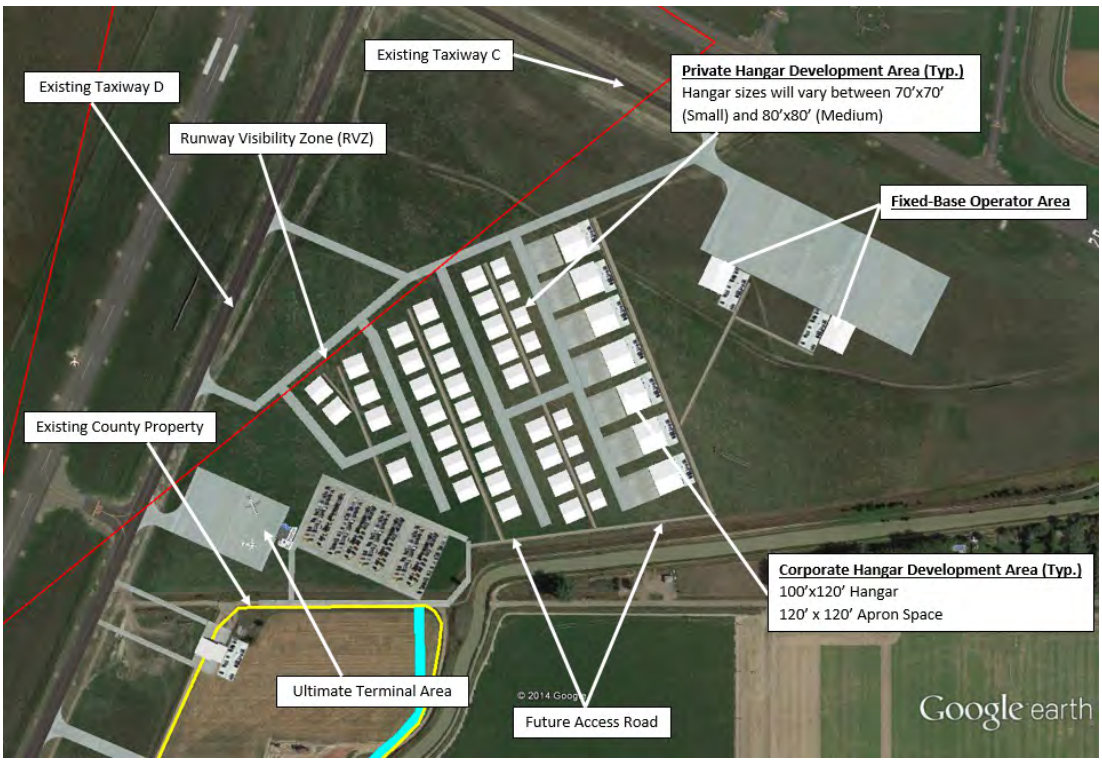


Exhibit 5-16 – Airside Alternative 4B (Ultimate)



Pros

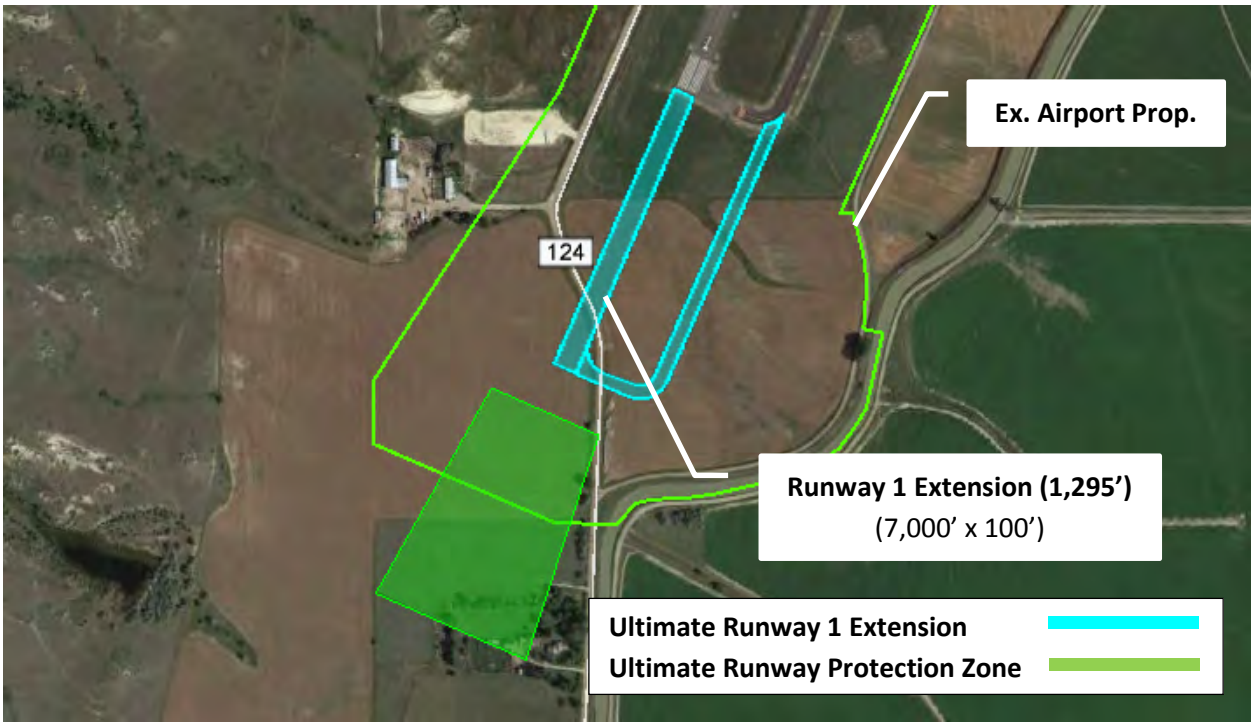
- Private hangar access areas have access roads behind every hangar lot, allowing vehicle access without driving on taxilanes
- Apron space accommodates two FBO lots
- Accommodates existing demand for corporate hangar development and small hangar development in Phase 1
- Allows flexibility for future development needs
- Near-term access to this alternative is available today
- Cargo Facilities have room to expand beyond the 20-year planning cycle
- Fixed-Base Operator (FBO) Facilities are close to corporate hangar development
- FBO facilities are close to existing FBO facilities

Cons

- Development of Cargo Facilities is dependent on the purchase of adjacent county land
- Ultimate Snow Removal Equipment (SRE) Building/Aircraft Rescue & Fire Fighting (ARFF) Building development relies on the purchase of County property

Runway Alternative 1

Exhibit 5-17 – Runway Extension Alternative 1



Pros

- Existing runway length of 5,705 covers 75 percent of fleet at 60 percent useful load. Per FAA Advisory Circular 150/5325-4B, this extension to 7,000 feet covers 75 percent of fleet at 90 percent useful load
- Planning for an extension will aid in the protection of the associated airspace involved

Cons

- This extension impacts roadways, as well as homesteads. These issues would need to be resolved prior to construction

Evaluation of Alternatives

Process

Landside Alternatives

Landside alternatives were evaluated and created based on the premise that future airside development would be in the central-portion of the airfield. This conclusion was made as a result of the existing airside footprint to have no space for expansion. As a result, immediate landside needs were evaluated, as well as the most effective way to provide long-term access

to the area. Alternatives were presented to the sponsor in conjunction with the airside alternatives, so an informed decision could be made on what they feel is best for their airport in their near-term and long-term goals.

Airside Alternatives

Through discussions with the sponsor, and coordinating with State/FAA officials, it was determined the existing airside footprint cannot accommodate additional hangar growth. As a result, other areas surrounding the airport were evaluated for potential hangar/facility development. The only area on existing airport property, available for development, was the centrally-located green space. This green space is relatively flat, has no wetlands, and has an existing county road in the area that could be used for immediate access. Based on these criteria, this area was selected as the only feasible area to develop additional airport infrastructure. Alternatives were then developed in this area and presented to the airport for review and consideration.

Runway Alternatives

An initial review of the existing runways at Sidney-Richland Regional Airport was completed before runway improvement alternatives were created. Land use restrictions like a golf course to the north, terrain to the west, and water features to the east have limited the discussions on the possibility of runway extensions. Moreover, the existing and ultimate design aircraft identified in this master plan does not necessarily justify the need for an extension. However, protecting the next step in runway length is still a viable option, as it would give aircraft the ability to use the airport with less weight restrictions.

Preferred Alternatives

Summary

Each of the alternatives mentioned above were initially presented to the airport on June 18th, 2014. From there, additional meetings between the sponsor and KLJ discussed possible modifications and preferred alternatives.

Landside Alternative

Alternative 1 was chosen because it allows immediate access to the centrally-located development area. However, because this access road would be impacted by the ultimate construction of a runway extension, this alternative was not chosen as a long-term solution. For a long-term to airport access, ***Alternative 4*** was chosen. This alternative was selected by the sponsor for its access to their main street, and the ability to provide access to the airport away from existing residential areas.

Airside Alternative

Alternative 4A was selected as the preferred airside alternative for a few reasons. One of the reasons it was chosen as the preferred alternative by the sponsor is the location of the Fixed-Base Operator (FBO) location. This alternative allows one or both FBOs to relocate to

the centrally-located development area. Alternative 4A was also the preferred alternative for its ability to accommodate various-sized hangars. These hangar sizes vary from larger corporate, to medium general aviation users (that may have more than one aircraft to store), and small hangars for single aircraft storage. Phase 1 of this alternative was also one of the reasons the sponsor selected this alternative. This initial phase gives the airport the ability to accommodate more than one hangar in the initial-build, and allows corporate and smaller hangars at the same time. This phase 1 build could allow hangar development through the next 10 years of anticipated additional based aircraft at the airport.

Runway Alternative

Alternative 1 was selected as a preferred alternative for runway development. As a result of land use constraints surrounding the airport, this was the only alternative evaluated. While existing and future critical aircraft do not require this extension, this extension would allow aircraft to use the airfield with less weight restrictions. As such, planning for the extension allows the airport to protect for future surrounding development in the event this extension comes to fruition.

Chapter 6: Implementation

As a result of items identified in the facility requirements chapter (Chapter 4), in conjunction with the preferred alternatives (Chapter 5), improvements have been identified for the Sidney-Richland Regional Airport throughout the planning cycle of this study (20 years).

Airport Capital Improvement Plans (ACIPs) assist the airport in programming for projects in the short-term (0-5 years); mid-term (6-10 years); and long-term (11-20 years).

Although the ACIP lays out projects for the next 20 years, projects are funded based on eligibility requirements and justification provided by the airport. These two triggers, funding availability and justification, can sometimes shift projects identified on the ACIP as well.

Short-Term (0-5 Years)

Design and Construct New Mid-field GA Hagar Area (FY 2015)

Construction of new general aviation area consists of an access taxilane that ties into Taxiway C and Taxiway D. Project also includes hangar taxilanes allowing construction of private corporate hangars (approximately three spaces), private medium-sized hangars (approximately five spaces), as well as private small-sized hangars (approximately six spaces). It also includes extension of electric and natural gas to the site.

Estimated Total Project Cost: $2,670,000
FAA Share (90%): $2,403,000
Local Share: $267,000

Construct FBO Apron and Taxiway Access (FY 2017)

It is anticipated one of the existing Fixed-Base Operators (FBOs) has an interest in relocating their facilities to the centrally-located development area. This project covers the construction of public-use apron space, as well as taxilanes providing access to the new apron area.

Estimated Total Project Cost: $2,500,000
FAA Share (90%): $2,250,000
Local Share: $250,000

Rehabilitation of Taxiways A & B and Northwest GA Apron (FY 2019)

Pavement rehabilitation is necessary to extend the useful-life of the surface. This project consists of a mill and overlay, in order to remove existing lateral and transverse cracking, weathering, and normal wear and tear on the surfaces.

Estimated Total Project Cost: $1,800,000
FAA Share (90%): $1,620,000
Local Share: $180,000

Pavement Maintenance – Runways, Taxiways, Aprons (FY 2019)

Pavement maintenance is necessary to extend the useful-life of the surface. It is recommended pavement maintenance be conducted every few years. Pavement maintenance can consist of crack routing and sealing, fog seals, and application of new markings.

Estimated Total Project Cost: $290,000

FAA Share (90%): $261,000

Local Share: $29,000

PROJECT WORK DESCRIPTION

1. CONSTRUCTION OF MID-FIELD GA HANGAR AREA, TAXIWAY, AND ACCESS ROADS – FY 2015
2. CONSTRUCT FBO APRON AND TAXIWAY ACCESS – FY 2017
3. REHABILITATION OF TAXIWAYS A & B – FY 2019
4. PAVEMENT MAINTENANCE RUNWAYS, TAXIWAYS, APRONS, – FY 2019
5. RECONSTRUCTION OF NORTHWEST GA APRON – FY 2019
6. TERMINAL ENHANCEMENTS FOR IMPROVED UTILIZATION – FY 2020

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SHORT-TERM
CAPITAL IMPROVEMENT PLAN

DRAFTED	J.M.F.
REVIEWED	C.G.C.
PROJECT NUMBER	MISC
ISSUE DATE	4/14/2015
SHEET	

Apr 15, 2015 – 4:27pm – P:\Airport\MT\Sidney\CIP\2015\CIP-SDY-FY 2015 to 2035 Sketch.dwg (Short-Term)

© KLJ 2015

Mid-Term (6-10 Years)

Terminal Enhancements for Improved Utilization (FY 2020)

Terminal enhancements consist interior remodeling needed to enhance passenger convenience specific to passenger check-in, screening, and post-screening. These enhancements will allow the airport to process passengers faster and utilize the existing terminal space in a more efficient manner.

Estimated Total Project Cost: $600,000
FAA Share (90%): $540,000
Local Share: $60,000

Transfer of County Property to Airport (FY 2021)

Project consists of county property being released to the Sidney-Richland Regional Airport Authority. The release of this land gives the airport control of the access road and adjacent land for airport projects.

Estimated Total Project Cost: $25,000
FAA Share (90%): $22,500
Local Share: $2,500

Construct Cargo Apron and Taxiway (FY 2022)

Construction of an apron and taxiway to allow dedicated space for cargo operations to be conducted.

Estimated Total Project Cost: $1,645,250
FAA Share (90%): $1,480,725
Local Share: $164,525

Wildlife Fencing (North and West of Airport) (FY 2022)

Relocation of wildlife fence consists of the removal of existing fence-line near the Runway 1 end.

Estimated Total Project Cost: $118,000
FAA Share (90%): $106,200
Local Share: $41,000

Relocate County Rd 124 (FY 2022)

Relocation of County Rd 124 consists of the removal of the existing road alignment and shifting it west.

Estimated Total Project Cost: $410,000
FAA Share (90%): $369,000
Local Share: $41,000

Bridge over Canal and Access Road (FY 2022)

Airport access will be achieved by constructing a new road along the existing drainage ditch approximately 0.5 miles south of 14th St SW. The road will require a bridge to access airport property.

Estimated Total Project Cost: $1,427,500
FAA Share (90%): $1,284,750
Local Share: $142,750

Pavement Maintenance – Runways, Taxiways, Aprons (FY 2024)

Pavement maintenance is necessary to extend the useful-life of the surface. It is recommended pavement maintenance be conducted every few years. Pavement maintenance can consist of crack routing and sealing, fog seals, and application of new markings.

Estimated Total Project Cost: $290,000
FAA Share (90%): $261,000
Local Share: $29,000

PROJECT WORK DESCRIPTION

1. REHABILITATION (MILL AND OVERLAY) OF RUNWAYS 1-19 AND 11-29 -- FY 2021
2. CONSTRUCT CARGO APRON AND TAXIWAY -- FY 2022
3. WILDLIFE FENCING (NORTH AND WEST OF AIRPORT) -- FY 2022
4. RELOCATE COUNTY RD 124 -- FY 2022
5. BRIDGE OVER CANAL FOR AND ACCESS ROAD -- FY 2022
6. PAVEMENT MAINTENANCE - RUNWAYS, TAXIWAYS, APRONS -- FY 2024

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SIDNEY, MONTANA

MID-TERM CAPITAL IMPROVEMENT PLAN

DRAFTED	J.M.F.
REVIEWED	C.C.C.
PROJECT NUMBER	MISC
ISSUE DATE	4/14/2015
SHEET	

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Long-Term (11-20 Years)

Extension of Mid-field Taxilanes (FY 2026)

The taxilanes constructed in 2015 will be extended to the southeast to allow for additional hangar construction.

Estimated Total Project Cost: $694,500
FAA Share (90%): $625,050
Local Share: $69,450

Rehabilitation (Mill and Overlay) of Apron (FY 2026)

Pavement rehabilitation is necessary to extend the useful-life of the surface. This project consists of a mill and overlay, in order to remove existing lateral and transverse cracking, weathering, and normal wear and tear on the surfaces.

Estimated Total Project Cost: $820,200
FAA Share (90%): $738,180
Local Share: $82,020

Construction of Snow Removal Equipment Building (FY 2028)

Increased pavement area will require additional snow removal equipment and additional storage to house the equipment. A new snow removal equipment building will be constructed in the mid-filed area to house the equipment and relocate it to a central location allowing quicker access to all airport pavements for snow removal operations.

Estimated Total Project Cost: $700,000
FAA Share (90%): $630,000
Local Share: $70,000

Pavement Maintenance – Runways, Taxiways, Aprons (FY 2029)

Pavement maintenance is necessary to extend the useful-life of the surface. It is recommended pavement maintenance be conducted every few years. Pavement maintenance can consist of crack routing and sealing, fog seals, and application of new markings.

Estimated Total Project Cost: $290,000
FAA Share (90%): $261,000
Local Share: $29,000

New Terminal and Parking Area – Design (FY 2030)

Project consists of design for new commercial terminal building, aircraft apron space, as well as automobile parking and road access.

Estimated Total Project Cost: $250,000
FAA Share (90%): $225,000
Local Share: $25,000

New Terminal and Parking Area – Construction (FY 2031)

Project consists of construction for new commercial terminal building, aircraft apron space, as well as automobile parking and road access.

Estimated Total Project Cost: $4,000,000
FAA Share (90%): $3,600,000
Local Share: $400,000

Construct Mid-field Taxilane (FY 2031)

Project consists of construction for a new taxilane on the west side of the mid-field apron area to expand hangar lot capacity.

Estimated Total Project Cost: $532,500
FAA Share (90%): $479,250
Local Share: $53,250

Reconfigure Taxiway C and Runway 1-19 Intersection (FY 2031)

In preparation for the completion of parallel taxiway C, the remaining portion of the angled Taxiway C will be removed and aligned to be parallel to Runway 11-29. A connector taxiway to Runway 11-29 will also be constructed as part of this project.

Estimated Total Project Cost: $616,500
FAA Share (90%): $554,850
Local Share: $61,650

Pavement Maintenance – Runways, Taxiways, Aprons (FY 2034)

Pavement maintenance is necessary to extend the useful-life of the surface. It is recommended pavement maintenance be conducted every few years. Pavement maintenance can consist of crack sealing, fog seals, or slurry seals.

Estimated Total Project Cost: $290,000
FAA Share (90%): $261,000
Local Share: $29,000

Construct Partial Parallel Taxiway C to Runway 29 (FY 2035)

Project consists of constructing additional taxiway and extending Taxiway C towards the Runway 29 end, as well as construction of connecting taxiway to the Runway 29 end.

Estimated Total Project Cost: $339,750
FAA Share (90%): $305,775
Local Share: $33,975

Construct Partial Parallel Taxiway C to Runway 11 (FY 2035)

Project consists of constructing additional taxiway and extending Taxiway C towards the Runway 11 end. Project also addresses the realignment of north entrance taxiway to Runway 19, and creates an angle perpendicular to Runway 1/19. This alignment straightens the parallel taxiway for Runway 11/29, and then extends to the Runway 11 end to complete construction and create a full parallel taxiway. Project also includes an entrance taxiway to Runway 11/29. When landing on the Runway 29 approach, this entrance taxiway allows aircraft to exit Runway 11/29 prior to crossing Runway 1/19.

Estimated Total Project Cost: $384,300
FAA Share (90%): $345,870
Local Share: $38,430

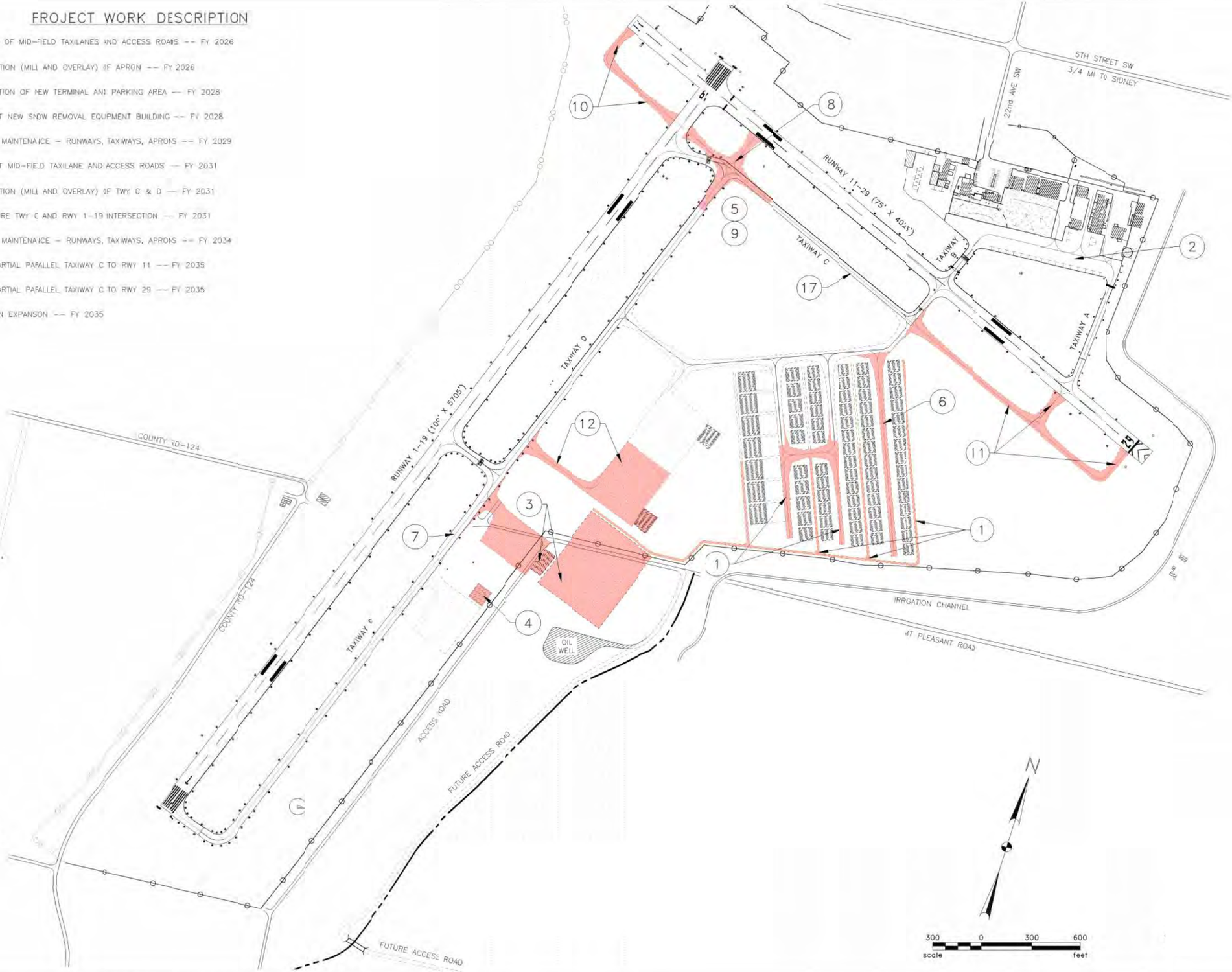
FBO Apron Expansion (FY 2035)

Project will double the size of the existing FBO apron to allow an additional FBO to locate to the mid-field area. The project will include the expansion of the FBO apron and the construction of an additional taxilane for airport access.

Estimated Total Project Cost: $1,554,250
FAA Share (90%): $1,398,825
Local Share: $155,425

PROJECT WORK DESCRIPTION

1. EXTENSION OF MID-FIELD TAXILANES AND ACCESS ROADS -- FY 2026
2. REHABILITATION (MILL AND OVERLAY) OF APRON -- FY 2026
3. CONSTRUCTION OF NEW TERMINAL AND PARKING AREA -- FY 2028
4. CONSTRUCT NEW SNOW REMOVAL EQUIPMENT BUILDING -- FY 2028
5. PAVEMENT MAINTENANCE - RUNWAYS, TAXIWAYS, APRONS -- FY 2029
6. CONSTRUCT MID-FIELD TAXILANE AND ACCESS ROADS -- FY 2031
7. REHABILITATION (MILL AND OVERLAY) OF TWY C & D -- FY 2031
8. RECONFIGURE TWY C AND RWY 1-19 INTERSECTION -- FY 2031
9. PAVEMENT MAINTENANCE - RUNWAYS, TAXIWAYS, APRONS -- FY 2034
10. EXTEND PARTIAL PAPALLEL TAXIWAY C TO RWY 11 -- FY 2035
11. EXTEND PARTIAL PAPALLEL TAXIWAY C TO RWY 29 -- FY 2035
12. FBO APRON EXPANSON -- FY 2035



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SIDNEY-RICHLAND AIRPORT AUTHORITY
SIDNEY, MONTANA

LONG-TERM
CAPITAL IMPROVEMENT PLAN

DRAFTED	J.M.F.
REVIEWED	C.C.C.
PROJECT NUMBER	MISC
ISSUE DATE	4/14/2015
SHEET	

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Anticipated Funding Sources

FAA

Sidney-Richland Regional Airport is a part of the National Plan of Integrated Airport System (NPIAS), and is eligible for federal funding through the FAA's Airport Improvement Program (AIP). For airports qualifying for AIP funding, typically the FAA will contribute 90 percent of total eligible project costs. The remaining 10 percent must be covered by the sponsor, or could be split between the sponsor and the state. On an annual basis, airports in the NPIAS program receive entitlement dollars. The amount of entitlements received will depend on the level of service(s) provided for the airport. For instance, a general aviation airport will receive $150,000 entitlements annually, while those airports providing commercial service can receive more than $150,000 if they meet certain criteria. The next level of entitlements, for commercial service airports, is a minimum of $1 Million when a particular airport exceeds 10,000 annual airport enplanements (from two years prior).

The FAA also has funding options through discretionary funding. Discretionary funds are surplus dollars from various sources (IE airports that have not used their entitlements and had to give them back) and are used to fund projects based on a priority system until the funds are depleted. For airports requesting discretionary funding, their project(s) are ranked and compared to other airports requesting discretionary funding. The FAA then releases the discretionary funding to those projects with the highest priority, until the pool of discretionary funding runs out. Airports requesting discretionary funding are not guaranteed to receive funding. As a result, this is not a common area for airports to receive funding on the majority of projects unless the project is known to be a high priority project.

Since Sidney-Richland Regional Airport exceeded 10,000 annual enplanements in 2013, it is anticipated the airport will have $1 Million in entitlements for 2015 projects. It is not anticipated that Sidney will seek discretionary funding for any of the upcoming projects.

Montana (State) Funding

Typically, state funding contributions are less than what the FAA will allow. Contribution rates can vary from 50 percent, to 75 or even 90 percent. However, higher contributions (IE 90 percent) are typically provided to airports not in the NPIAS and are unable to carry the financial burden of their projects. For those airports included in the NPIAS, 50 or 75 percent contributions tend to be the normal.

Because Sidney-Richland Regional Airport is considered a Primary Airport, they are not eligible for State Aid.

Local (Airport) Funding

Based on the projections of available federal funds available it is reocommended that the Airport look at different options in order to fund the projects outlined in the short term (1-5 years). There are several options that the Airport should explore, these identified below:

1. Review lease rates to see how the Airport's rates compare to airports within the region (eastern Montana, western North Dakota)
2. Develop a fee structure for private development on the airport- reduce lease rates for x amount of years based on the amount of capital invested in development projects.
3. Research reversion clauses and implement them on new leases
4. Investigate implementing a mil tax –State of Montana Code - (10) A governmental entity may levy mills for the support of airports as authorized in 67-10-402, 67-11-301, or 67-11-302 even though the governmental entity has not imposed a levy for the airport or the airport authority in either of the previous 2 years and the airport or airport authority has not been appropriated operating funds by a county or municipality during that time.
5. Consider lease rates for private users (FBOs)
6. Review rates and charges to see how the Airport's rates compare to airports within the region (eastern Montana, western North Dakota)

Chapter 7 – Environmental

Introduction

FAA Advisory Circular 150/5070-6B, Airport Master Plans, includes an environmental review as one of the elements of effective planning. The purpose behind this element of the airport master planning process is to help the sponsor thoroughly evaluate airport development alternatives and to provide information for subsequent environmental processing. ***Appendix J*** evaluates the potential for airport solid waste recycling at Sidney-Richland Regional Airport.

This environmental review is not intended to fulfill the requirements of environmental review required by National Environmental Policy Act (NEPA) or provide a definitive determination of whether an Environmental Assessment may be required for the proposed improvements. The purpose of this environmental review is to provide community, airport sponsor, and regulatory awareness of the importance of minimizing the environmental impacts of proposed airport development and to provide a general indication of the likely need for further investigation.

The proposed improvements have been identified in the Capital Improvement Program for Sidney-Richland Regional Airport, found in **Chapter 6 - Implementation**. A review of the proposed improvements indicated most of the anticipated work for the planning period is anticipated to require a Categorical Exclusion.The following activities are actions that are anticipated to require an Environmental Assessment if implemented:

- Environmental Assessment - Runway 1 Extension

Environmental Impact Categories

Descriptions of the impacts associated with the proposed improvements are discussed by the impact categories identified in FAA Order 1050.1E, Environmental Impacts: Policies and Procedures. Additional consultation regarding the proposed improvements would be warranted in the future.

Air Quality

Sidney-Richland Regional Airport is not located in a Clean Air Act non-attainment or maintenance area. The emission inventories at the Airport are at low operation levels and are not likely to predict pollutant discharges high enough to cause degradation to the existing air quality. Temporary increases due to construction will be mitigated through the use of BMP's.

Coastal Resources

The project area is not located in a coastal zone as defined in the Coastal Zone Management Act of 1972. No further analysis is required.

Compatible Land Use

Compatible land uses are those that typically are not influenced by normal airport operations. The compatibility of existing land uses in the vicinity of an airport is usually associated with the extent of noise impacts off of airport property and safety concerns, such as whether the area contains land uses that would attract hazardous wildlife.

FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, recommends wildlife attractants be located 10,000 feet away from airport operation areas for turbine-powered aircraft. Land uses that could be considered wildlife hazards may include Lone Tree Creek which borders the north end of the airport, and an irrigation system located to the east of the Airport. Further analysis may be required to determine if wildlife attractants exist near the airport, but do not appear to be hazardous at this time.

Construction Impacts

Specific impacts are anticipated to occur as a result of construction activities. These include impacts such as noise from construction equipment on the site, noise and dust from delivery of materials, and potential water pollution from erosion. These impacts are temporary and do not usually produce long-term impacts.

The proposed improvements at the Sidney-Richland Regional Airport may involve activities that would produce some amount of airborne material or dust, temporary construction noise, and short-term water quality impacts. Mitigating measures to control and limit the amount of dust would be required by the project specifications, as recommended by the Montana Department of Environmental Quality (MT DEQ).

Overall, construction impacts associated with the proposed improvements would be minimized through the use of Best Management Practices. Further, the Contractor responsible for the proposed improvements would be advised of the provisions in Advisory Circular 150/5370-10E, Standards for Specifying Construction of Airports, Item P-156 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control, and the need to abide by these specifications throughout the construction of the proposed projects.

Department of Transportation Act Section 4(f)

Federal Law 23 CFR 774, commonly known as Section 4(f) of the Department of Transportation Act of 1966, as codified in the 49 U.S.C. § 303, provides that the Secretary shall not approve any program or project which requires the use of publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national state, or local significance, or land of an historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless: (1) there is no

feasible or prudent alternative to the use of such land, and (2) such program or project includes all possible planning to minimize harm resulting from the use.

The Sidney Country Club is located approximately .48 miles north of the project area. It is a publically owned 18-hole golf course. The projects only propose infrastructure improvements within the current airport property. The proposed Runway 1/19 extension to the South will impact roadway 124. If Runway 1/19 were implemented a Runway Protection Zone (RPZ) analysis would have to be completed to identify potential incompatible land uses within the RPZ. This could include impacts to homesteads and the Sidney Country Club. If the Runway extension is not implemented then the project will not affect publicly owned lands from parks, recreation areas, refuge areas, or historic sites within the vicinity of the proposed improvements. Further review may be required.

Farmlands

The Farmland Protection Policy Act of 1981 provides protection to prime and unique farmlands. The Act defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. Unique farmland is farmland that is used for production of specific high value food, feed, and fiber crops.

Information from the Natural Resources Conservation Service (NRCS) Web Soil Survey for Richland County, MT indicates that, if irrigated, part of the Airport could be on prime farmland. Otherwise, no protected farmlands are located within the study area. Please refer to **Exhibit 7-1: Farmland Classification Map**. No further analysis is required.

Fish, Wildlife, and Plants

Pursuant to the Fish and Wildlife Coordination Act, if the proposed improvements would affect water resources (i.e. wetlands; groundwater; impoundment, diversion, deepening, controlling, modifying, polluting, dredging, or filling of any stream or other water body), then consultation with the US Fish and Wildlife Service (USFWS) and the state agency having administration over wildlife resources must be initiated.

In addition, threatened and endangered species are protected under the Endangered Species Act. This Act requires federal agencies to ensure that any action funded or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species or species proposed to be listed, or likely to result in the destruction or adverse modification of habitat of such species which is determined to be critical by the Secretary of the Interior. In accordance with Section 7 of the Endangered Species Act, consultation with USFWS to determine the potential for occurrences of federally-listed threatened and endangered species in the project area would be necessary. There are federally-listed threatened and endangered species located in Richland County, but they are not likely to be present on the proposed improvement areas. Prior to project implementation, further analysis is required to identify the potential for fish, wildlife and plant impacts as a result of the project.

Floodplains

Floodplains constitute lands situated along rivers and their tributaries that are subject to periodic flooding on the average interval of 100 years or less. The proposed improvements are located on both the outside of the regulated floodplain, and located at the North end of the Airport (near the current terminal and hangers) in an area that has a .1 - .2% annual chance of flood. Please see **Exhibit 7-2: FEMA FIRM Map** (Panel 30083C1055C and 30083C1060C).

Hazardous Materials, Pollution Prevention, and Solid Waste

FAA Order 5050.4B requires an analysis of the proposed improvements and their associated solid waste impacts as they relate to waste from the airfield development, waste from terminal area development, and the location of local waste disposal facilities that have yet to be determined as of May 2015. Please refer to ***Appendix J*** for the evaluation of potential airport solid waste recycling at Sidney-Richland Regional Airport.

The proposed improvements at Sidney-Richland Regional Airport are not likely to produce any significant increases in solid waste collection, control, or disposal, other than what is associated with construction activity. In addition, there are no hazardous materials believed to be in the area. Richland County is preparing a Multi-Hazard Mitigation Plan (MHMP). A MHMP provides the county with a tool to identify, prepare for and plan for potential hazards. No further analysis is required.

Historical, Architectural, Archaeological, and Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires that federally funded projects be evaluated for the effects on historic and cultural properties included in, or eligible for listing in, the National Register of Historic Places. The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.

Before a project that involves land disturbance is implemented, an analysis to identify the potential for cultural resources would need to be conducted for the project area. Coordination with the State Historic Preservation Office (SHPO) is necessary for projects involving land disturbance. Additionally, any project affecting buildings that have the potential to be listed in the National Register of Historic places would require coordination with SHPO. Further analysis is required prior to project implementation.

A Class III Cultural Resource Inventory Survey was completed in September 2014. No new historic or archeological sites were discovered. Coordination with the Tribal Historic Preservation Officers (THPO) is necessary and is currently pending as of May 2015.

Light Emissions and Visual Impacts

Light emissions from the various types of lighting installed on an airport can be a potential annoyance for people living or working in the vicinity of the installation. Simple shielding, changing a beam angle, or considering the location of lighting systems can avoid such an annoyance. The proposed improvements

may include additional lighting for the new taxiway connecting Taxiway D and Taxiway C, and the reconstruction of Taxiway A and Taxiway B. These lights are not anticipated to significantly increase light emissions or cause visual impacts to the area. The aesthetic value of an area is influenced by its landscape and the viewer's response to the view, scenic resource, or man-made feature. No visual impacts are anticipated. No further analysis is required.

Natural Resources and Energy

Impacts on energy supplies and natural resources are related to changes of stationary facilities, such as airfield lighting or terminal building heating, as well as any increase of fuel consumption by aircraft or ground vehicles. Proposed improvements at Sidney-Richland Regional Airport would require additional energy, but are not anticipated to cause impacts to energy supplies or natural resources. No further analysis is required.

Noise

Noise emitted from aircraft can significantly affect the well-being of people living or working near an airport. The FAA requires noise studies for certain projects. If a project involves Airplane Design Groups I and II and have forecasted operations of less than 90,000 annual propeller operations or 700 annual adjusted jet operations, than no further noise analysis is required. Sidney-Richland Regional Airport does not exceed this threshold; therefore, no noise analysis is required.

Secondary (Induced) Impacts

Induced impacts primarily involve the potential for induced or secondary impacts on surrounding communities. The proposed improvements are not anticipated to significantly affect shifts in patterns of population movement and growth or public service demands. The proposed improvements are not anticipated to encourage growth in the community. No further analysis would be required for secondary impacts.

Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

Social impacts from a project depend on how that project affects the character, habits, and economic conditions of the people living within the affected area of the project. The project's effects on business, employment, transportation, utilities, etc. are factors that affect the social climate of a community. Any action that would either adversely or beneficially affect the factors stated above would be considered as having some type of social impact on the residents of a particular community. The proposed improvements do not have the potential to result in social impacts. No further analysis is required.

Water Quality

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, provides the authority to establish water quality standards, control discharges into surface and subsurface waters,

develop waste treatment management plans and practices, issue permits for discharges (Section 402) and for dredged or fill material (Section 404).

Airport activities can affect water quality. This is mainly due to stormwater runoff from paved areas. Providing treatment for stormwater runoff from runway and taxiway areas through the use of best management practices and grassed swale areas would minimize potential impacts to water quality.

The Environmental Protection Agency requires a National Pollutant Discharge Elimination System (NPDES) permit for the proposed improvements that exceeds one acre of disturbance. The Sponsor is required to comply with this program by applying for the MPDES Storm Water Permit through the MT Department of Environmental Quality (MT DEQ). Further coordination with the MT DEQ will be needed.

Wetlands

Wetlands are defined in Executive Order 11990, Protection of Wetlands, as those areas that are inundated by surface or groundwater with a frequency 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. Three parameters that define a wetland as outlined in the US Army Corps of Engineers Wetland Delineation Manual are hydric soils, hydrophytic vegetation, and hydrology.

Analysis of the National Wetlands Inventory data indicates the presence of no wetlands within the study area. Please refer to **Exhibit 7-3: *USFWS National Wetlands Inventory map***. A wetland delineation was completed September 5, 2014 for part of the Sidney-Richland Regional Airport. It concluded that there were no wetlands present within the midfield study area. Neither hydric soils, indicators of wetland hydrology, nor hydrophytic vegetation were present in the study area. Further analysis will be required.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968, as amended, identified rivers within the United States that are eligible to be included in a system afforded protection, which are free flowing and possessing outstandingly remarkable scenic recreational, geologic, fish and wildlife, historic, cultural or other similar values. Sidney-Richland Regional Airport is not located near a wild or scenic river. Therefore, no further analysis is required.

Environmental Summary

Table 5-1. Environmental Review Summary, summarizes the potential environmental impacts identified in the prior sections. This table is intended to give a general indication of the likely need for further environmental analysis. According to this table, additional environmental investigation is necessary to determine possible impacts associated with the proposed improvements.

At the appropriate time, the FAA would decide whether, and to what extent, any additional investigation would be performed. Based on the findings of this environmental review, it is estimated

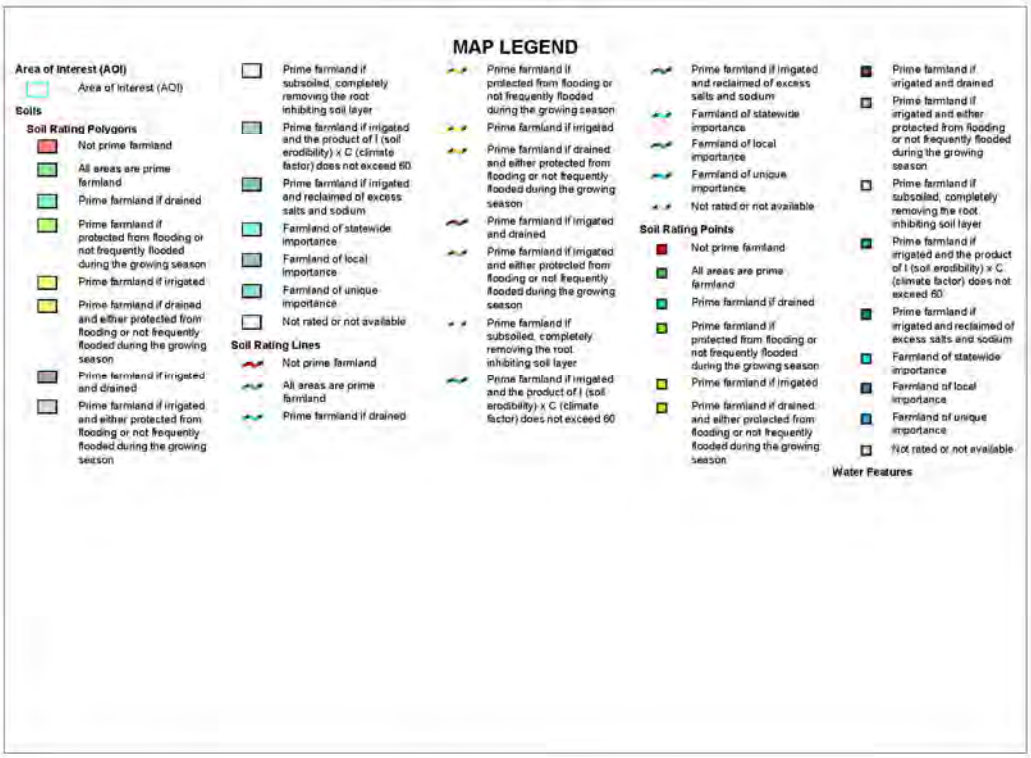
that further environmental analysis is required for the proposed improvements at Sidney-Richland Regional Airport.

Table 5-1. Environmental Review Summary

Impact Category	Further Analysis Required (*)
Air Quality	
Coastal Resources	
Compatible Land Use	*
Construction Impacts	
Department of Transportation Act Section 4(f)	*
Farmlands	
Fish, Wildlife, and Plants	*
Floodplains	
Hazardous Materials, Pollution Prevention, and Solid Waste	
Historical, Architectural, Archaeological, and Cultural Resources	*
Light Emissions and Visual Impacts	
Natural Resources and Energy Supply	
Noise	
Secondary (Induced) Impacts	
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	
Water Quality	*
Wetlands	*
Wild and Scenic Rivers	

Exhibit 7-1: Farmland Classification Map




MAP LEGEND
Area of Interest (AOI)
Area of Interest (AOI)
Soils
Soil Rating Polygons
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Soil Rating Lines
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Richland County, Montana
Survey Area Data: Version 11, Sep 23, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 21, 2011—Sep 10, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Richland County, Montana (MT083)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
201C	Lonna-Cambeth silt loams, 2 to 8 percent slopes	Not prime farmland	7.2	0.4%
202D	Lonna-Cambeth-Cabbart silt loams, 4 to 12 percent slopes	Not prime farmland	7.4	0.4%
BkB	Banks loamy fine sand, 0 to 4 percent slopes	Not prime farmland	309.1	17.4%
CeA	Cherry silty clay loam, 0 to 2 percent slopes	Prime farmland if irrigated	138.9	7.8%
CeB	Cherry silty clay loam, 2 to 4 percent slopes	Prime farmland if irrigated	86.1	4.9%
FaA	Farnuf loam, 0 to 2 percent slopes	Prime farmland if irrigated	163.0	9.2%
HaA	Havrelon silt loam, 0 to 1 percent slopes	Prime farmland if irrigated	73.5	4.1%
LaE	Lambert gravelly loam, 15 to 40 percent slopes	Not prime farmland	103.5	5.8%
LfF	Lambert-Dimyaw complex, 15 to 65 percent slopes	Not prime farmland	22.2	1.2%
LmD	Lihen loamy fine sand, 4 to 15 percent slopes	Not prime farmland	2.2	0.1%
Rd	Ridgelawn loam	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60	22.3	1.3%
SaA	Savage silty clay loam, 0 to 2 percent slopes	Prime farmland if irrigated	326.0	18.4%
ShA	Shambo loam, 0 to 2 percent slopes	Prime farmland if irrigated	62.8	3.5%
ShB	Shambo loam, 2 to 4 percent slopes	Prime farmland if irrigated	72.9	4.1%
ShC	Shambo loam, 4 to 8 percent slopes	Farmland of statewide importance	28.7	1.6%
TaA	Tally fine sandy loam, 0 to 2 percent slopes	Farmland of statewide importance	47.2	2.7%
TaB	Tally fine sandy loam, 2 to 4 percent slopes	Farmland of statewide importance	5.0	0.3%
TeF	Tinsley soils, 15 to 65 percent slopes	Not prime farmland	46.5	2.6%

Farmland Classification— Summary by Map Unit — Richland County, Montana (MT083)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Tm	Trembles fine sandy loam	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60	224.2	12.6%
ToB	Turner-Beaverton complex, 0 to 4 percent slopes	Not prime farmland	12.9	0.7%
VdC	Vida clay loam, 4 to 8 percent slopes	Farmland of statewide importance	1.2	0.1%
VhC	Vida-Zahill complex, 4 to 8 percent slopes	Not prime farmland	10.1	0.6%
Totals for Area of Interest			**1,772.9**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Exhibit 7-2: FEMA FIRM Map

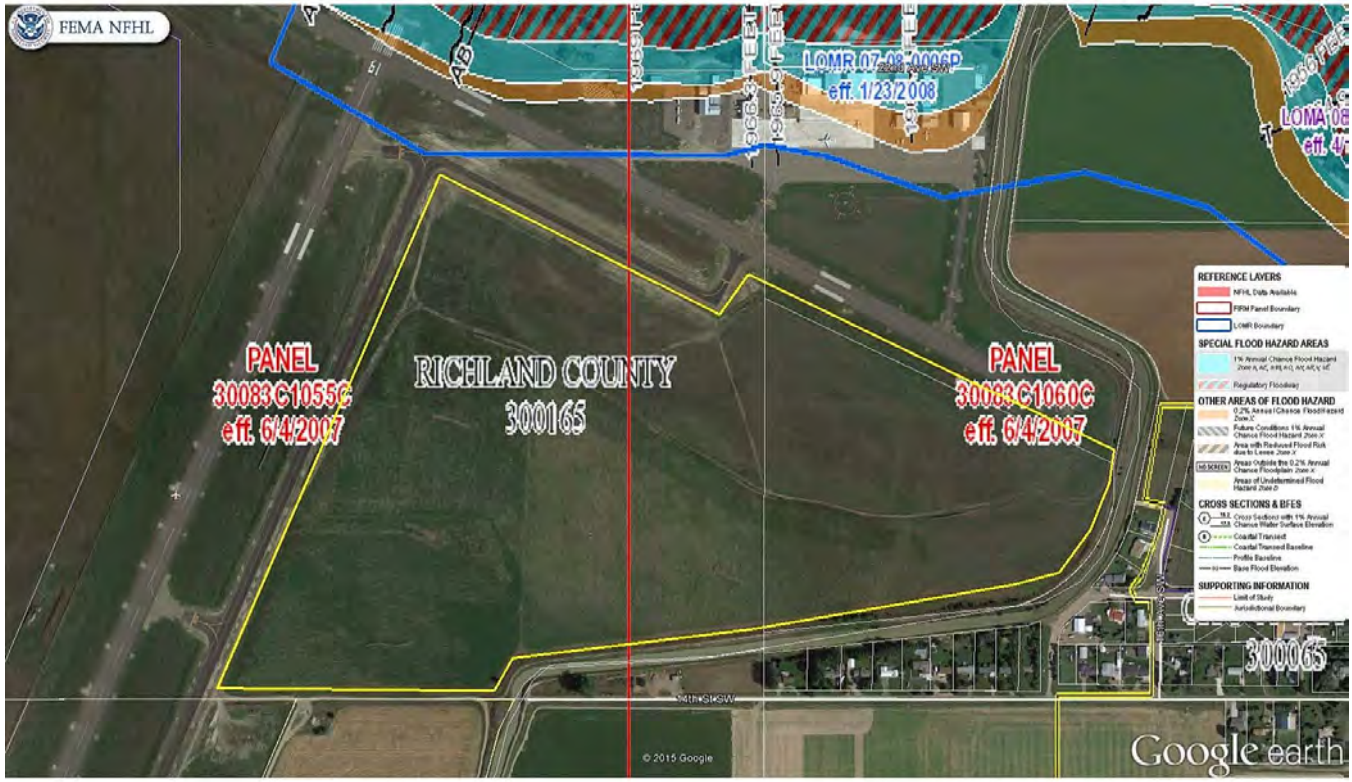
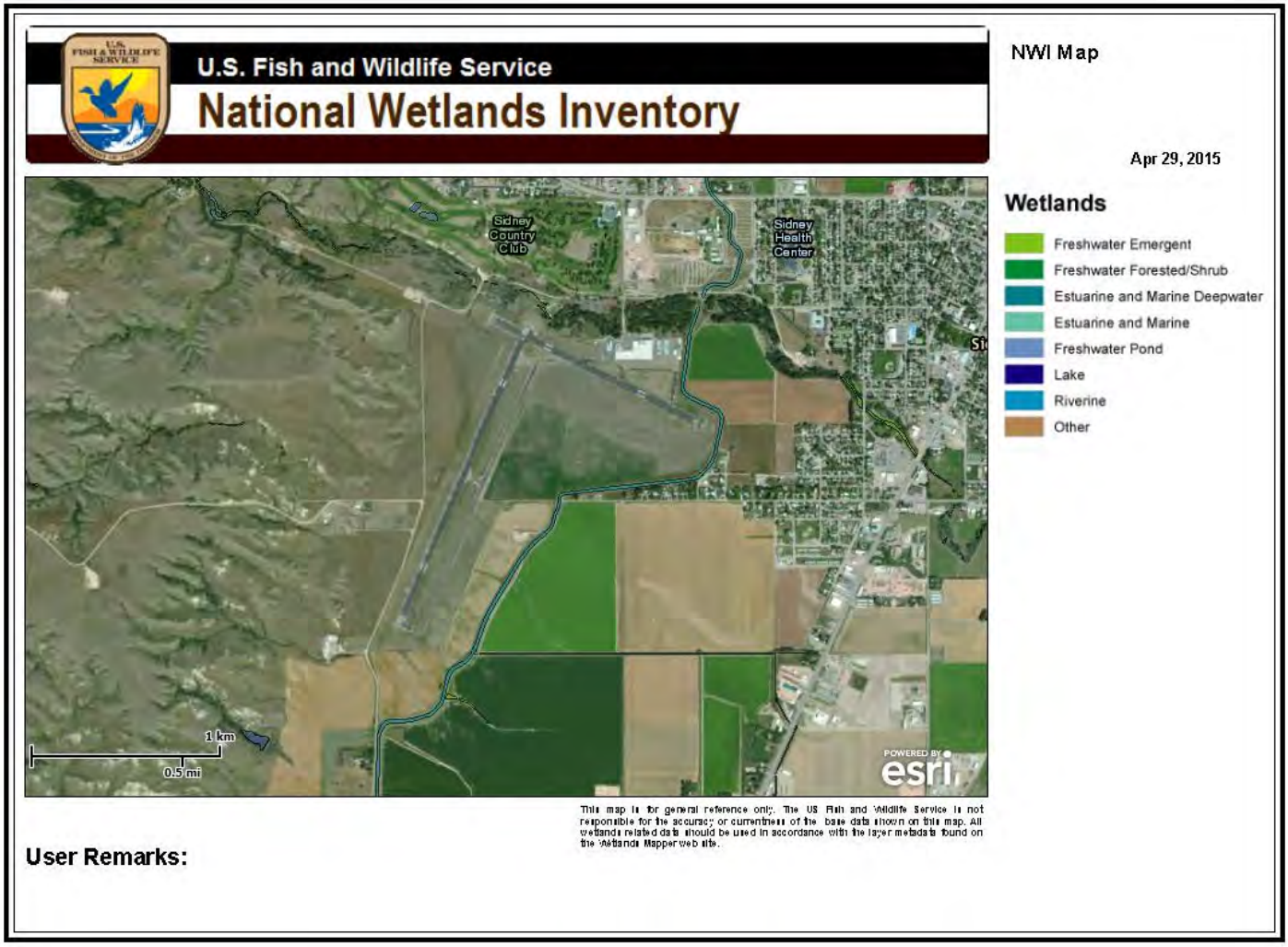


Exhibit 7-3: ***USFWS National Wetlands Inventory map***



Appendices

Appendix A – Glossary of Terms

Introduction

Combing the extremely technical language of airports and aviation with the bureaucratic language of government organizations can create a myriad of unusual words and term. In addition, this combination of technical language and "governmentese" often results in many short-hand phrases or acronyms. This appendix discusses many of the terms used throughout the master plan as well as many of the acronyms used.

Glossary of Terms

ABOVE GROUND LEVEL (AGL): The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy, guidance, and information relative to a specific aviation subject. However, the recommendations in these publications are considered mandatory requirements for airports that have received federal grants.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION (AOPA: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT APPROACH CATEGORY (AAC): A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.

- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF): A service and facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify the type of airport.

AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP): The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

Airport Improvement Program (AIP): A program created under the Airport and Airway Improvement Act of 1982 to provide funding for airport planning and development.

AIRPORT LAYOUT PLAN (ALP): The drawing of the airport showing boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes, the location and nature of existing and proposed airport facilities and structures, and the

location on the airport of existing and proposed non-aviation areas and improvements thereto.

AIRPORT MASTER PLAN: A long-range plan for the development of an airport, including descriptions of the data and analyses on which the plan is based.

AIRPORT MOVEMENT AREA SAFETY SYSTEM (AMASS): A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other details in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT (ASDE): A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR (ASR): The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, usingair/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIRPORTS GEOGRAPHIC INFORMATION SYSTEM (AIRPORTS GIS or AGIS): Used by the FAA to collect airport and aeronautical data to support NextGen. AGIS provides standards for surveying and data collection to assist the FAA in the development of instrument approaches as well as providing the basis for electronic ALPs (eALP).

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL (ATC): A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR TRANSPORT ASSOCIATION OF AMERICA (ATA): An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level or above ground level.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION (RNAV): The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B): A major component of the FAA's NextGen system, where aircraft equipped with GPS receivers can transmit their location and altitude to other nearby aircraft and to air traffic control.

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the down-wind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The total number of active general aviation aircraft that use or may be expected to use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line on an airport layout plan beyond which airport buildings must not be position in order to limit their proximity to aircraft movement areas.

CAPITAL IMPROVEMENT PLAN (CIP): A program for the design and construction of airport improvements necessary to accommodate the operational and passenger levels of the airport.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

CATEGORY I ILS: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runwaythreshold.

CATEGORY II ILS: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III ILS: An ILS that provides acceptable guidance informationto a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: See Controlled Airspace

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY (CTAF): A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedures. Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure of 20 micronewtons per square meter.

DECISION HEIGHT: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA)**: The runway length declared available and suitable for the ground run of an airplane taking off;

- **TAKEOFF DISTANCE AVAILABLE (TODA)**: The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA;

- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)**: The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

- **LANDING DISTANCE AVAILABLE (LDA)**: The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION (DOT): The cabinet-level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 PM and 7 AM as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENROUTE: The portion of a flight between departure and arrival terminal areas.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of an authority's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE (EAS): A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from losing such service.

FEDERAL AVIATION REGULATIONS (FAR): The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, aircraft storage, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A designation for altitude within controlled airspace.

FLIGHT SERVICE STATION (FSS): An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except commercial or military aircraft.

GLIDESLOPE (GS): An electronic component of an ILS system that emits signals which provide vertical guidance by reference to airborne instruments during instrument approaches Provides vertical guidance for aircraft during approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo freight, and airport services.

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS (HIRL): The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds up to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

INSTRUMENT APPROACH: An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

INSTRUMENT APPROACH PROCEDURE (IAP): A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope
3. Outer Marker.
4. Middle Marker
5. Approach lights

INSTRUMENT METEOROLOGICAL CONDITIONS (IMC): Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Arrivals and departures by aircraft to or from an area greater than 20 miles from the airport.

KNOTS: A unit of speed used in navigation that is equivalent to the number of nautical miles traveled in one hour.

LAND AND HOLD SHORT OPERATIONS (LAHSO): An air traffic control procedure intended to increase airport capacity without compromising safety that allows pilots to land and hold short of an intersecting runway, an intersecting taxiway, or some other designated point on a runway.

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM (LAAS): A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy, integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.

LOCALIZER (LOC): The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE (LPV): A Global Positioning System (GPS) runway instrument approach procedure providing horizontal and vertical guidance. Accuracy levels are 16 meters horizontally and 20 meters vertically.

LOW INTENSITY RUNWAY LIGHTS (LIRL): The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MEDIUM INTENSITY RUNWAY LIGHTS MIRL: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace.

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with an airport traffic control tower, air traffic control clearance is required for entry onto the movement area.

NATIONAL AIRSPACE SYSTEM (NAS): The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS): The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD (NTSB): A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVIGATIONAL AID (NAVAID): A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (e.g., PAPI, VASI, ILS, etc.).

NEXT GENERATION AIR TRANSPORTATION SYSTEM (NextGen): An umbrella term for the FAA's ongoing transformation for the National Airspace System from a ground-based system of air traffic control to a satellite-based system of air traffic management.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which horizontal but no vertical course guidance is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN (NOTAM): A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: A take-off or a landing.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I):** A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- **CATEGORY II (CAT II):** A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- **CATEGORY III (CAT III):** A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR(PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR (PAR): A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range (VOR) station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs

were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ATCTs.

RELIEVER AIRPORT: An airport that serves general aviation aircraft which might otherwise use a congested air-carrier airport.

REQUIRED NAVIGATION PERFORMANCE (RNP): A type of performance-based navigation that allow an aircraft to fly a specific path between two 3D-defined points, fundamentally similar to RNAV. An RNP specification requires on-board navigation performance monitoring and alerting; an RNAV specification does not.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation: airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances with-out the need to over-fly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT (RAIL): A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of theapproach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An electronically-derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

SPECIALIZED AVIATION SERVICE OPERATOR (SASO): Sometime known as single-service providers or special FBOs, a SASO is a commercial service provider on an airport typically providing a single specialized aeronautical service and typically do not meet the minimum standards for a full service fixed based operator (FBO).

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern Information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- ALERT AREA: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- CONTROLLED FIRING AREA: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- MILITARY OPERATIONS AREA (MOA): Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- PROHIBITED AREA: Designated airspace within which the flight of aircraft is prohibited.

- RESTRICTED AREA: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- WARNING AREA: Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD TERMINAL ARRIVAL (STAR): A pre-planned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an air craft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions

TERMINAL RADAR APPROACH CONTROL (TRACON): An element of the air traffic control system responsible for monitoring the enroute and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

UNCONTROLLED AIRPORT: An airport without an airport traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A non-government communication facilitywhich may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth,

oriented from magnetic north. Used as the basis for navigation in the national air-space system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM (WAAS): An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Acronyms and Abbreviations

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

ADS-B: automatic dependent surveillance - broadcast

AFSS: automated flight service station

AGL: above ground level

AGIS: Airports Geographic Information System

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and firefighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity for aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LAAS: local area augmentation system

LAHSO: land and hold short operations

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LPV: localizer performance with vertical guidance

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with runway alignment indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NextGen: next generation air transportation system

NM: nautical mile (6,076 .1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rulemaking

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW: public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: Poor visibility and ceiling.

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RNP: required navigation performance

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASO: specialized aviation service operator

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with sequenced flashers

SSALR: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear

STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TDZ: touchdown zone

TDZE: touchdown zone elevation

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

WAAS: wide area augmentation system

Appendix B – Airport Master Plan Process

Introduction

An airport master plan is a comprehensive study of an airport and usually describes the short-, medium-, and long-term development plans to meet aviation demand. The elements of the master planning process will vary in complexity and level of detail, depending on the size, function, issues, and problems of the individual airport. This appendix describes the master planning process used by KLJ Engineering, Inc., a process that is based on the FAA's Advisory Circular 150/5070-6B *Airport Master Plans.*

Master Plan Process Overview

Airport master plans are prepared to support the modernization or expansion of existing airports or the creation of a new airport. When completed, the master plan documents the airport sponsor's plan or strategy for the development of the airport. It provides the framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts.

The master plan process is intended to meet the following objectives:

1. Document the issues the proposed development will address.
2. Justify the proposed development through the technical, economic, and environmental investigation of concepts and alternatives.
3. Provide an effective graphic presentation of the development of the airport and anticipated land uses in the vicinity of the airport.
4. Establish a realistic schedule for the implementation of the development proposed in the plan, particularly the short-term capital improvement program.
5. Propose an achievable financial plan to support the implementation schedule.
6. Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before the project is approved.
7. Present a plan that adequately addresses the issues and satisfies local, state, and Federal regulations.
8. Document policies and future aeronautical demand to support municipal or local decisions on spending, debt, land use controls, and other policies necessary to preserve the integrity of the airport and its surroundings.
9. Set the stage and establish the framework for a continuing planning process that monitors key conditions and permits changes in plan recommendations as required.

KLJ uses an interactive process to conduct master plan studies. This process involves a variety of stakeholders as appropriate, including the airport sponsor's organization, airport users and tenants, the FAA and state aeronautical organizations, other resource and governmental agencies, community groups, and the traveling public. See Attachment 1 for a flow chart depicting the master planning process used by KLJ.

The interactive process is the unique element of the KLJ process. The KLJ process focuses on making the master plan's data, analyses, findings, and recommendations more useful and more easily understood by the airport sponsor and interested organizations. This is accomplished through the use of state-of-the-art electronic and graphic technology to present the airport's existing conditions, identified requirements, alternatives and concepts, recommendations, and implementation plans in a visual (3-D if appropriate) format. This format enables the planner to help the sponsor more effectively understand the airport's needs and visualize the alternatives to implement those requirements. It show the flexibility available to the sponsor by visually presenting the recommended improvements, displaying the effect of those improvements on the airfield and its operations, and showing the sponsor the varying options for implementing those improvement projects, thereby enhancing the sponsor's decision-making process.

Types of Master Plan Studies

The master planning process will vary with the size, complexity, and role of the studied airport and may include a variety of supporting studies. However, all master planning studies will fall within one of two basic types: Airport Master Plans or Airport Layout Plan (ALP) Updates.

Airport Master Plans - An airport master plan is a comprehensive study of the airport and typically describes short-, medium-, and long-term plans for airport development. Master planning studies that address major revisions are commonly referred to as "Master Plans," while those that change only parts of the existing document and require a relatively low level of effort tend to be known as "Master Plan Updates." In common usage, however, the distinction refers to the relative levels of effort and detail of master planning studies. In most cases, the master plan will include the following elements:

1. ***Pre-planning*** – The pre-planning process includes an Initial Needs Determination, Request for Proposal and Consultant Selection, Development of Study Design, Negotiation of Consultant Contract, and Application for Study Funding.
2. ***Public Involvement*** – Once the consultant team is under contract and has been issued a notice-to-proceed, establish a public involvement program and identify and document the key issues of various stakeholders.
3. ***Environmental Considerations*** – A clear understanding of the environmental requirements needed to move forward with each project in the recommended development program.
4. ***Existing Conditions*** – An inventory of pertinent data for use in subsequent plan elements.
5. ***Aviation Forecasts*** – Forecasts of aeronautical demand for short-, medium-, and long-term time frames.
6. ***Facility Requirements*** – Assess the ability of the existing airport, both airside and landside, to support the forecast demand. Identify the demand levels that will trigger the need for facility additions or improvements and estimate the extent of new facilities that may be required to meet that demand. KLJ planners will use the latest technology to present identified requirements in a visual interactive process to assist the sponsor to fully understand the identified facility requirements.

7. ***Alternatives Development and Evaluation*** – Identify options to meet projected facility requirements and alternative configurations for each major component. Assess the expected performance of each alternative against a wide range of evaluation criteria, including its operational, environmental, and financial impacts. A recommended development alternative will emerge from this process and will be further refined in subsequent tasks. This element should aid in developing the purpose and need for subsequent environmental documents. KLJ planners will present the identified alternatives, using the latest technology, in a visual interactive process to assist the sponsor to fully understand the studied alternatives and their effect on the airport.
8. ***Airport Layout Plans*** – One of the key products of a master plan is a set of drawings that provides a graphic representation of the long-term development plan for an airport. The primary drawing in this set is the Airport Layout Plan (ALP). Other drawings may also be included, depending on the size and complexity of the individual airport.
9. ***Facilities Implementation Plan*** – Provides a summary description of the recommended improvements and associated costs. The schedule of improvements depends, in large part, on the levels of demand that trigger the need for expansion of existing facilities. KLJ planners will use the latest technology to present the recommended improvements in a visual interactive process to assist the sponsor to fully understand the recommended improvements, potential phasing of the development, and available flexibility in implementation of the recommended improvements.
10. ***Financial Feasibility Analysis*** – Identify the financial plan for the airport, describe how the sponsor will finance the projects recommended in the master plan, and demonstrate the financial feasibility of the program.

Airport Layout Plan Updates - An update of the airport layout plan (ALP) drawing set should be an element of any master plan study. In fact, keeping the ALP current is a legal requirement for airports that receive Federal assistance. An update of the ALP drawing set will reflect actual or planned modifications to the airport and significant off-airport development. An accompanying ALP Narrative Report should explain and document those changes and contain at least the following elements:

1. Basic aeronautical forecasts.
2. Basis for the proposed items of development.
3. Rationale for unusual design features and/or modifications to FAA Airport Design Standards.
4. Summary of the various stages of airport development and layout sketches of the major items of development in each stage.

An ALP drawing set update is an appropriate alternative to a full master plan whenever the fundamental assumptions of the previous master plan have not changed. If there have not been any major changes in airport activity or improvements that have had unanticipated consequences, a master plan update is not necessary. Another situation where only an ALP update would be appropriate is the examination of a single development item, such as runway safety area improvements. As indicated above, an ALP update will typically involve fewer elements than a full master plan study, including only the aviation demand forecasts, an assessment of facility requirements, a facility implementation and financing plan, and an airport layout plan drawing set. If additional steps are required to complete the ALP update, a full master plan study is probably a better choice.

Products of the Master Planning Process

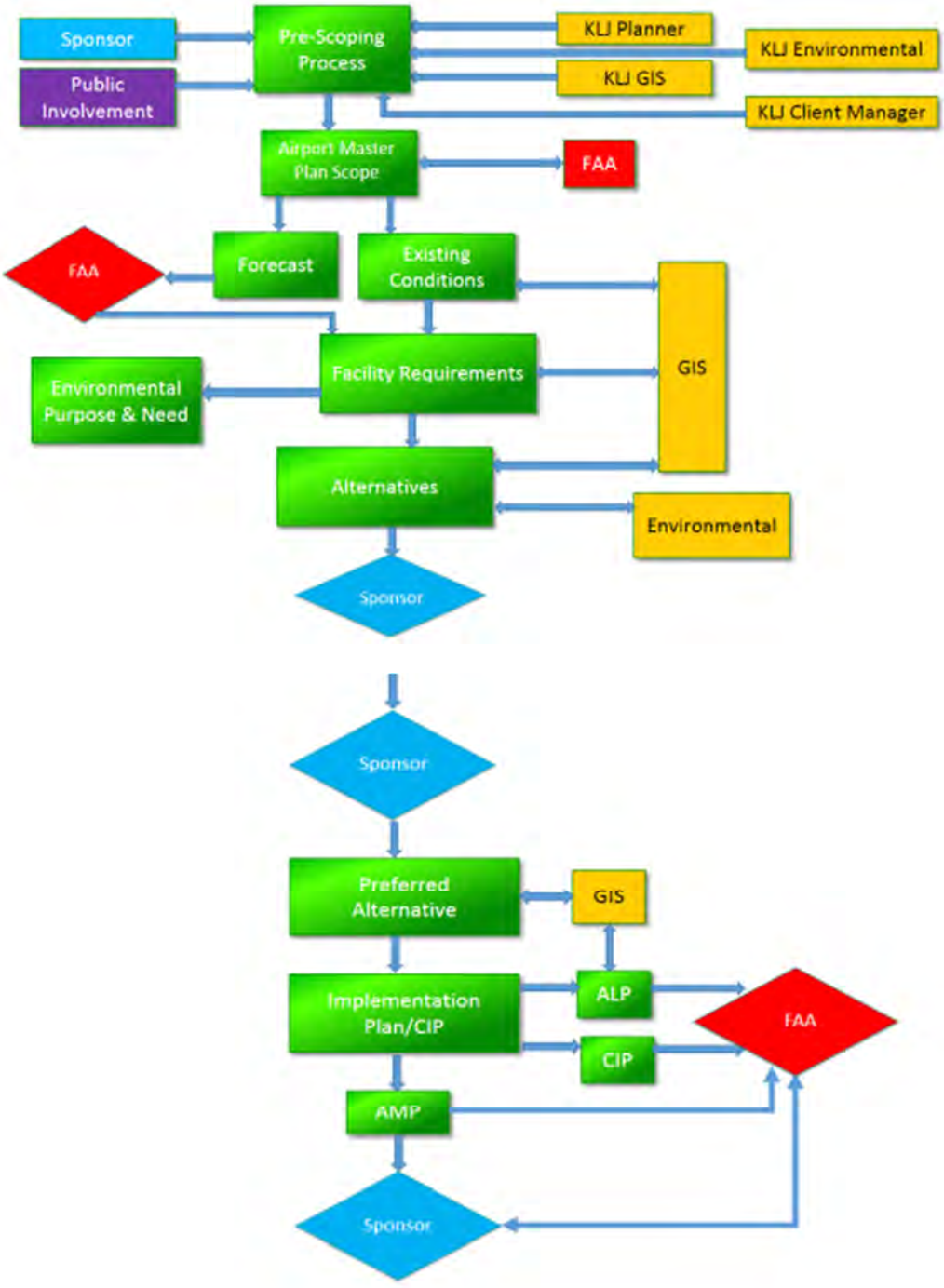
The products of the master planning process, often referred to as deliverables, will vary with the complexity of the effort. Master plans can include the following deliverables:

1. ***A Technical Report*** contains the results of the analyses conducted during the development of the master plan and is normally considered as the "Airport Master Plan" when referring to a specific document. For complex studies, interim reports may be produced to facilitate coordination with various government agencies, tenants, users, the general public, and other interested parties. At the conclusion of the study, the interim reports are assembled into the final technical report. In addition to typical studies, such as obstruction analysis, noise modeling, and forecasting, there may also be a need for special studies, such as land use planning (including wildlife assessments), airline service analysis, economic impact studies, and terminal studies. Technical reports by KLJ are prepared in the following format:
    a. Narrative chapters. The narrative chapters do not contain all of the accumulated data in the master plan study, as has been the historical practice for many master plans. Instead, the narrative chapters summarize the collected data, analyses, and conclusions/recommendations to provide a more concise document for the reader, rather than overwhelm the reader with data. If the reader desires more detailed information on a specific subject, the narrative will refer the reader to a specific appendix.
    b. Appendices. The appendices contain all of the data, analyses, findings, recommendations, etc., on specific subjects. Each appendix deals with a specific subject and presents all available information on the subject.
    c. Hyperlinks. Designed for electronic media, hyperlinks will take the reader from a key word or phrase in the master plan narrative to a specific point in the appropriate appendix. This concept allows the reader to focus on high level data and conclusions in the narrative, yet provides immediate access to more complete data if desired.
    d. Media. In addition to the standard printed format, KLJ presents the master plan technical report in several new formats:
        i. CD or DVD. This format allows the reader to use existing computer technology to read the narrative report and then use hyperlinks to move to specific points in the appendices for additional information.
        ii. Tablet. With this format, all of the technical report narratives and appendices are contained on an electronic tablet. In addition to other airport information, this format makes the technical report portable and allows the user instant access to all of the master plan information.
2. ***A Summary Report*** is useful in bringing together pertinent facts, conclusions, and recommendations for public review. Such a report, often referred to as the Executive Summary, is an excellent place to highlight the economic benefits that flow from the airport to the communities it serves.
3. ***An Airport Layout Plan Drawing Set*** contains a graphical representation of the proposed development in the master plan and is typically produced as a separate set of full-sized drawings. In addition, the ALP drawing set is typically included in the Technical Report in reduced form. KLJ can provide the ALP information in the following formats:
    a. Standard CAD

b. GIS/EALP
c. Other (e.g., Google Earth 3-D presentation)

4. ***A Web Page*** – Many airport sponsors maintain a public access web page with general information about the governmental unit involved and specific information regarding the airport or airports operated by the sponsor. The Internet provides an excellent forum for the distribution of information on the progress of the study and its final findings and recommendations.
5. ***Public Information Kit*** – Throughout the master plan study, airport sponsor representatives may be asked to speak to community associations, civic clubs, and other organizations with an active interest in the airport. Visual aids such as models, summary brochures, or computer presentations are excellent tools to use at these events to maintain support for the airport development program.

Attachment 1 – KLJ AMP Process Flowchart



Appendix C – Airport Classification

Introduction

Airports are given different classifications or designations, depending on the source. This appendix discusses the various sources or systems used nationally, regionally, or locally to classify an airport. The primary systems used to classify an airport include:

a. FAA National Plan of Integrated Airport Systems (NPIAS)
b. Regional or State Aviation System Plans (SASP)
c. FAA General Aviation Airport Report (ASSET)
d. FAA Airport Design Standards

National Plan of Integrated Airport Systems

The Airport and Airway Improvement Act of 1982 directed the Secretary of Transportation to prepare, publish, and biannually revise a national system plan – the National Plan of Integrated Airport Systems (NPIAS) – for the development of public-use airports in the United States. This requirement can be found in Public Law 49 United States Code § 47103. The NPIAS is a system that emphasizes system planning and development to meet current and future aviation needs. It includes the development considered necessary to provide a safe, efficient, and integrated airport system to meet the needs of civil aviation, national defense, and the United States Postal Service. It takes into account the relationship of each airport to the rest of the transportation system in a particular area, the forecast of technological developments in aeronautics, and the development forecast in other modes of transportation.

To be eligible for funding under the Airport Improvement Program (AIP), an airport must be included in the NPIAS. The FAA determines whether an airport can be included in the NPIAS and the requirements for inclusion in the NPIAS are defined by law and FAA policy. As general criteria, the airport must be a publicly-owned, public-use airport serving civil aviation (privately-owned, public use airports may be included under certain circumstances) with an eligible sponsor, must have at least 10 based aircraft, and must be located at least 20 miles from another NPIAS airport.

Although it is not a factor in determining an airport's classification in the NPIAS, it is important to note that, after an airport is included in the NPIAS and accepts a federal grant for AIP funds, the airport sponsor is contractually obligated to meet the terms and conditions of the AIP grant. These terms and conditions, typically called grant assurances, are established by federal law and define the requirements a sponsor must comply with in the safe and efficient operation and maintenance of the airport. See www.faa.gov/airports/aip/grant_assurances/media/airport_sponsor_assurances_2012.pdf for the grant assurances.

NPIAS Airport Classification

The public law that created the NPIAS plan defines airports by categories of airport activities. Those categories are defined as follows:

Commercial Service

Commercial service airports are defined as publicly owned airports that have at least 2500 passenger boardings each calendar year and receive scheduled passenger service. Commercial service airports are further categorized based on the number of annual passenger boardings.

- **Primary commercial service**: a commercial service airport with more than 10,000 passenger boardings each year.
- **Nonprimary commercial service**: a commercial service airport with at least 2,500 but no more than 10,000 passenger boardings each year. These airports are commonly referred to as **Commercial Service** airports.

Because of the wide range in levels of passenger boardings throughout the United States, primary commercial service airports are further categorized by the percentage of total passenger boardings in the United States.

- **Large Hub**: a primary commercial service airport with 1 percent or more of the annual national passenger boardings. Commonly referred to as **Large Hub** airports, annual passenger boardings typically range above 8 million.
- **Medium Hub**: a primary commercial service airport with at least 0.25 percent but not more than 1 percent of the annual national passenger boardings. Commonly referred to as **Medium Hub** airports, passenger boardings typically range from 2 million to 8 million.
- **Small Hub**: a primary commercial service airport with at least 0.05% but not more than 0.25 percent of the annual national passenger boardings. Commonly referred to as **Small Hub** airports, passenger boardings typically range from 350,000 to 2 million.
- **Nonhub**: a primary commercial service airport with more than 10,000 but less than 0.05 percent of the annual national passenger boardings. Commonly referred to as **Nonhub Primary** airports, passenger boardings typically range from 10,000 to 350,000.

General Aviation

Most airports that are not considered commercial service airports fall into this category. Although some general aviation airports do have scheduled passenger service, they have fewer than 2500 annual boardings and therefore are not classified as commercial service airports. See the section **General Aviation Airport Report** for more detail on general aviation airports.

Reliever

Reliever airports are general aviation airports designated by the FAA to relieve congestion at a commercial service airport and to provide more general aviation access to the overall community. The

current FAA criteria for reliever airports includes more than 75,000 annual operations, a runway greater than 5,000 feet, a precision instrument landing procedure, more than 100 based aircraft, and relieving an airport with 20,000 hours of annual delays of commercial passenger aircraft operations.

Sidney-Richland Municipal Airport Classification

The Sidney-Richland Municipal Airport is classified as a "Non-Primary Commercial Service Airport" in the current NPIAS. This is based on the number of enplanements at an airport, where 2,500-10,000 annual enplanements classifies an airport as Non-Primary Commercial Service. As a whole, Non-Primary Commercial Service Airports account for 0.1% of all enplanements in the US annually.

State Aviation System Plan

An integrated State airport system plan is the representation of facilities required to meet immediate and future needs as well as achieve overall goals of the State. It recommends the general role, location, and characteristics of new airports or the nature of expansion for existing ones. In order for an airport to be considered for inclusion in the NPIAS, it must first be included in the State's Aviation System Plan (SASP). Each SASP may use different terms or definitions for the role of an airport within the state, and those roles are defined below.

Montana State Aviation System Plan

The current Montana State Aviation System Plan that establishes airport classifications was completed in 1998, and an update of this SASP has been initiated. The current Montana SASP lists the following airport classifications:

- Primary Commercial Service: Often called Primary Airports, these are airports that enplane 10,000 or more passengers per year.
- Non-primary Commercial Service: Commonly referred to as Commercial Airports, these airports have scheduled flights that enplane at least 2,500 but less than 10,000 passengers annually.
- General Aviation Paved, over 10,000 operations: these are general aviation airports that have a paved runway and have over 10,000 operations annually.
- General Aviation Paved, less than 10,000 operations: these are general aviation airports that have a paved runway, but have less than 10,000 annual operations.
- General Aviation Turf: these are general aviation airports with turf or gravel runways.

Sidney-Richland Municipal Airport is classified as a Primary Commercial Service Airport.

FAA Airport Design Standards Classifications

A variety of codes or designations are used to represent aircraft operating and physical characteristics, runway design standards and airport capabilities. Complete descriptions, definitions and design

standards can be found in the current version of FAA Advisory Circular 150/5300-13, Airport Design. Rather than continually repeating standards or characteristics in the planning documentation, codes or designations are typically used as a "shorthand" reference to the complete standards or characteristics. This section explains the various codes, characteristics or design standards they represent, and the expected code's use in planning documents.

Common Terms

Throughout the planning documents, a variety of terms are used to describe aircraft groups, runway design standards, runway capabilities or airport capabilities. The codes used to represent these standards or capabilities all have the same basis and are often used interchangeably. While they appear the same, i.e., they are composed of an alphabetic character, a roman numeral, and occasionally another number, the context in which they are used is very important. As an example, the code C-II could refer to a number of different characteristics, design standards, or capabilities, including:

- Aircraft characteristics, either a group of aircraft or a specific airplane.
- Runway design standards.
- Runway operational capability.
- Airport operational capability.

The following sections will explain how the codes are determined, define what they mean, and explain how they are used in the context of the master plan.

Aircraft Characteristics

Airport design is largely determined by the physical and operating properties of the largest aircraft that will use the airport, as well as the visibility minimums for landing at the airport. Aircraft, in turn, are categorized by three parameters:

- Aircraft Approach Category (AAC), a grouping of aircraft based on landing speed.
- Airplane Design Group (ADG), a grouping of aircraft based on wingspan and tail height.
- Taxiway Design Group (TDG), a grouping of aircraft based on the width of the main landing gear and the distance from the cockpit to the main gear.

AAC categories range from A to E, and ADG categories range from Group I to Group IV. Specific criteria are listed in Table 1 and Table 2. These categories are linked to specific runway standards, which can be found in the current version of AC 150/5300-13. In general, as the AAC increases, i.e., goes from A to B to C, etc., and as the ADG increases, i.e., goes from I to II to III, etc., the runway dimensions and associated safety areas increase. As an example, a B-II runway would be 75 feet wide, a C-II runway would be 100 feet wide, and a C-III runway would be 150 feet wide.

TDG categories range from TDG-1 to TDG- 7, with specific standards found in the current version of AC 150/5300-13. Pavement width requirements for taxiing aircraft are based on the TDG. The TDG is also used to determine standards for taxiway safety areas, clearances and the geometry of taxiway intersections. Table 3 shows a sample of some basic taxiway dimensions as related to the

TDG as indication of dimensional changes with each TDG. Figure 1 shows a graph used to determine an aircraft's TDG based on main gear width and distance from the cockpit to the main gear. However, please see the current version of AC 150/5300-13 for complete details.

Table 1 Aircraft Approach Categories

Aircraft Approach Category	Approach Speed
A	Less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

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

Table 2 Airplane Design Group

Airplane Design Group	Wingspan	Tail Height
I	Less than 49 feet	Less than 20 feet
II	49 feet or more but less than 79 feet	20 feet or more but less than 30 feet
III	79 feet or more but less than 118 feet	30 feet or more but less than 45 feet
IV	118 feet or more but less than 171 feet	45 feet or more but less than 60 feet
V	171 feet or more but less than 214 feet	60 feet or more but less than 66 feet
VI	214 feet or more but less than 262 feet	66 feet or more but less than 80 feet

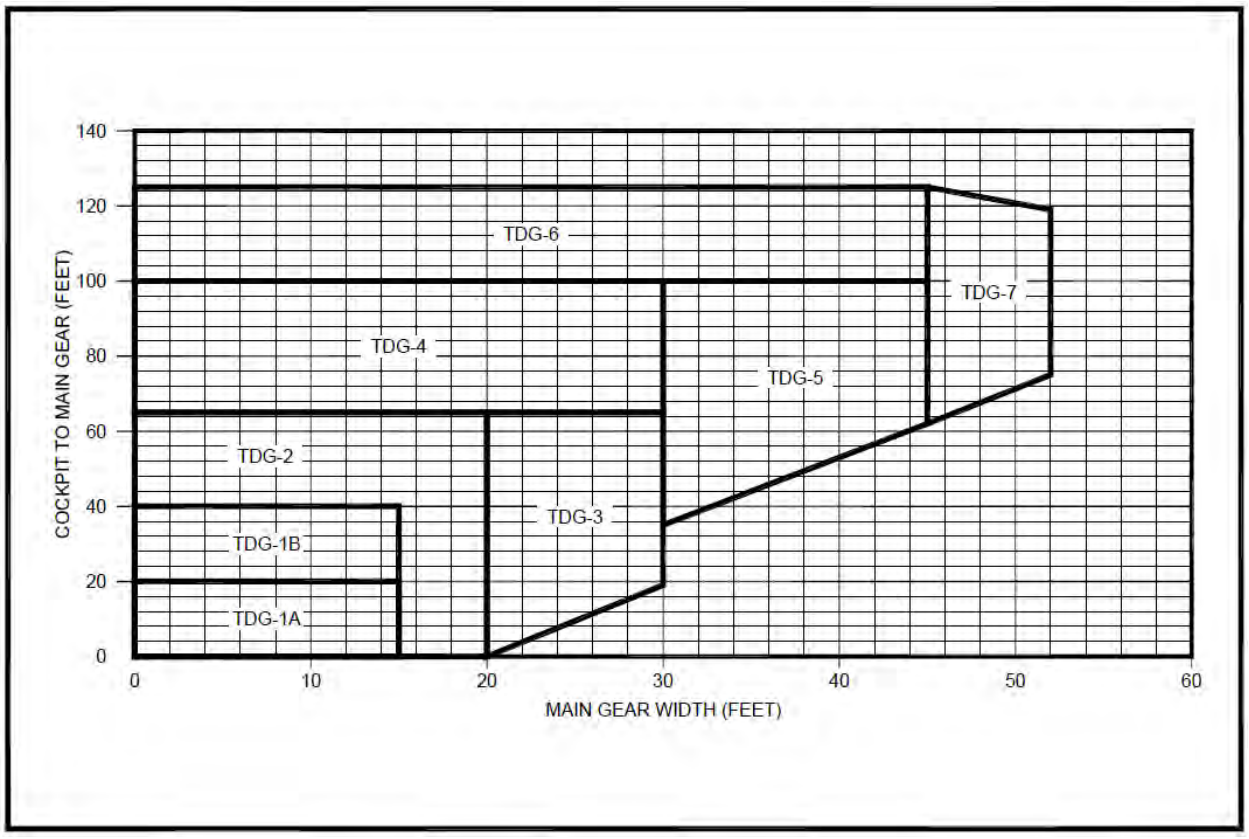
Source: FAA AC 150/5300-13, Airport Design

Table 3 TDG Groups and Select Design Standards

TDG Number	1	2	3	4	5	6	7
Taxiway Width	25 ft	35 ft	50 ft	50 ft	75 ft	75 ft	82 ft
Taxiway Shoulder	10 ft	15 ft	20 ft	20 ft	30 ft	30 ft	40 ft

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

Figure 1 Taxiway Design Groups (TDGs)



For most planning discussions, the AAC and ADG categories are sufficiently descriptive and aircraft groups are commonly referred to as “B-II” or “C-III” aircraft, for example, when linking the aircraft groups to design standards. While smaller aircraft are normally grouped as a family of aircraft and categorized as a family, such as A-I or B-II, larger aircraft normally have a specific designation. As an example, an Airbus A-319 is classified as a C-III aircraft and a Boeing B-747-100 is classified as a D-V aircraft. The current version of FAA AC 5300-13 has a comprehensive listing of most aircraft, their characteristics and designations.

Runway Design Code (RDC)

Runway designs are based on specific FAA runway design standards. These standards, found in the current version of FAA AC 150/5300-13, provide basic guidelines for a safe and efficient airport system, and are based on the most demanding or “design” aircraft expected to use the runway. Runway lengths are related to the design aircraft but are determined in accordance with procedures detailed in the current version of FAAAC 150/5325-4. All other critical dimensions related to the design aircraft are found in the current version of FAA AC 150/5300-13, including dimensions for runway widths, safety areas and separations from other infrastructure.

These runway design standards are designated by a Runway Design Code (RDC), which is defined **as the standards to which a runway must be built**. This code consists of three components: the AAC and ADG

of the design aircraft, combined with a number that represents the planned visibility minimums. The AAC and ADG criteria are identified in Table 1 and Table 2. Table 4 has the criteria for visibility minimums.

Table 4 Visibility Minimums

RVR (ft)	Instrument Flight Visibility Category (statute miles)
5000	Not lower than 1 mile
4000	Lower than 1 mile but not lower than 3/4 mile
2400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)
1600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)
1200	Lower than 1/4 mile (CAT-III PA)

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

As an example, a runway designed to accommodate C-II aircraft with minimums lower than ¾ mile but not lower than ½ mile, or CAT-I, would have a RDC code of C-II-2400. For general discussions, an RDC designation, such as C-II, is normally sufficient to identify the critical or design aircraft, as well as the specific standards used as the basis for the runway design.

Runway Reference Codes (APRC and DPRC)

The previous designation was called the Runway Reference Code (RRC) and was defined as **the current operational capabilities of a runway and its associated parallel taxiway**. The RRC described the operational capabilities of the runway where no special procedures are necessary. In an effort to develop a code more indicative of a runway's operational capabilities, Change 1 to FAA AC 150/5300-13A replaced RRC with two new codes: Approach Reference Code (APRC) and Departure Reference Code (DPRC). Table 5 and 6 summarize the data for APRC and DPRC but refer to FAA AC 150/5300-13A for more specific information on the use of these codes.

Like the RDC, the APRC is composed of three components: the AAC, the ADG, and the visibility minimums. In contrast, the RDC is composed of the same three components, but is based on planned development and has no operational application. APRC signifies the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. The visibility minimums are linked to critical standards that determine which aircraft can operate on taxiways adjacent to a runway under particular meteorological conditions with no special operational procedures necessary.

DPRC signifies the runway's operational capabilities with regard to takeoff operations. The DPRC code is the similar to the APRC code, but is comprised of two components, AAC and ADG. It represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under particular meteorological condition with no special procedures necessary.

Table 5 Approach Reference Code (APRC)

Visibility Minimums	Runway to Taxiway Separation (ft)									
	≥150	≥200	≥225	≥240	≥250	≥300	≥350	≥400	≥500	≥550
Visual	B/I(S)/VIS	B/I(S)/VIS	B/I/VIS	B/II/VIS	B/II/VIS	B/III/VIS D/II/VIS	B/III/VIS	D/IV/VIS D/V/VIS	D/VI/VIS	D/VI/VIS
Not lower than 1 mile	B/I(S)/5000	B/I(S)/5000	B/I/5000	B/II/5000	B/II/5000	B/III/5000 D/II/5000	B/III/5000	D/IV/5000 D/V/5000	D/VI/5000	D/VI/500(
Not lower than 3/4 mile	B/I(S)/4000	B/I(S)/4000	B/I/4000	B/II/4000	B/II/4000	B/III/4000 D/II/4000	B/III/4000	D/IV/4000 D/V/4000	D/VI/4000	D/VI/400(
Lower than 3/4 mile but not lower than 1/2 mile		B/I(S)/2400	B/I/4000 B/I(S)/2400	B/II/4000	B/I/2400	B/III/4000 [1] D/II/4000 B/II/2400	B/III/2400	D/IV/2400 D/V/2400	D/VI/2400	D/VI/240(
Lower than 1/2 mile								D/V/2400 D/IV/1600	D/VI/2400 D/V/1600	D/VI/160(

Table 6 Departure Reference Code (DPRC)

Runway to Taxiway Separation (ft)					
≥ 150	≥ 225	≥ 240	≥ 300	≥ 400	≥ 500
B/I(S)	B/I	B/II	B/III D/II	D/IV D/V [1]	D/VI [2]

As with discussions regarding RDC codes, discussions about existing runways and their current RRC typically use the first two components (AAC and ADG) but do not include the third component, minimums. As an example, an RRC of C-II would mean a runway currently meets the FAA design standards for a runway capable of accommodating C-II aircraft without any special operational procedures.

Airport Reference Code (ARC)

The Airport Reference Code (ARC) is another common use of the AAC and ADG components. An ARC is a designation that signifies the highest RDC, minus the visibility component, of an airport. The runway with the highest RDC is frequently considered the primary runway on smaller airports. The ARC is used

for planning and design only, and does not limit the aircraft that may be able to operate safely on an airport. As an example, an airport with a primary runway with a RDC of C-II and a crosswind runway with a RDC of B-I would be designated as an ARC C-II airport.

Code Context

It's critical to determine the context in which the specific code is being used. Depending where the code is being used, a C-II code could have the following meanings:

- Critical or design aircraft. This is the aircraft that the existing runway was built for, or is the aircraft that the new runway is being designed for. Looking at Table 1 above or FAA AC 150/5300-13A, a C-II aircraft is an aircraft with an approach speed between 121 and 140 knots, and a wingspan between 49 and 78 feet or a tail height between 20 and 29 feet.
- Runway Design Code (RDC). The planned runway will be designed to meet the FAA runway design standards for a C-II aircraft. If the RDC was shown as C-II-2400, the runway would also be designed to meet the standards required for CAT-I visibility minimums.
- Runway Reference Code (RRC). The RRC is normally used when discussing existing conditions. A RRC of C-II would mean the runway currently meets the FAA design standards for a runway capable of accommodating C-II aircraft without any special operational procedures.
- Airport Reference Code (ARC). The ARC can be used to discuss the operational capability of an existing airport, e.g., if the highest RDC of existing runways at an airport is C-II, the airport would have an ARC of C-II. The ARC can also be used to discuss the planned capability of an airport, i.e., an airport will be designated as an ARC C-II airport when the highest RDC of the planned runways is C-II.

Summary

All codes discussed in this section consist of at least two, and sometimes three, characters: a letter, a roman numeral and sometimes a number. As discussed above, the same code can represent planned or actual characteristics of aircraft, runways or airports in a number of different situations. Like many other acronyms, these codes have become a type of "shorthand" in discussions regarding airport design. To avoid confusion, it is important to understand the context in which a code is being used and the specific standards associated with it. This section is a summary of airport design standards found in the current version of FAA AC 150/5300-13 and the AC should be referred to for more detailed information.

A table of sample aircraft that utilized the Sidney Richland Municipal Airport during FFY 2013 is found below:

Aircraft Type	Design Group	MTOW	FFY 2013 Operations
BeechCraft 1900	B-II	17,000	2448
Pilatus PC12	B-II	<12,500	603

Super King Air B200	B-II	<12,500	315
Cessna 402	B-I	<12,500	42
Super King Air B350	B-II	15,000	213
King Air C90	B-II	<12,500	88
Cessna 310	B-I	<12,500	104
Super King Air B300	B-II	14,000	71
Cessna 421	B-I	<12,500	57
Cessna Citation Excel	B-II	20,000	60
Citation 5 Ultra	C-II	16,000	65
Citation Mustang	C-I	<12,500	62
Cessna 340	B-I	<12,500	34
Cessna 404	B-I	<12,500	40

Source: KLJ Analysis/Flight Aware Data

During FFY 2013, other aircraft did use Sidney Richland Municipal Airport. However, only aircraft with close to one weekly operation were included in the sample data.

Sidney Richland Municipal Airport - Airport Codes

In accordance with the current version of FAA AC 150/5300-13, the following codes describe the runways and airfield at Sidney Richland Municipal Airport:

Sidney-Richland Municipal Airport has various airport classification criteria throughout the airfield. Runway 1/19 is currently classified as a B-II runway, as is Runway 11/29. In the future, Runway 1/19 is planned to be classified as a C-II runway, while Runway 11/29 is anticipated to remain the same. The future design characteristics of these runways are based on the assumption that Runway 1/19 has the ability to be lengthened, and is the primary runway of the airfield. Runway 11/29 was not identified to change in design criteria as a result of land use restrictions.

Taxiway systems are designed off of the distance from main landing gear to cockpit, as well as the distance between both main gear wheel wells. The existing hangar area has taxilanes designed for Group 1A aircraft. The existing apron area, Taxiway A, and Taxiway C are all designed to Taxiway Design Group 2 standards. Existing Taxiway B and Taxiway D are designed to Group 3 pavement standards.

In the future, it is anticipated this area will remain in the Group 1A category. However, future development in the central-portion of the airfield will be planned for Group 2 pavement standards. This applies to both taxilanes and apron spaces in this area. Moreover, future changes in pavement design standards consist of Taxiway C being planned for as Group 3. Other existing surfaces will remain the same in the future.

Taxiways also have design criteria based on how far objects must be from centerline. Known as the Taxiway Object Free Area (TOFA), this imaginary surface is designed to give aircraft wingtip clearance for safe operation of aircraft on taxiways. In the existing hangar areas, the airport is designed to Group I

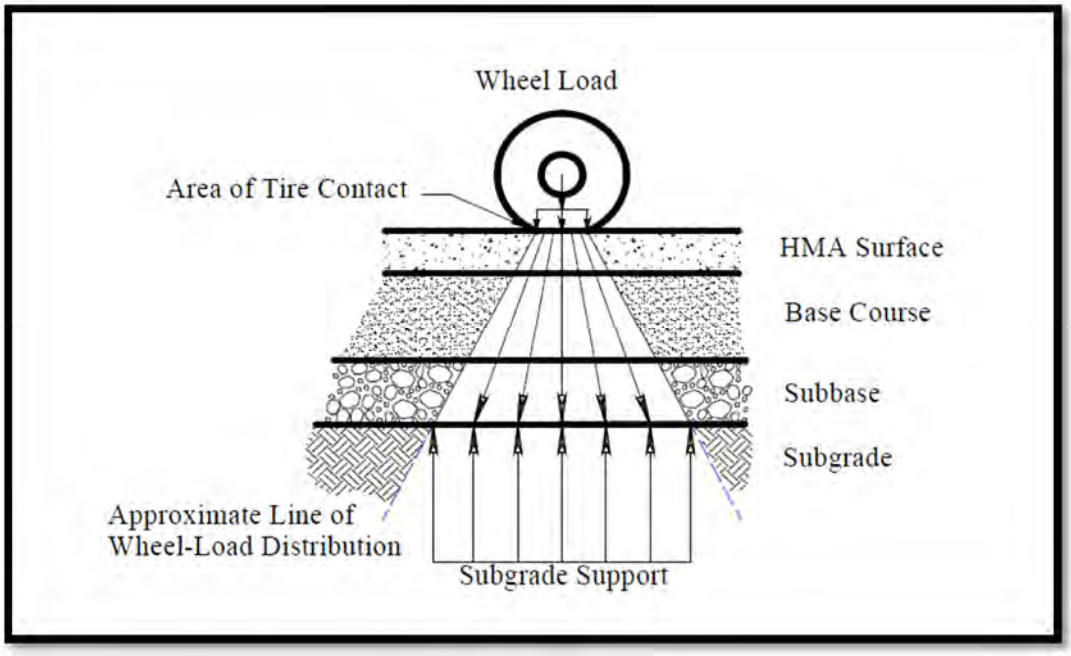
standards. This would include aircraft with wingspans less than 49’ in width. In the existing apron footprint, the existing TOFA design standard is Group II. Group II will continue to be planned for with future development requirements.

Appendix D - Airfield Pavements

Pavement is one of the most important aspects of an airport. If an airport has failing pavement (runway, taxiway, or apron), aircraft operations will suffer and can affect aircraft safety. When considering pavement design, construction, and maintenance, certain elements need to be considered in order to develop pavement surfaces. Some of these elements include but are not limited to the design aircraft that serves the airport, economic factors, weather conditions, the location of the airport, and personal preference of the owner/operator. This section highlights general knowledge of airfield pavements and things to consider when viewing the pavement at your airport.

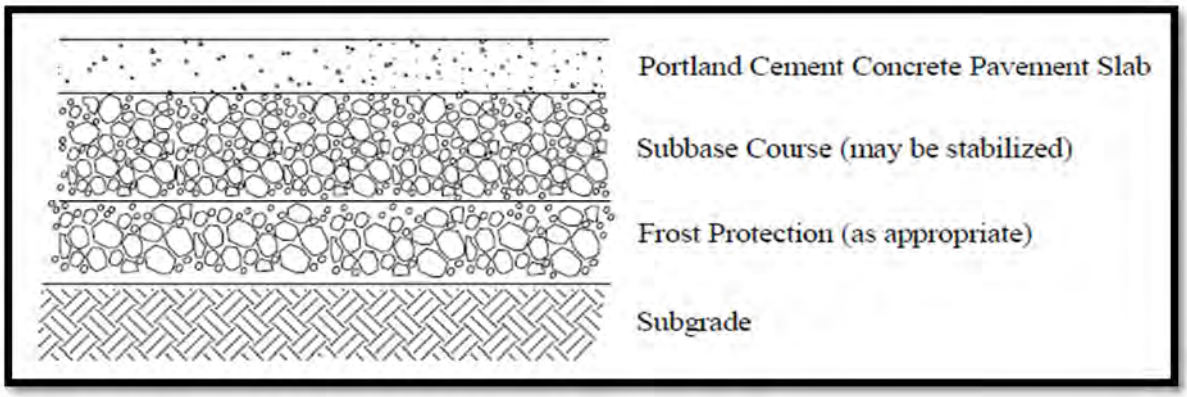
Types

There are two main types of pavement on an airfield; one type is Hot-Mix Asphalt (HMA). HMA is a flexible-type of pavement, and distributes aircraft weight through the layers below the asphalt surface (See exhibit below). When constructed, the HMA surface is in a smooth state. This is a result of the application method of rolling the surface for proper compaction.

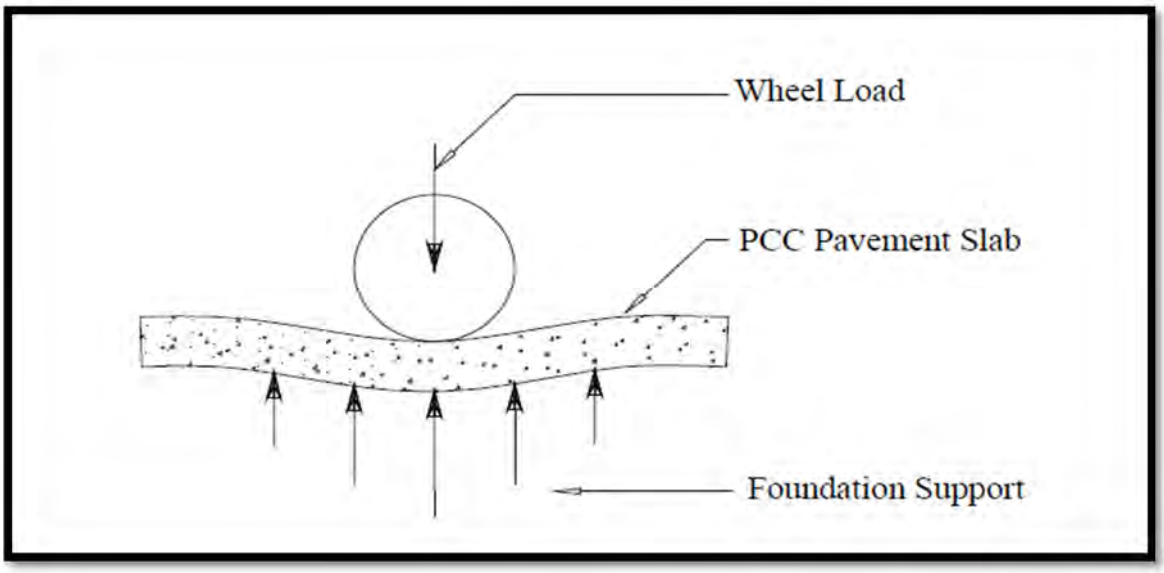


Source: Advisory Circular 150/5380-6B

The second type of pavement found at an airport is Portland Cement Concrete (PCC). This type of pavement is known as rigid pavement, and distributes weight evenly across the surface (See exhibit below). When initially poured, the PCC surface is a smooth surface.



Source: Advisory Circular 150/5380-6B



Source: Advisory Circular 150/5380-6B

Both HMA and PCC have FAA specifications and design criteria. HMA is typically referred to as "P-401", and PCC is typically referred to as "P-501". P-401 and P-501 are FAA specifications that contain requirements for the materials used in the pavement such as aggregate, bituminous or cement material, or any admixtures. These specifications also contain requirements for proper construction, quality control, and quality assurance. For further detail, refer to FAA Advisory Circular 150/5370-10F, *Standards for Specifying Construction of Airports.*

Surface Texturing/Measuring

Because both HMA and PCC initially have a smooth surface when constructed, it is important to look at methods that increase the friction of the surface. This can be completed for either surface type by grooving. Grooving tends to be the most common type of surface treatment, and is typically constructed by cutting transverse grooves, 1 1/2 inches apart, and 1/4 inch deep the entire length of the runway after the pavement has set. These saw cut grooves help with water runoff and reduce the risk of aircraft hydroplaning.

Moreover, contractors can also use a brush/broom finish, burlap dragging, or wire combing to increase the friction of PCC surfaces on taxiways and aprons. Other methods to increase surface friction for HMA consist of Porous Friction Course (PFC), Chip Seals, and Aggregate Slurry Seals. The ultimate goal in this process is to give the aircraft greater friction and better maneuverability during adverse weather conditions.

At commercial services airports, it is a requirement to monitor the level of friction provided by pavements during adverse weather conditions. This can be completed by operations personnel on the field monitoring the braking action of various surfaces with friction measurement equipment. On runways and taxiways used by commercial service aircraft, Continuous Friction Measurement Equipment (CFME) or Decelerometers are utilized to give specific values of friction that are associated with a piece of pavement. This value, known as a "M_u", is a percentage from 0-100 percent (100 percent being absolute friction and 0 percent no friction whatsoever). A Mu reading of less than 40 requires that a Notice To Airman (NOTAM) be issued to alert aircraft using the airport that less than optimal friction is available for breaking action.

A CFME can be used when calculating the general friction of the runway. When aircraft continually land on a section of pavement, a build-up of rubber can occur. This build up, known as rubber-reversion, collects rubber on the pavement section and decreases the M_u value.

At an airport serving general aviation aircraft only, pavement friction is not required to be monitored by friction measuring equipment during adverse weather conditions. This pavement is monitored by operations personnel and presented with values of braking action reported as good, fair, poor, or nil.

Strength

Pavement strength is driven by multiple factors. Initially, the airport needs to determine the design aircraft that will be using the airport. The design aircraft can be determined by one

single-most demanding aircraft, or a mix of the most demanding aircraft that drive similar standards. By identifying the design aircraft, the airport can determine the pavement strength needed for the pavement surfaces on the airfield.

From determining the design aircraft, the FAA has determined a standard method to determine pavement strength required at an airport. In the aviation world, there are two types of pavement strength classification; Utility and Other-Than-Utility. Utility pavements are capable of handling aircraft of up to 12,500 pounds maximum gross weight, while Other-Than-Utility pavements are capable of handling aircraft greater than 12,500 pounds.

If the design aircraft is 12,500 pounds or less, the pavement strength reporting remains fairly simple and straight forward. However, if the design aircraft is determined to have a maximum gross weight of greater than 12,500 pounds, the ACN-PCN method is used to determine what the pavement is capable of handling. ACN is the number that expresses relative effect of an aircraft at a given configuration on a pavement structure for a specified subgrade strength, while PCN is a number that expresses the load-carrying capacity of a pavement for unrestricted operations.

The ACN-PCN method of determining pavement strength does have some drawbacks. It is only intended to report relative pavement strength (so airport operators can evaluate acceptable operations of aircraft), but it is not intended for pavement design.

Markings

Pavement marking is an important aspect of pavement development. Not only does it give the pilot vital information on where they are located on the airfield, but it also can affect the surface friction of the pavement.

More specifically for runway markings, there are two types of paint applications; striated or solid. Striated markings are stripe-like patterns, while solid runway pavement markings do not have any spacing. Pavement heats quicker than paint and, as a result, any exposed pavement will melt any frozen contaminants quicker than what is on a painted surface. By striating the pavement, gaps of exposed pavement can help melt frozen contaminants quicker than if the pavement marking was solid. This increases friction and helps aircraft stop more consistently along the runway. As a result, striated pavement markings are more relevant in northern-climates, where weather contaminants can accumulate and freeze on runway surfaces. Furthermore, striated markings are only used for runway markings, as aircraft are operating at a higher speed. Additional details regarding pavement marking requirements can be found under *Appendix H – Navigational Aids*.

Maintenance

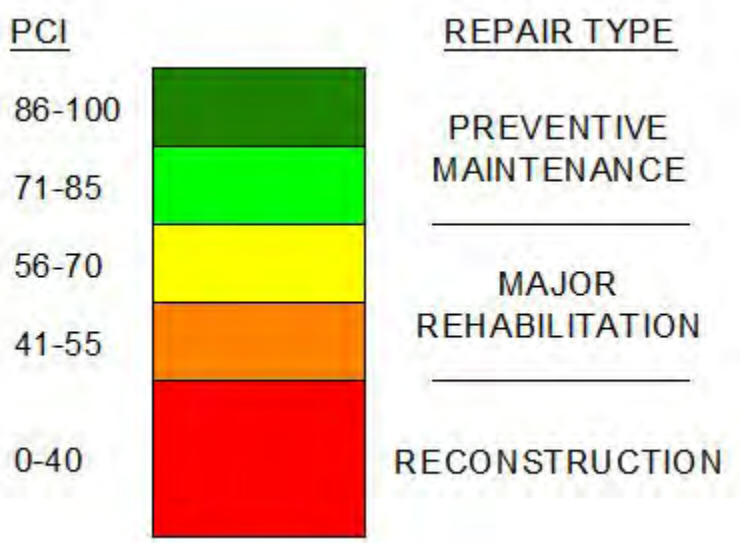
Maintenance is necessary throughout the useful life of the pavement. Moreover, per FAA Grant Assurance #11, federally-funded airports are required to implement a Pavement Preventative Maintenance program. This program assures an effective airport pavement maintenance-management program that will be used throughout the useful life of any pavement constructed, reconstructed, or repaired with federal funds. Pavement distress may include cracking, joint seal damage, disintegration, distortion, or loss of skid resistance. All of these distresses affect the aircraft's ability to maneuver around the airport safely. Moreover, these distresses can cause FOD (Foreign Object Debris) to accumulate on the pavement surface which can damage aircraft and compromise safety.

Pavement maintenance can either be contracted out, or serviced by operations/maintenance personnel on the airfield. Some pavement maintenance methodologies include, but are not limited to, patching, crack seals, mill and overlays, rejuvenators, spall-repairs, or slurry seals. Sometimes fabrics are added to HMA pavements, either during initial construction or as a pavement maintenance method (sometimes called pre-pave fabric), and add resistance to typical HMA pavement wear. Typical repair methods for flexible pavement (HMA) can include any of the above, but rigid pavement (PCC) typically is repaired by crack sealing. In the event that pavement has failed or reached the end of its useful life, a complete reconstruction is necessary.

To monitor the distress of pavement at airports, Pavement Condition Index (PCI) Reports are completed periodically. These reports can sometimes be completed on a state-wide basis, and are updated every few years. PCI reports tell the airport owner how distressed their pavement is based on a percentage value from 100 to 0. The ranges of pavement distress are as follows:

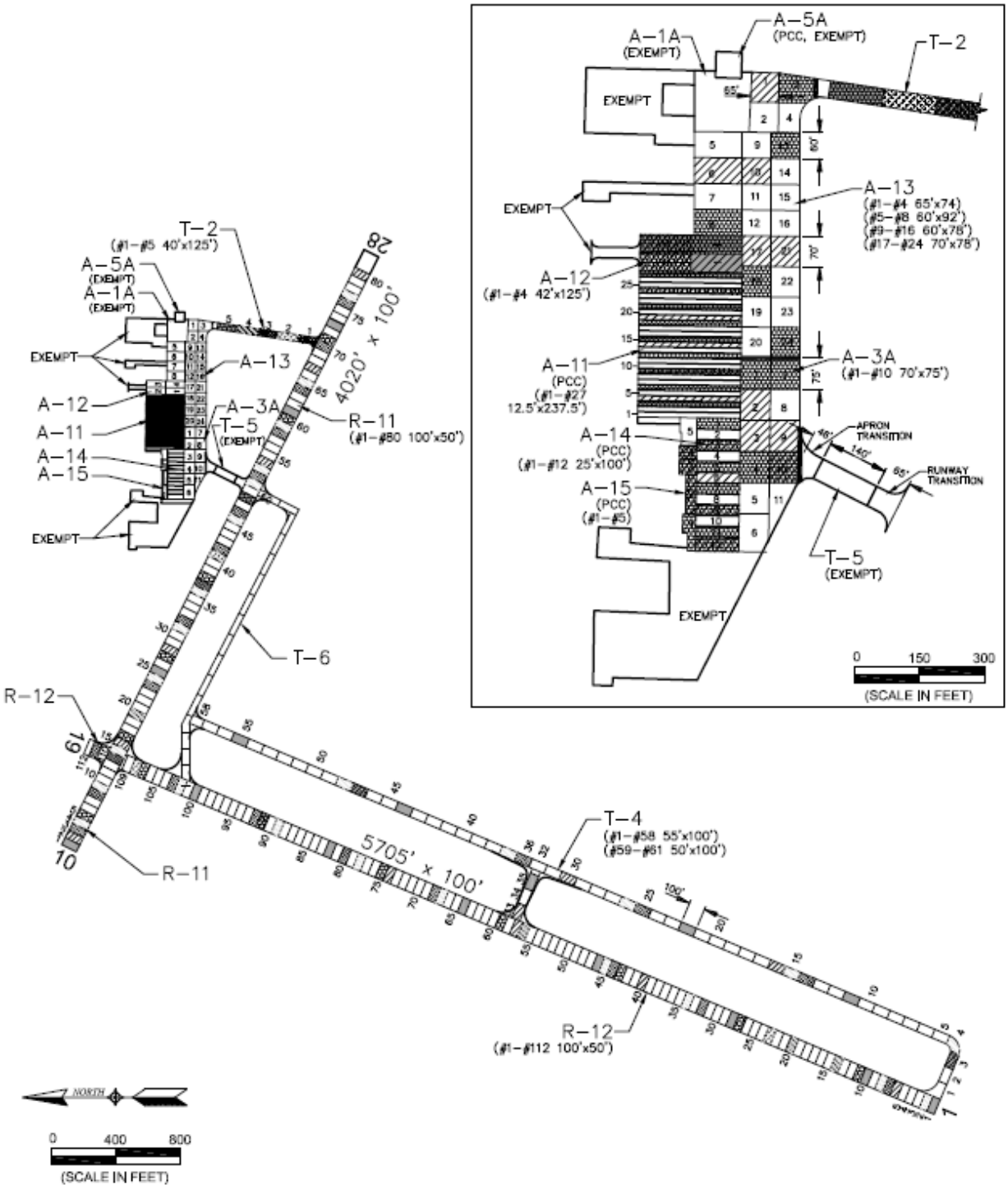
- Very Good (100-86)
- Good (85-71)
- Fair (70-56)
- Poor (55-41)
- Very Poor (40-0)

From this evaluation, each category of pavement distress requires a certain level of pavement maintenance. Although it may vary from state to state, a graphic depiction of the typical maintenance required for each category is shown below:



Most airport PCI reports will include an estimate of costs to maintain or rehabilitate airfield pavements. With this information airport owners can plan for the financial needs of pavement management accordingly. Below is the most current PCI report for Sidney-Richland Municipal Airport.

SIDNEY


A–5A
(PCC, EXEMPT)
A–1A
(EXEMPT)
T–2
EXEMPT
A–13
(#1–#4 65'x74')
(#5–#8 60'x92')
(#9–#16 60'x78')
(#17–#24 70'x78')
EXEMPT
A–12
(#1–#4 42'x125')
A–11
(PCC)
(#1–#27
12.5'x237.5')
A–3A
(#1–#10 70'x75')
A–14
(PCC)
(#1–#12 25'x100')
APRON
TRANSITION
RUNWAY
TRANSITION
A–15
(PCC)
(#1–#5)
T–5
(EXEMPT)
EXEMPT
0 150 300
(SCALE IN FEET)
T–2
(#1–#5 40'x125')
A–5A
(EXEMPT)
A–1A
(EXEMPT)
EXEMPT
A–13
A–12
A–11
A–14
A–15
A–3A
T–5
(EXEMPT)
R–11
(#1–#80 100'x50')
EXEMPT
4020' x 100'
T–6
R–12
19
10
R–11
5705' x 100'
T–4
(#1–#58 55'x100')
(#59–#61 50'x100')
R–12
(#1–#112 100'x50')
NORTH
0 400 800
(SCALE IN FEET)

Sidney-Richland Municipal Airport Pavement Data

Runway 1/19 Pavement

Criteria	Runway 1/19		
	Existing	Future	Ultimate
Length	5,705’	5,705’	7,000’
Width	100’	100’	100’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	82	100	100
FAA Airplane Design Group (ADG)	B-II	C-II	C-II
Striated Markings	No	No	No
Grooved?	Yes	Yes	Yes

Source: KLJ Analysis

Runway 11/29 Pavement

Criteria	Runway 11/29		
	Existing	Future	Ultimate
Length	4,020’	4,020’	4,020’
Width	100’	100’	100’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	81	100	100
FAA Airplane Design Group (ADG)	B-II	B-II	B-II
Striated Markings	No	No	No
Grooved?	Yes	Yes	Yes

Source: KLJ Analysis

Construction Details

Runway 1/19

Per the 2012 PCI report, Runway 1/19 went through a rehabilitation project in 1984. In 2003, construction consisted of an overlay, grooving, crack seal, fog seal, and remarking. Most recently, in 2010, Runway 1/19 had seal coat, crack sealing, and pavement markings redone.

Existing cross sections of the runway consist of:

Soil Class	E-6
Sub-Grade Class	F6
Subbase Course	6” of P-154
Base Course	6” of P-209
Surface Course	2” of P-609 & 4” of P-401
Overlay	4 ½” of P-401

Runway 11/29

Per the 2012 PCI report, Runway 11/29 (formerly known as Runway 10/28) went through a rehabilitation project in 1980. In 2003, construction consisted of an overlay, grooving, crack seal, fog seal, and remarking. Most recently, in 2010, Runway 1/19 had seal coat, crack sealing, and pavement markings redone.

Existing cross sections of the runway consist of:

Soil Class	E-5
Sub-Grade Class	F5
Subbase Course	3” of P-154
Base Course	6” of P-209
Surface Course	2” of P-609 & 4” of P-401
Overlay	4 ½” of P-401

Existing Issues

Other than normal distress of pavement, there are no known existing issues with regards to runway pavement at the Sidney-Richland Municipal Airport.

Taxiway Pavement

Criteria	Taxiway A		
	Existing	Future	Ultimate
Width	40’	40’	40’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	66	100	100
FAA Taxiway Design Group (TDG)	2	2	2

Source: KLJ Analysis

Construction Details

Per the 2012 PCI report, Taxiway A went through a rehabilitation project in 1984. An overlay project was completed in 1997. Most recently, in 2010, Taxiway A had a seal coat, crack seal, and remarking project completed.

Existing cross sections of Taxiway A consist of:

Soil Class	E-5
Sub-Grade Class	F5
Subbase Course	N/A
Base Course	6” of P-209
Surface Course	4” of P-401
Overlay	4 ½” of P-401

Criteria	Taxiway B		
	Existing	Future	Ultimate
Width	50’	50’	50’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	*	100	100
FAA Taxiway Design Group (TDG)	3	3	3

Source: KLJ Analysis

** PCI value not listed in the 2012 PCI Report*

Construction Details

Per the 2012 PCI report, Taxiway B went through a rehabilitation project in 1984. More recently, an overlay project was completed on Taxiway B in 1997.

Existing cross sections of Taxiway B consist of:

Soil Class	E-5
Sub-Grade Class	F5
Subbase Course	Fabric
Base Course	9” of P-208
Surface Course	4” of P-401
Overlay	N/A

Criteria	Taxiway C		
	Existing	Future	Ultimate
Width	35’	35’	35’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	*	100	100
FAA Taxiway Design Group (TDG)	2	2	2

Source: KLJ Analysis

** PCI value not listed in the 2012 PCI Report*

Construction Details

Per the 2012 PCI report, Taxiway C was newly constructed in 2012.

Existing cross sections of Taxiway C consist of:

Soil Class	N/A
Sub-Grade Class	N/A
Subbase Course	Geogrid 24” P-154
Base Course	4” P-209
Surface Course	5” of P-401
Overlay	N/A

Criteria	Taxiway D		
	Existing	Future	Ultimate
Width	50’	50’	50’
Type	Asphalt	Asphalt	Asphalt
Strength	Other-Than-Utility	Other-Than-Utility	Other-Than-Utility
Weight Bearing	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW	40 SW, 55 DW, 85 DTW
PCI Value	*	100	100
FAA Taxiway Design Group (TDG)	3	3	3

Source: KLJ Analysis

** PCI value not listed in the 2012 PCI Report*

Construction Details

Per the 2012 PCI report, Taxiway D went through rehabilitation in 2012.

Existing cross sections of Taxiway D consist of:

Soil Class	E-7
Sub-Grade Class	N/A
Subbase Course	16” P-154
Base Course	6” P-208
Surface Course	5” of P-401
Overlay	3 ½” of P-401

Existing Issues

Other than normal distress of pavement, there are no known existing issues with regards to taxiway pavement at the Sidney-Richland Municipal Airport.

Apron Pavement

• Criteria	Apron		
	Existing	Future	Ultimate
Dimensions	385’x1,100’[(1)]	TBD	TBD
Type	Asphalt[(2)]	TBD	TBD
Strength	40 SW[(3)]	Other-Than-Utility	Other-Than-Utility
# Tiedowns	31	TBD	TBD
Weight Bearing	40 SW	40 SW	40 SW
PCI Value	67[(4)]	100	100
FAA Taxiway Design Group (TDG)	2	2	2

Source: KLJ Analysis

[(1)] Dimensions are approximate. Apron dimensions vary

[(2)] Commercial Apron & FBO Apron areas are concrete

[(3)] Strongest pavement strength noted on Apron (Commercial and FBO Apron space). Strength varies throughout

[(4)] PCI Value noted for Commercial Service Apron area. PCI value on apron varies

Construction Details

The apron area at the Sidney-Richland Municipal Airport varies in size, as well as pavement type. While the majority of pavement is asphalt, the commercial service and FBO apron areas are concrete. In the apron area, typical subgrade classes vary from CBR = 5 or 4, sub-base course can vary from 8” P-152 or fabric, and base courses vary between 6” and 10” of P-208. The concrete surface course is 6” of PCC, while the asphalt surface course varies from 4” to 8” of P-401 or P-501.

Existing Issues

Other than normal distress of pavement, there are not known existing issues with regards to the apron pavement at the Sidney-Richland Municipal Airport.

Appendix E: Airfield Design Requirements

Design Standards

Guidance on airport design standards is found in FAA Advisory Circular 150/5300-13A, *Airport Design*. Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. Careful selection of basic aircraft characteristics for which the airport will be designed is important. Airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft unlikely to operate at the airport are not economical.

Design Aircraft

Planning a new airport or improvements to an existing airport requires the selection of one or more "design aircraft." FAA design standards for an airport are determined by a coding system that relates the physical and operational characteristics of an aircraft to the design and safety separation distances of the airfield facility. The design aircraft is the most demanding aircraft operating or forecast to operate at the airport on a regular basis, which is typically considered 500 annual operations. The design aircraft may be a single aircraft, or a grouping of aircraft.

The first consideration should be the safe operation of aircraft that regularly use the airport. According to FAA AC 150/5300-13A, any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin unless air traffic control (ATC) Standard Operating Procedures (SOPs) are in place for those operations. However, the AC also states that it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently, and it is appropriate and necessary to develop ATC SOPs to accommodate faster and/or larger aircraft that use the airport occasionally.[9] The FAA typically only provides funding for the airport to be designed to existing and forecasted critical aircraft that are expected to exceed 500 annual operations.

Airport and Runway Classifications

The FAA has established aircraft classification systems that group aircraft types based on their performance and geometric characteristics. These classification systems, described below and illustrated in **Table 1** and **Exhibit 1**, are used to determine the appropriate airport design standards for specific runway, taxiway, apron, or other facilities, as described in FAA AC 150/5300-13A *Airport Design*.

- **Aircraft Approach Category (AAC)**: a grouping of aircraft based on approach speed.

- **Airplane Design Group (ADG)**: a classification of aircraft based on wingspan and tail height. When the aircraft wingspan and tail height fall in different groups, the higher group is used.

[9] FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*

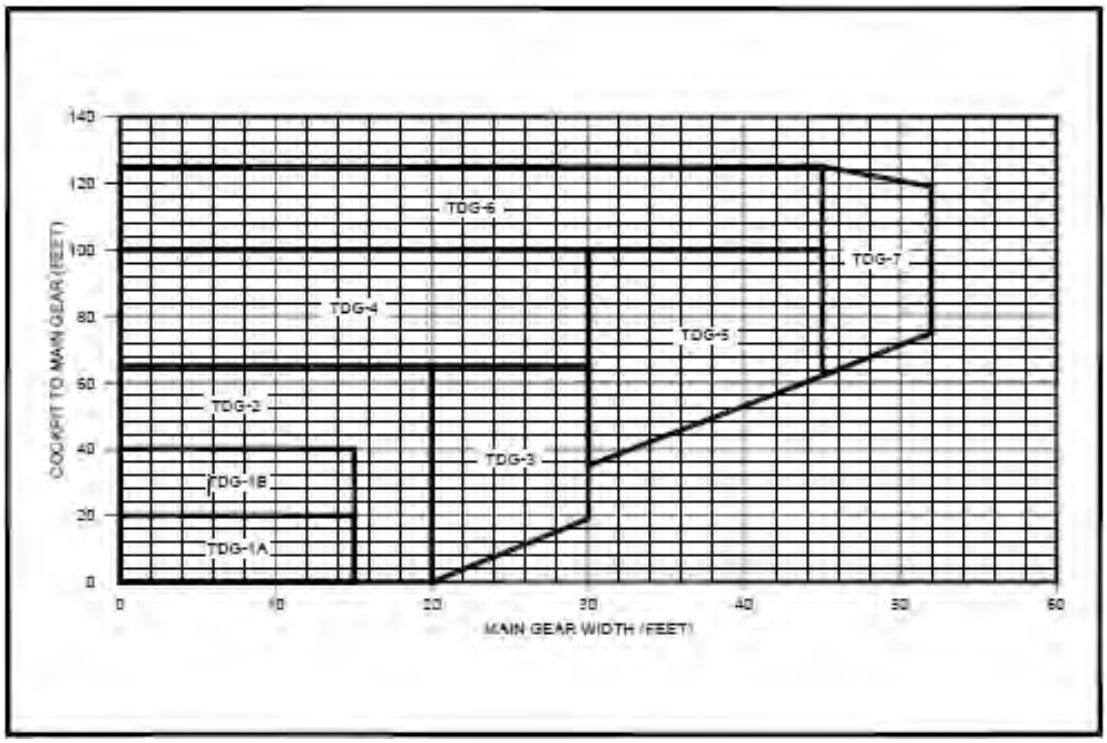
- **Approach Visibility Minimums**: relates to the visibility minimums expressed by Runway Visual Range (RVR) values in feet of 1200, 1600, 2400, 4000, and 5000 (corresponding to lower than 1/4 mile, lower than 1/2 mile but not lower than 1/4 mile, lower than 3/4 mile but not lower than 1/2 mile, lower than 1 mile but not lower than 3/4 mile, and not lower than 1 mile, respectively).

- **Taxiway Design Group (TDG)**: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

Table 1: Classification Systems

Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group (ADG)		
Group	**Tail height (ft)**	**Wingspan (ft)**
I	< 20’	< 49’
II	20’ - < 30’	49’ - < 79’
III	30’ - < 45’	79’ - < 118’
IV	45’ - < 60’	118’ - < 171’
V	60’ - < 66’	171’ - < 214’
IV	66’ - < 80’	214’ - < 262’
Approach Visibility Minimums		
RVR (ft)[1]	**Instrument Flight Visibility Category (statue mile)**	
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than ¾ mile (APV ¾ but< 1 mile	
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)	
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)	
1200	Lower than ¼ mile (CAT-III PA)	

Exhibit 1



Airport Reference Code (ARC)

The Airport Reference Code (ARC) is an airport designation that represents the AAC and ADG of the aircraft that the airfield is intended to accommodate on a regular basis. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

Runway Design Code (RDC) and Runway Reference Code (RRC)

RDC is a code signifying the design standards to which the overall runway is to be planned and built. RRC is a code signifying the operational capabilities of each specific runway end. These classifications are expressed in three components: AAC, ADG, and the highest approach visibility minimums that either end of the runway is planned to provide. Within these classifications, instrument approach visibility minimums are expressed in RVR values of 1200, 1600, 2400 and 4000 feet as shown in **Table 1**. Corresponding to the specific published approach procedures, a runway end may have more than one RRC depending on the minimums available to a specific AAC. In the case of an airport with multiple runways, a design aircraft is selected for each runway. For example, an airport's air carrier runway can have an RDC of C-III-1600 and the same airport's smaller runway used for general aviation activity can have an RDC of B-II-4000. (The design aircraft for other aspects of runway design, such as length and pavement strength, may be different. It will be based on other factors, such as haul length and maximum takeoff weight.)

Generally, runway standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums. Runway to taxiway and taxiway/taxilane to taxiway/taxilane separation standards are related to ADG, TDG, and approach visibility minimums. **Table 2** summarizes aircraft classifications and their related design components.

Code Context

It's critical to determine the context in which the specific code is being used. Depending where the code is being used, a C-II code could have the following meanings:

- Critical or design aircraft. This is the aircraft that the runway was either built for, or is the aircraft that the runway is being designed for. Looking at **Table 1** above or FAA AC 150/5300-13A, a C-II aircraft is an aircraft with an approach speed between 121 and 140 knots, and a wingspan between 49 and 78 feet or a tail height between 20 and 29 feet.
- Runway Design Code (RDC). The planned runway will be designed to meet the FAA runway design standards for a C-II aircraft. If the RDC was shown as C-II-2400, the runway would also be designed to meet the standards required for CAT-I visibility minimums.
- Runway Reference Code (RRC). The RRC is normally used when discussing existing conditions. A RRC of C-II would mean the runway currently meets the FAA design standards for a runway capable of accommodating C-II aircraft without any special operational procedures.
- Airport Reference Code (ARC). The ARC can be used to discuss the operational capability of an existing airport, i.e., if the highest RDC of existing runways at an airport is C-II, the airport would have an ARC of C-II. The ARC can also be used to discuss the planned capability of an airport, i.e., an airport will be designated as an ARC C-II airport when the highest RDC of the planned runways is C-II.

Table 2

Table 2: Classification & Design Components	
Aircraft Classification	**Related Design Components**
Aircraft Approach Speed (AAC)	Runway Safety Area (RSA), Runway Object Free Area (ROFA), Runway Protection Zone (RPZ), runway width, runway-to-taxiway separation, runway-to-fixed object
Airplane Design Group (ADG)	Taxiway and apron Object Free Areas (OFAs), parking configuration, hangar locations, taxiway-to-taxiway separation, runway-to-taxiway separation

Runway Design Standards

The FAA design and safety standards related to runways are described below.

- **Runway Width** – The physical width of the runway pavement.

- **Runway Safety Area (RSA)** – Graded surface centered on the runway centerline. The RSA shall be free of objects and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Runway Object Free Area (ROFA)** – The ROFA is also centered on the runway centerline and requires the clearing of all above ground objects protruding above the RSA edge elevation (unless objects need to be located in the OFA for air navigation or aircraft ground maneuvering purposes).
- **Runway Object Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxiing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.
- **Runway Protection Zone (RPZ)** – The RPZ is a trapezoidal area located 200 feet beyond the runway end and centered on the extended runway centerline. The RPZ is primarily a land use control that is meant to enhance the protection of people and property near the airport through airport control. Such control includes clearing of RPZ areas of incompatible objects and activities. With special application of declared distances, separate approach and departure RPZs are required.
- **Runway Obstacle Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.

Primary Runway

The future RDC planned for the primary runway is B-II, based on the existing Pilatus PC-12 critical aircraft. The ultimate RDC planned for the primary runway is C-II, based on the Cessna Citation 560 that currently uses the airport, but had 65 annual operations. Non-precision approaches with greater than ¾ mile visibility minimums are expected for ultimate primary runway on both ends. The design standards applicable to these conditions are summarized in shown in **Figure 1** and **2**.[10]

Crosswind Runway

The crosswind runway planned for SDY will be designed according to B-II standards. Non-precision instrument approaches with visibility minimums not lower than one mile are anticipated for the runway ends. The design standards applicable to planned crosswind are shown in **Figure 3**.[2]

Table 3 provides a summary of existing, future and ultimate design standards for the airport's runways and associated taxiways.

[10] Figures M-6, M-7, and M-8 are derived from a runway design standards matrix located in Appendix 7 of FAA AC 150/5300-13A. Items in "red" are changes to the AC to provide additional information or highlight the appropriate design standards.

Table 3: Runway & Associated Taxiway Design Standards						
	Existing		Future		Ultimate	
Primary Runway	**1**	**19**	**1**	**19**	**1**	**19**
Approach Category and Design Group	B-II-5000	B-II-5000	B-II-5000	B-II-5000	C-II-4000	C-II-4000
Departure Category and Design Group	B-II		B-II		C-II	
Design Aircraft	Pilatus PC-12		Cessna Citation 560		Cessna Citation 560	
Dimensions	5,705’ X 100’		7,000’ x 100’		7,000’x100’	
Visibility Minimums	1 Mile	1 Mile	1 Mile	1 Mile	>3/4	>3/4
TDG / Design Aircraft	TDG-2		TDG-3		TDG-3	
Primary Taxiway Width	50’		50’		50’	
Crosswind Runway						
Approach Category and Design Group	B-II-VIS	B-II-VIS	B-II-VIS	B-II-VIS	B-II-5000	B-II-5000
Departure Category and Design Group	B-II		B-II		B-II	
Design Aircraft	Pilatus PC12		Pilatus PC12		Pilatus PC12	
Dimensions	4,023’ x 100’		4,023’ x 100’		4,023’ x 100’	
Visibility Minimums	Visual		Visual		1 Mile	
TDG / Design Aircraft	TDG-2		TDG-2		TDG-2	
Crosswind Taxiway Width	35’		35’		35’	

Figure 1

Table A7-4. Runway design standards matrix, A/B – II

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		A/B - II			
ITEM	DIM [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A		*Refer to paragraphs 302 and 304*		
Runway Width	B	75 ft	75 ft	75 ft	100 ft
Shoulder Width		10 ft	10 ft	10 ft	10 ft
Blast Pad Width		95 ft	95 ft	95 ft	120 ft
Blast Pad Length		150 ft	150 ft	150 ft	150 ft
Crosswind Component		13 knots	13 knots	13 knots	13 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [9, 10]	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	C	150 ft	150 ft	150 ft	300 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	Q	500 ft	500 ft	500 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length			*Refer to paragraph 308*		
Width			*Refer to paragraph 308*		
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,700 ft	2,500 ft
Inner Width	U	500 ft	500 ft	1,000 ft	1,000 ft
Outer Width	V	700 ft	700 ft	1,510 ft	1,750 ft
Acres		13.770	13.770	48.978	78.914
Departure Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Inner Width	U	500 ft	500 ft	500 ft	500 ft
Outer Width	V	700 ft	700 ft	700 ft	700 ft
Acres		13.770	13.770	13.770	13.770
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H		*Refer to paragraph 310*		
Holding Position		200 ft	200 ft	200 ft	250 ft
Parallel taxiway/taxilane centerline [2, 4]	D	240 ft	240 ft	240 ft	300 ft
Aircraft parking area	G	250 ft	250 ft	250 ft	400 ft
Helicopter touchdown pad			*Refer to AC 150/5390-2*		

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Figure 2

Table A7-8. Runway design standards matrix, C/D/E - II

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		C/D/E - II			
ITEM	**DIM** [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A	*Refer to paragraphs 302 and 304*			
Runway Width	B	100 ft	100 ft	100 ft	100 ft
Shoulder Width		10 ft	10 ft	10 ft	10 ft
Blast Pad Width		120 ft	120 ft	120 ft	120 ft
Blast Pad Length		150 ft	150 ft	150 ft	150 ft
Crosswind Component		16 knots	16 knots	16 knots	16 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [9, 10]	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [11]	P	600 ft	600 ft	600 ft	600 ft
Width [13]	C	500 ft	500 ft	500 ft	500 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [11]	P	600 ft	600 ft	600 ft	600 ft
Width	Q	800 ft	800 ft	800 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length		*Refer to paragraph 308*			
Width		*Refer to paragraph 308*			
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	2,500 ft
Inner Width	U	500 ft	500 ft	1,000 ft	1,000 ft
Outer Width	V	1,010 ft	1,010 ft	1,510 ft	1,750 ft
Acres		29.465	29.465	48.978	78.914
Departure Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	1,700 ft
Inner Width	U	500 ft	500 ft	500 ft	500 ft
Outer Width	V	1,010 ft	1,010 ft	1,010 ft	1,010 ft
Acres		29.465	29.465	29.465	29.465
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H	*Refer to paragraph 316*			
Holding Position		250 ft	250 ft	250 ft	250 ft
Parallel taxiway/taxilane centerline [2]	D	300 ft	300 ft	300 ft	400 ft
Aircraft parking area	G	400 ft	400 ft	400 ft	500 ft
Helicopter touchdown pad		*Refer to AC 150/5390-2*			

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Figure 3

Table A7-3. Runway design standards matrix, A/B – II Small Aircraft

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		A/B - II Small Aircraft			
ITEM	**DIM** [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A		*Refer to paragraphs 302 and 304*		
Runway Width	B	75 ft	75 ft	75 ft	100 ft
Shoulder Width		10 ft	10 ft	10 ft	10 ft
Blast Pad Width		95 ft	95 ft	95 ft	120 ft
Blast Pad Length		150 ft	150 ft	150 ft	150 ft
Crosswind Component		13 knots	13 knots	13 knots	13 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [9, 10]	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	C	150 ft	150 ft	150 ft	300 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	300 ft	300 ft	300 ft	600 ft
Length prior to threshold	P	300 ft	300 ft	300 ft	600 ft
Width	Q	500 ft	500 ft	500 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length			*Refer to paragraph 308*		
Width			*Refer to paragraph 308*		
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,700 ft	2,500 ft
Inner Width	U	250 ft	250 ft	1,000 ft	1,000 ft
Outer Width	V	450 ft	450 ft	1,510 ft	1,750 ft
Acres		8.035	8.035	48.978	79.000
Departure Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Inner Width	U	250 ft	250 ft	500 ft	500 ft
Outer Width	V	450 ft	450 ft	700 ft	700 ft
Acres		8.035	8.035	13.770	13.770
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H		*Refer to paragraph 316*		
Holding Position		125 ft	125 ft	125 ft	175 ft
Parallel taxiway/taxilane centerline [2, 4]	D	240 ft	240 ft	240 ft	300 ft
Aircraft parking area	G	250 ft	250 ft	250 ft	400 ft
Helicopter touchdown pad			*Refer to AC 150/5390-2*		

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Taxiway Design Standards

Similar to runways, taxiways are subject to FAA design requirements such as pavement width, edge safety margins, shoulder width, and safety and object free area dimensions. The FAA standards in relation to taxiways (as defined in AC 150/5300-13A *Airport Design*) are described below.

- **Taxiway Width** – The physical width of the taxiway pavement.
- **Taxiway Edge Safety Margin** – The minimum acceptable distance between the outside of the airplane wheels and the pavement edge.
- **Taxiway Shoulder Width** – Taxiway shoulders provide stabilized or paved surfaces to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines which overhang the edge of the taxiway pavement.
- **Taxiway/Taxilane Safety Area (TSA)** – The TSA is located on the taxiway centerline and shall be cleared and graded, properly drained, and capable, under dry conditions, of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Taxiway/Taxilane Object Free Area (TOFA)** – The TOFA is centered on the taxiway centerline and prohibits service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes.
- **Taxiway Separation Standards** – Separation standards between the taxiways and other airport facilities are established to ensure operational safety of the airport and are as follows:
    - Taxiway centerline to parallel taxiway/taxilane centerline
    - Taxiway centerline to fixed or moveable object

The dimensions for each of these standards vary according to the group of aircraft the taxiways are intended to accommodate. **Figure 4** shows AC 150/5300-13A taxiway design standards based on Airplane Design Group (ADG) and Taxiway Design Group (TDG).

Figure 4

Table 4-1. Design standards based on Airplane Design Group (ADG)

ITEM	DIM (See Figure 3-26)	ADG					
		I	II	III	IV	V	VI
TAXIWAY PROTECTION							
TSA	E	49 ft (15 m)	79 ft (24 m)	118 ft (36 m)	171 ft (52 m)	214 ft (65 m)	262 ft (80 m)
Taxiway OFA		89 ft (27 m)	131 ft (40 m)	186 ft (57 m)	259 ft (79 m)	320 ft (98 m)	386 ft (118 m)
Taxilane OFA		79 ft (24 m)	115 ft (35 m)	162 ft (49 m)	225 ft (69 m)	276 ft (84 m)	334 ft (102 m)
TAXIWAY SEPARATION							
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline [1]	J	70 ft (21 m)	105 ft (32 m)	152 ft (46.5 m)	215 ft (65.5 m)	267 ft (81 m)	324 ft (99 m)
Taxiway Centerline to Fixed or Movable Object	K	44.5 ft (13.5 m)	65.5 ft (20 m)	93 ft (28.5 m)	129.5 ft (39.5 m)	160 ft (48.5 m)	193 ft (59 m)
Taxilane Centerline to Parallel Taxilane Centerline [1]		64 ft (19.5 m)	97 ft (29.5 m)	140 ft (42.5 m)	198 ft (60 m)	245 ft (74.5 m)	298 ft (91 m)
Taxilane Centerline to Fixed or Movable Object		39.5 ft (12 m)	57.5 ft (17.5 m)	81 ft (24.5 m)	112.5 ft (34 m)	138 ft (42 m)	167 ft (51 m)
WINGTIP CLEARANCE							
Taxiway Wingtip Clearance		20 ft (6 m)	26 ft (8 m)	34 ft (10.5 m)	44 ft (13.5 m)	53 ft (16 m)	62 ft (19 m)
Taxilane Wingtip Clearance		15 ft (4.5 m)	18 ft (5.5 m)	23 ft (6.5 m)	27 ft (8 m)	31 ft (9.5 m)	36 ft (11 m)

Note: 1. These values are based on wingtip clearances. If 180 degree turns between parallel taxiways are needed, use this dimension or the dimension specified in Table 4-2, whichever is larger.

Table 4-2. Design standards based on Taxiway Design Group (TDG)

ITEM	DIM (See Figure 4-7)	TDG						
		1	2	3	4	5	6	7
Taxiway Width	W	25 ft (7.5 m)	35 ft (10.5 m)	50 ft (15 m)	50 ft (15 m)	75 ft (23 m)	75 ft (23 m)	82 ft (25 m)
Taxiway Edge Safety Margin	M	5 ft (1.5 m)	7.5 ft (2 m)	10 ft (3 m)	10 ft (3 m)	15 ft (5 m)	15 ft (5 m)	15 ft (5 m)
Taxiway Shoulder Width		10 ft (3 m)	10 ft (3 m)	20 ft (6 m)	20 ft (6 m)	25 ft (7.5m)	35 ft (10.5 m)	40 ft (12 m)
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline [1]	J	70 ft (21 m)	70 ft (21 m)	160 ft (49 m)	160 ft (49 m)	240 ft (73 m)	350 ft (107 m)	350 ft (107 m)
TAXIWAY FILLET DIMENSIONS		See Table 4-3, Table 4-4, Table 4-5, Table 4-6, Table 4-7 and Table 4-8						

Note: 1. Use this dimension or the dimension specified in Table 4-1, whichever is larger, when 180 degree turns between parallel taxiways are required.

Runway Length

Current Conditions

Runway 1-19 is the primary runway at Sidney-Richland Municipal Airport. It is 5,705 feet long by 100 feet wide. Runway 11-29, the crosswind runway, is 4,023 feet long by 100 feet wide.

Runway Length Requirements

FAA Advisory Circular (AC 150/5325-4B) provides guidance on runway length requirements. The AC uses a five-step process to determine recommended runway lengths for a selected list of critical design airplanes. The five steps are as follows:

Step #1. Identify the list of critical design airplanes that will make regular use of the proposed runway for an established planning period of at least five years. Critical design airplanes are the listing of airplanes (or a single airplane) that results in the longest recommended runway length. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations).

Step #2. Identify the airplanes that will require the longest runway lengths at maximum certificated takeoff weight (MTOW). This will be used to determine the method for establishing the recommended runway length. Except for regional jets, when the MTOW of listed airplanes is 60,000 pounds or less, the recommended runway length is determined according to a *family grouping of airplanes* having similar performance characteristics and operating weights. Although a number of regional jets have a MTOW less than 60,000 pounds, the exception acknowledges the long range capability of the regional jets and the necessity to offer regional jet operators the flexibility to interchange regional jet models according to passenger demand without suffering operating weight restrictions. When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to *individual airplanes*. The recommended runway length in the latter case is a function of the most critical individual airplane's takeoff and landing operating weights, which depend on wing flap settings, airport elevation and temperature, runway surface conditions (dry or wet), and effective runway gradient. The procedure assumes that there are no obstructions that would preclude the use of the full length of the runway.

Step #3. Determine the method that will be used for establishing the recommended runway length. *Potential design airplanes* are categorized according to their MTOWs. MTOW is used because of the significant role played by airplane operating weights in determining runway lengths. Small airplanes, defined as airplanes with MTOW of 12,500 pounds or less, are further subdivided according to approach speeds and passenger seating. Regional jets are assigned to the same category as airplanes with a MTOW over 60,000 pounds. Airplane manufacturers' airport planning manuals (APM) provide the

takeoff and landing runway lengths that an airport designer will in turn apply to the associated guidelines set forth by AC 150/5325-4B to obtain runway lengths.

Step #4. Select the recommended runway length from among the various runway lengths generated by step #3 per the process identified in AC 150/5325-4B chapters 2, 3, or 4, as applicable.

Step #5. Apply any necessary adjustment to the obtained runway length, when instructed by the applicable chapter of AC 150/5325-4B, to the runway length generated by step #4 to obtain a final recommended runway length. For instance, an adjustment to the length may be necessary for runways with non-zero effective gradients. Chapter 5 of AC 150/5325-4B provides the rationale for these length adjustments.

The following pages provide runway length recommendations based on the airport conditions listed below and application of the five steps listed above.

Conditions used in runway length calculations

- Mean daily maximum temperature of 86.9° F
- Elevation of 1,985 feet MSL
- 2.1 feet and 14.3 runway gradient used for Runway 1-19 and Runway 11-29, respectively.

Primary Runway

The recommended runway length for the primary runway has been determined according to individual airplanes. The recommended runway length is a function of the critical design airplane's takeoff distance, which depends on takeoff weight, wing flap settings, airport elevation, temperature, runway surface conditions and effective runway gradient.

The aircraft selected as the critical design aircraft were based on a review of aircraft currently operating at the Airport and aircraft types frequently used by the Cape Air and expected to serve Sidney-Richland Municipal Airport in the future. **Table 4** provides a list of aircraft utilized by the Sidney-Richland Municipal Airport. This data was obtained through Flight Aware, and captures aircraft operations via flight plans filed to or from the airport. Some aircraft do not file flight plans though. Those aircraft not filing flight plans to or from the airport are not captured through the process. However, Flight Aware gives the airport a tangible sample of aircraft currently using the airport. Generally, larger corporate aircraft and commercial aircraft are filing flight plans. As a result, the Flight Aware data is a good way to evaluate the most-demanding aircraft using the airfield.

Based on the evaluation of Flight Aware Data, as well as discussions with the sponsor, the planned ultimate Runway 1/19 length was calculated to 7,000 feet. This was based on the ultimate critical aircraft being the Cessna Citation 560. With 65 operations in 2013, the Cessna Citation 560 does not meet the 500 annual operation requirement to be an existing critical aircraft. However, through the course of the 20-year planning period, this aircraft could increase in the number of operations and may exceed 500 annual operations. As a result, planning for this expansion was identified in the master plan.

7,000 feet of runway length was calculated based on FAA Advisory Circular 150-5325-4B, *Runway Length Requirements for Airport Design*, and was calculated under *Large Airplanes of 60,000 pounds or less (70 percent of fleet at 90 percent useful load)*. Based on the airport's mean max temperature, elevation, and runway gradient, this chart indicates a recommended runway length of 6,400 feet. However, because the airport operates with turbojet-powered aircraft, and the ultimate critical aircraft is a turbojet-powered aircraft, wet and slippery conditions must be factored. This calculation adjusts the runway length by an additional 15 percent, or 7,000 feet in length (whichever is less).

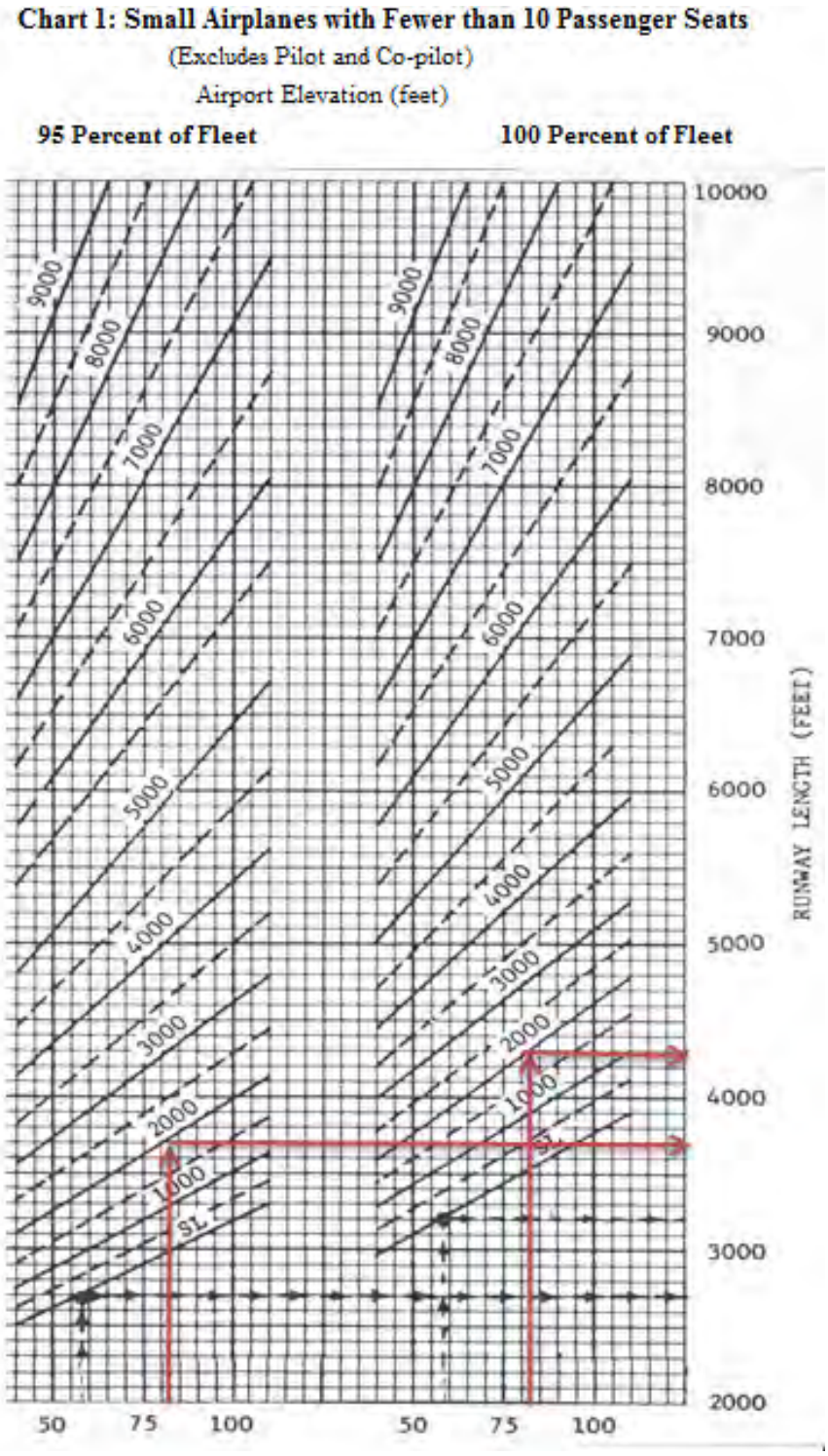
Figure 5 provides the performance charts used to determine the necessary runway length for both the existing and ultimate critical aircraft.

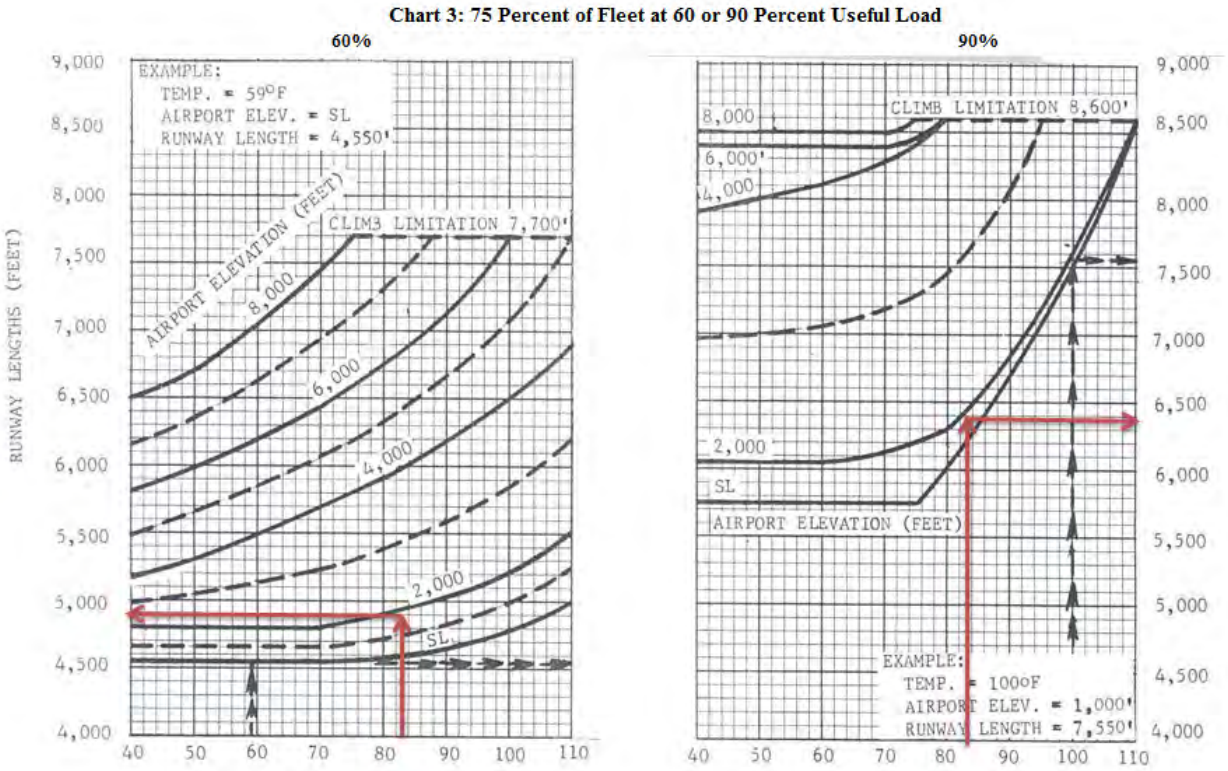
Table 4: Aircraft Fleet Mix (2013 Flight Aware Data)

Aircraft Type	Design Group	MTOW	2013 Flight Aware Operations
BeechCraft 1900*	B-II*	17,000*	2448*
Pilatus PC12	B-II	<12,500	603
Super King Air B200	B-II	<12,500	315
Cessna 402	B-I	<12,500	42
Super King Air B350	B-II	15,000	213
King Air C90	B-II	<12,500	88
Cessna 310	B-I	<12,500	104
Super King Air B300	B-II	14,000	71
Cessna 421	B-I	<12,500	57
Cessna Citation Excel	B-II	20,000	60
Citation 5 Ultra	C-II	16,000	65
Citation Mustang	C-I	<12,500	62
Cessna 340	B-I	<12,500	34
Cessna 404	B-I	<12,500	40

**Aircraft no longer provides commercial service to the airfield, and was not considered as the existing critical aircraft.*

Figure 5


Chart 1: Small Airplanes with Fewer than 10 Passenger Seats
(Excludes Pilot and Co-pilot)
Airport Elevation (feet)
95 Percent of Fleet
100 Percent of Fleet
9000
8000
7000
6000
5000
4000
3000
2000
1000
SL
10000
9000
8000
7000
6000
5000
4000
3000
2000
RUNWAY LENGTH (FEET)
50
75
100
50
75
100



Crosswind Runway

FAA guidance states that when the primary runway does not provide adequate wind coverage (at least 95% of the time for aircraft needing a crosswind on a regular basis), a crosswind runway may be justified. Since larger, heavier aircraft are less affected by wind, they require a crosswind runway less often than smaller, lighter aircraft. Different crosswind components (winds speeds) are used in the crosswind runway analysis for different aircraft. The FAA recommends that the criteria depicted in the table below be applied:

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

* Includes A-I and B-I small aircraft.

Runway Length Recommendation

The Sidney-Richland Municipal Airport has an existing Crosswind Runway 11/29. Evaluations of the Crosswind Runway 11/29 have indicated there is minimal room for a runway extension in either

direction. This is a product of airspace and land use constraints. Terrain off of Runway 11 causes concerns for airspace requirements, and the However, the existing length of 4,032 accommodates the existing critical aircraft (Pilatus PC-12). The Pilatus PC-12 requires a 3,700-foot runway length. **Figure 6** represents the chart utilized in calculating this runway length. 95 percent of fleet was utilized as a result of the airport not being located in a densely-populated area.

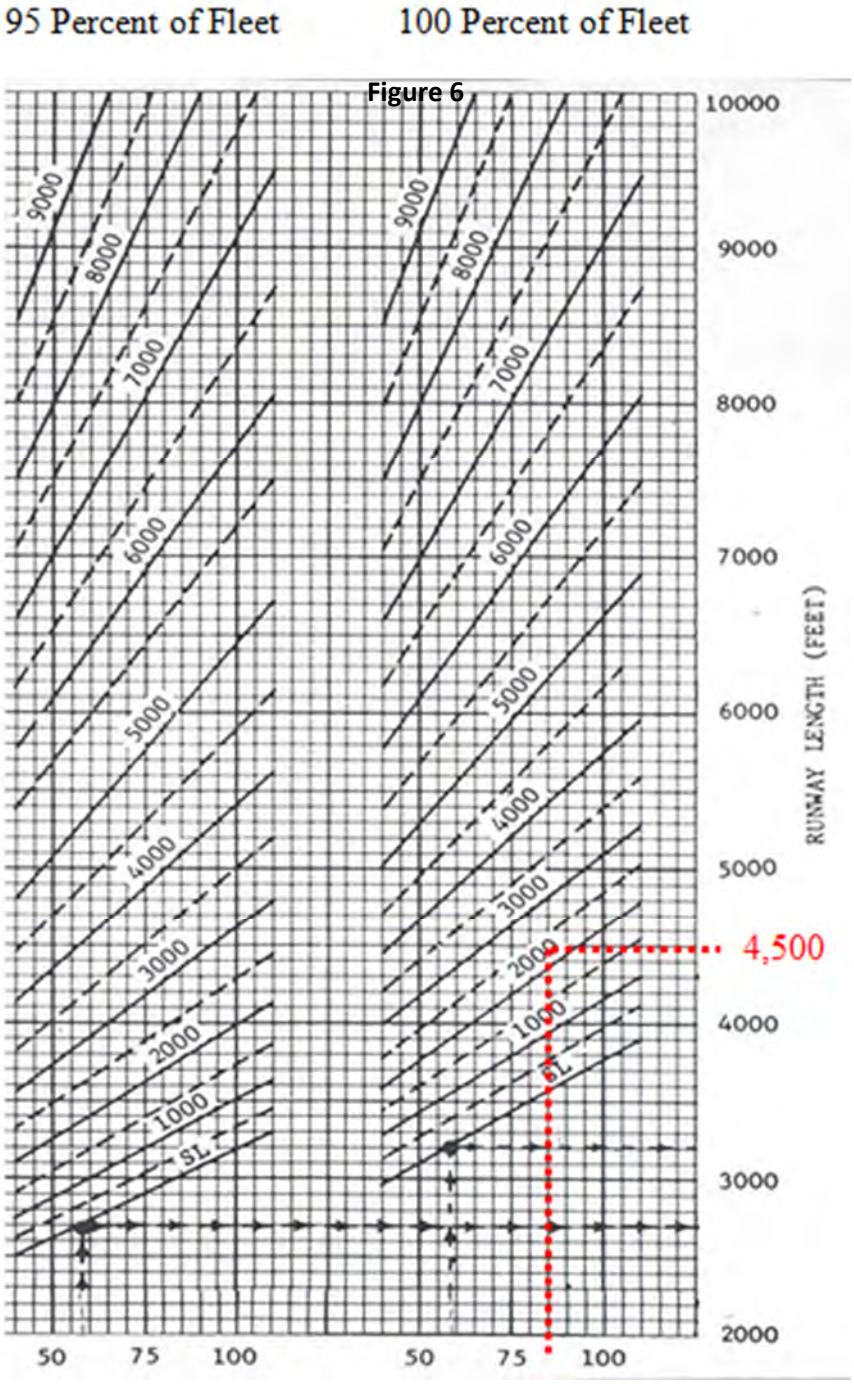


Figure 6

Appendix F - General Aviation & Other Facilities

While commercial service operations can easily be defined under *14 CFR Part 121, Air Carrier Certification*, general aviation covers a much broader portion of the aviation community. General aviation covers everything but commercial service and military activity. For the purpose of this appendix we will cover both General Aviation and Military activity. General aviation can include aerial application, medical, instructional, business, corporate, or personal aviation activity. These types of aeronautical activity serve the public in a capacity that may be less noticeable to the average citizen. Providing access for general aviation users can prove to be a vital asset to the communities the airport serves. This section contains information on general aviation as it pertains to a commercial service airport.

FBOs/General Aviation Terminal/Airport Businesses/Tenants

Background: Fixed-Base Operators (FBOs) serve the flying public with various amenities. They tend to be private companies that lease land from the airport, are suited to serve itinerant traffic but also serve based customers. The services they provide typically include fuel sales, aircraft rentals, aircraft storage, maintenance, flight instruction, pilot's lounge, major and minor maintenance, charter services, or hangar storage.

The general aviation terminal provides access to the airfield for airport users. This can be a separate building or within the Fixed-Base Operator (FBO) facility, and is usually separate from the commercial service terminal area. When an airport has multiple FBOs, each one typically provides a general aviation terminal facility. Amenities typically found in a general aviation terminal building include a pilot's lounge, restrooms, sleeping quarters, conference rooms, weather briefing capabilities, and vending machines.

Other tenants or businesses may be located on the airfield. These tenants could include, but are not limited to, Civil Air Patrol, flying clubs, or skydiving operations. Some of these tenants are known as Single Aeronautical Service Operators (SASOs). Sometimes known as "Special FBOs", SASOs are businesses on the airfield that provide a specialty service or focus (e.g., aircraft maintenance, skydiving, etc.). Refer to Advisory Circular 150/5190-7 *"Minimum Standards for Commercial Aeronautical Activities"* for additional information.

Existing: Sidney-Richland Municipal Airport has two Fixed-Base Operators on the airfield. Both facilities offer a terminal area for transient pilots and other services. These other services vary from fuel, aircraft charters or rentals, flight instruction, aircraft storage, maintenance, aerial tours, pilot lounges, internet, and restrooms.

Future: Based on discussions with the airport sponsor, there are concerns regarding the future expandability of the two FBOs. The existing footprint has limited space for additional hangar/structure growth, and was therefore evaluated in the master plan process. Alternatives were presented to the

sponsor on resolving this solution, and modifications were made to align itself with the vision of the airport. The result was a centrally-located alternative on the airfield, with an FBO lot. This planned FBO lot was added to the alternative so one or both of the existing FBO's could expand or relocate.

Ultimate: Ultimate planned development in this category would involve either FBO expanding on their facilities as demand warrants.

Cargo Operations

Background: Cargo operations are unique. Some cargo operations are based on larger aircraft that fly to an airport within a region, transfer packages to smaller aircraft, and those smaller aircraft then fly to smaller outlying communities. Smaller operations normally consist of smaller aircraft flying into the airport and transferring packages to and from trucks on the apron. Cargo operations occur during various times of the day, but typically occur rather quickly and all at once. The operations may occur out on the apron or through a building.

Existing: Existing cargo operations at the Sidney-Richland Municipal Airport include daily UPS service. This service is provided through Richland Aviation and their aircraft. FedEx also has expressed an interest in using the airfield, but does not provide regular service today.

Future: Per discussions with the sponsor, UPS operations are operating efficiently as they exist today. This existing operation is capable of meeting additional demand in the future. Should FedEx provide regular service to the area, the potential to lease hangar space exists. This hangar is identified on the east-side of the airfield, and is northeast of the existing Snow Removal Equipment (SRE) Building.

Ultimate: Ultimate cargo operations includes the planning and development of facilities near the centrally-located expansion alternative. Cargo facilities were identified near the beginning of the proposed ultimate airport access road. By doing so, larger cargo truck/van traffic will not have to drive deep into aviation traffic areas and will minimize vehicle congestion. The identified cargo operations area also allows those unfamiliar with an airport to drop off packages while minimizing the confusion of where to drive.

Aprons

Background: General aviation apron space can be utilized by either transient or based aircraft for overnight storage. When apron space is located in front of an FBO, typically there will be a small tiedown charge for overnight storage. However, at smaller airports with no FBO, overnight storage can sometimes be free. Apron space can also be used by an FBO to shuffle aircraft in and out of hangar storage.

Typically, aircraft apron storage is usually a function of the airport geographic location. In the winter months, if the airport is located in the northern regions of the country, most apron aircraft storage will be transient aircraft. Due to harsh weather conditions that can be present in colder weather climates, most based aircraft have enclosed hangar space for their aircraft. This can also be true for any other

type of severe weather climate. In extremely hot conditions, there may be less of a demand for apron space because based aircraft owners have a desire to store their aircraft in hangars for the shade in summer months. As a result, apron sizes may be smaller and utilized more frequently by transient aircraft.

Also, during adverse weather conditions, some commercial service airports utilize general aviation apron space for diverted commercial service aircraft. However, this is only possible if the airport has a runway capable of supporting such large aircraft.

Apron size requirements are typically driven by the most demanding aircraft (wingspan clearances) to utilize the space, as well as a function of how many aircraft will occupy the tiedown spots at any given time.

Existing: The existing apron space at Sidney-Richland Municipal Airport has about 31 tiedown spaces, and measures roughly 380 feet deep by 1,100 feet wide. Apron dimensions vary around the airfield, as the apron is not uniformly shaped. Per discussions with the sponsor, tiedown space does not pose concern in the existing or future timeframe. Different types of aircraft use the apron space, and vary from smaller GA traffic, to larger turbine-driven corporate traffic. The 2012 PCI report identifies the apron space to be deteriorating at a normal rate, and accommodates aircraft in the other-than-utility category. Please note the Airfield Pavement Appendix D for additional information on pavement.

Future: The existing apron area is limited on expandability. Moreover, expansion in the existing footprint has not been identified by the sponsor as a high-priority item. Future demands for apron include apron construction in the centrally-located portion of the airfield. As facilities relocate/expand to the center of the airfield, apron space will be planned for. This will accommodate additional growth, as well as allow transient aircraft to park close to newly-developed facilities (such as a relocated FBO).

Ultimate: Ultimate development of apron space will depend on increased demand of transient aircraft. However, the centrally-located alternative allows flexibility/expandability to allow for this increase in apron space.

Aircraft Storage

Background: General aviation aircraft storage is usually located in the same area as the general aviation terminal area. Storage can come from private hangar construction, nested t-hangars, or FBO hangar storage. Nested t-hangar units usually store smaller single or twin engine aircraft (when available at an airport). Private hangar construction can vary in size and shape, from small square hangars to larger corporate hangars, and are capable of storing multiple aircraft. Hangars may be constructed by the airport or by private companies or individuals who lease airport property for a specific lease term.

Demand for hangar space for based aircraft varies and is usually influenced by the geographic location of the airport. If it is in the northern portion of the country, there may be a higher demand for hangar space than apron space. This is due to the adverse weather conditions in winter. These conditions can be hazardous to aircraft when left outside for longer periods of time. This can be true for other types of

severe weather. In extremely hot conditions, there may be a higher demand for hangar storage/shade in the hot summer months.

Sometimes, aircraft owner/operators store their vehicles inside the hangars while operating their aircraft. While this type of storage is permissible, other non-aeronautical storage is not. It is important that the airport be aware of any non-aeronautical uses of hangars on their airfield. Non-aeronautical uses can affect the airport's ability to receive federal funding (under AIP grant assurances). It is imperative that the airport evaluates existing, future, and ultimate hangar uses/leases and ensures hangar usage is for aeronautical purposes.

Existing: Aircraft storage at the Sidney-Richland Municipal Airport is at or near capacity. Expanding hangar space off of the existing terminal area is not likely. Per discussions with the sponsor, the airport has multiple aircraft owners interested in basing their aircraft at SDY. Since the demand exceeds what is available, alternatives were explored to accommodate these aircraft owners. These aircraft owners range from general aviation, to corporate traffic.

Future: Additional hangar space was identified in the centrally-located alternative. This alternative plans for an initial build of corporate hangar lots, as well as smaller general aviation hangar lots.

Ultimate: Ultimate hangar development will expand upon what is initially constructed in the center portion of the airfield.

Vehicle Parking

Background: Generally speaking, vehicular parking for general aviation amenities are located in the same area as the aircraft. Fixed-Base Operators (FBOs) usually have their own parking, as do terminal buildings. General aviation hangar tenants typically drive their vehicle up to their hangar and often store in the hangar (when the aircraft is in use).

Existing: The existing terminal area has one parking lot, and has roughly over 100 spaces available for public use. This parking lot is used for both FBOs, the commercial terminal area, and general aviation fliers. Because the parking lot serves as multi-purpose, parking is limited and often at capacity. Moreover, the sponsor has expressed that oil-workers from the Bakken Oil-Shale often park their vehicles for an extended period of time. While these oil-workers are a part of Sidney-Richland Municipal Airport's flying public, these vehicles occupy spaces for a longer time frame and decreases available space for others to use.

Future: There are no short-term plans for parking. Some of the other short-term alternatives, like relocating an FBO or adding hangar-space in the central-portion of the airfield, will alleviate some of the parking issues noticed by the airport.

Ultimate: The existing terminal area has limited to no expandability for parking. As a result, ultimate plans have been identified to relocate the commercial service terminal to the center of the airfield. While this relocation is the result of limited building expandability, it also creates space for additional

parking. By relocating the commercial service terminal building, FBO and other airport users will have additional parking in the existing location. Moreover, the commercial service terminal building will have parking dedicated to commercial service users, as well as the ability to expand their parking according to growth and increased demand.

Appendix G – Support Facilities

General Description

The support facilities at an airport are an integral element of the airport, enabling it to safely serve certain sizes of aircraft, types of service (e.g. passenger airlines), and to do so in all types of weather conditions. These do not all need to be connected directly to the airfield but Must be located appropriately to meet the needs they are intended to fill. For example, the airport offices will need vehicle access for the general public while firefighting will need to have quick access to the airfield. These support facilities and their status at Sidney-Richland Municipal Airport are outlined in this appendix.

Aircraft Rescue and Firefighting (ARFF)

The Aircraft Rescue and Firefighting (ARFF) services at the Sidney-Richland Municipal Airport are provided by Sidney Volunteer Fire Department. These first responders would respond using the airport owned ARFF truck (2008 Rosenbauer Airwolf Class II ARFF). This truck is stationed in the airport's maintenance building. Airports provide ARFF as required by the FAA based upon accommodating passenger service airlines with seating of at least 10 passengers. In accordance with Federal Aviation Regulation (FAR) Part 139 *Certification of Airports*, an acceptable ARFF response time requires the airport to have sufficient apparatus meeting the applicable index proceed to the mid-point of the furthest runway and begin delivering an extinguishing agent in no more than 3 minutes from the time of the call for the first responding vehicle, and 3.5 minutes for the second vehicle (if applicable). The ARFF index is based upon having 5 or more average daily departures of aircraft with a certain fuselage length. These Indices are as follows (refer to CFR Part 139.315-317 for details:

Index A – aircraft less than 90 feet (Beech 1900, Embraer 120, Bombardier CRJ200, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 100 gallons of Water mixed with Aqueous Film Forming Foam AFFF carried on 1 vehicle.

Index B – aircraft at least 90 feet but less than 126 feet (Bombardier Q400, CRJ700, Embraer 145, 175, 190, CRJ 700, DC-9, Airbus A319, Boeing 737-700, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 1,500 gallons of water with commensurate quantity of AFFF carried on 1 or 2 vehicles.

Index C – aircraft at least 126 feet but less than 159 feet (Boeing 737-800, 757-200, Embraer 195, MD-80, Airbus A321, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 3,000 gallons of water with commensurate quantity of AFFF carried on 2 or 3 vehicles.

Index D – aircraft at least 159 feet but less than 200 feet (Airbus A330, Boeing 757-300, 767-300, 787, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 4,000 gallons of water with commensurate quantity of AFFF carried on 3 vehicles.

Index E – aircraft at least 200 feet (Airbus A340, Boeing 747, 777, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 6,000 gallons of water with commensurate quantity of AFFF carried on 3 vehicles.

The airport maintains an index level of A with the equipment listed in Table 1.

Table 1 ARFF Equipment

Location	ID	Type	Make / Condition	Water (gallons)	AFFF (gallons)	Dry Chemical (pounds)	Halon (lbs)	Status
Sidney	SDY	Rosenbauer	Airwolf ('08)	500	60	500	N/A	Operational

Source: http://www.rosenbaueramerica.com/stock/detail/?id=46

In order to meet the Index A requirements of the airline schedules, the Sidney Volunteer Fire Department has an agreement with the airport to provide service as required. Because the airport holds a Class III certificate, the airport can write an agreement with a fire department off of the airfield. Per *FAA CFR Title 14, Chapter 1, Subchapter G, Part 139, Subpart D, 139.315(e):*

"A holder of a Class III Airport Operating Certificate may comply with this section by providing a level of safety comparable to Index A that is approved by the Administrator. Such alternate compliance Must be described in the ACM and Must include:

(1) Pre-arranged firefighting and emergency medical response procedures, including agreements with responding services
(2) Means for alerting firefighting and emergency medical response personnel
(3) Type of rescue and firefighting equipment to be provided
(4) Training of responding firefighting and emergency medical personnel on airport familiarization and comMunications"

The staff maintains training through annual tabletop training exercises, and hands on training every 36 calendar months in order to maintain compliance with FAR Part 139. In addition, the airport has an emergency plan referred to as the Airport Emergency Plan (AEP) which serves as a guiding tool for the airport to outline how it will respond to different types of emergencies and what support entities exist at the airport and in the comMunity to support these responses.

Additional information regarding ARFF can be found in the following advisory circulars:

150/5200-31C Airport Emergency Plan
150/5210-15A Aircraft Rescue and Firefighting Station Building Design
150/5220-10E Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles

Currently, the 2008 Rosenbauser ARFF truck meets the needs of the airport. Any additional/future ARFF equipment and facility needs are included in the airports Capital Improvement Plan included in this Master Plan.

Snow and Ice Control

Snow and ice control for an airport is one of the most critical components to ensure all weather access to a comMunity. The FAA provides guidance for airports in determining the amount of equipment an airport needs and the size and layout of buildings to house the equipment. This guidance is found in three Advisory Circulars 150/5200-30C Airport Winter Safety and Operations; 150/5220-18A Buildings for Snow and Ice Control Equipment; and 150/5220-20 Airport Snow and Ice Control Equipment. An airport can determine the amount of equipment needed using the tables and information in AC 150/5220-20 and determine the size of building(s) using AC 150/5220-18A.

Priority 1 Area

The FAA emphasizes the clearance of Priority 1 areas as defined by AC 150/5200-30C. The Priority 1 areas include the primary runway(s), taxiways and aprons serving commercial service aircraft, as well as ARFF station(s), Mutual aid access points and emergency service roads. Priority 1 areas for FAA calculation purposes do not include entrance roads, parking, and other landside needs in the airline terminal or general aviation areas. To meet the needs of passengers, there are 'landside' areas that the airport will categorize as Priority 1 and it will be necessary to have sufficient equipment and personnel to clear these areas as well in a timely manner. The last areas, commonly referred to as Priority 2 are the other areas on the airfield such as crosswind runways, general aviation areas, additional taxiways, and the remaining landside areas. The same staff and equipment used on the Priority 1 areas will redirect their efforts to Priority 2 areas as soon as they are able. Some airports may further subdivide areas, other than Priority 1, into Multiple tiers of priorities (IE priority 3, 4, etc.). However, as indicated previously, only airside Priority 1 areas are used in the FAA prescribed calculations for equipment. Sidney's Priority Areas are listed in the table below:

Table 2 Existing Priority Areas and Square Footage by Location

Surface Type	Priority 1 SF	Priority 2 SF	Priority 3 SF
Runway 01/19	**570,500**	-	-
Runway 11/29	**-**	402,517	-
Emergency Facilities	**57,575**	-	-
Taxiways	**393,250**	36,279	-
Apron	**165,750**	139,386	211,394
TOTAL	**1,187,075**	578,182	211,394

Clearance Requirements

Once the amount of Priority 1 area is determined, the airport uses the guidance for clearance times found in AC 150/5200-30C, summarized in Table 2 and equipment calculations in AC 150/5220-20 to determine the amount of equipment needed.

Table 3 Clearance Times for Commercial Service Airports

Annual Airplane Operations (includes cargo operations)	Clearance Time (hours)
40,000 or more	½
10,000 but less than 40,000	1
6,000 but less than 10,000	1 ½
Less than 6,000	2
General: Commercial Service Airport means a public-use airport that has at least 2,500 passenger boardings each year and that receives scheduled passenger airplane service. These airports should have sufficient equipment to clear 1 inch of falling snow weighing up to 25 lb/ft^3 from Priority 1 areas within the recommended clearance times.	

Source: FAA AC 150/5200-30C Table 1-1

Snow Removal Equipment (SRE)

Sidney-Richland Municipal Airport has the following SRE equipment listed in Table 3 to handle snow and ice control.

Table 4 Snow and Ice Control Equipment – Current & Recommended

Make/Model	Plow Size (feet)	Broom Size (feet)	Rotary Plow (tons/hour)	Year
Tractor - CASE III/MX210				
Front End Loader – CAT/962G				
Rotary Broom – Sweepster/28-4253				
Snow Blower – Kodiak/LMSC4448-120				
Front End Loader – Caterpillar/LMSC4448-120				

Source: Sidney-Richland Municipal Airport Certification Manual (ACM)

The FAA allows federal funding to be used to acquire SRE based on the Priority 1 Areas and Clearance Times. Based on current FAA policy, general aviation airports may use federal funding to acquire only one piece of equipment. For airports with scheduled airline service, more equipment can be funded. Any SRE acquired with federal funding Must principally be used for snow and ice control. Any other use Must be in compliance with FAA policy.

SRE Plan and Reporting

The Sidney-Richland Municipal Airport has a Snow and Ice Control Plan (SICP) that includes information on all equipment, staff, and procedures the airport follows to handle snow and ice events. The airport is also required to consistently report the current airfield conditions to the FAA so that pilots can make informed decisions on using the airport. This is done by the airport's operations staff who provides Notices to Airmen (NOTAMs) through the FAA.

The airport uses equipment such as runway surface sensor systems, decelerometers, and/or continuous friction measuring equipment in order to assess the field conditions, carry out snow/ice control, and accurately report current conditions. These items are described as follows:

- Runway Surface Sensors – this is a package of sensors located on the runway that can detect current pavement conditions and ground temperature at specific locations. This tool is used by airport operations along with weather forecast information to determine how to best treat the snow and ice conditions in order to maintain airport safety. At this time, the Sidney-Richland Municipal Airport does not have an existing runway surface sensor system in place.
- Decelerometers – this is a device used in a vehicle to measure the rate of deceleration. It is used to determine the current braking action conditions. Typical decelerometer operation consists of the using the vehicle's brakes/brake pedal. By stepping on the brake, the computer measures how well the tires stop. The computer then averages the readings that were taken and spits out a M_u value. These conditions are then reported through the NOTAM system as M_u readings.
- Continuous Friction Measuring Equipment (CFME) – this is a device used in or with a vehicle that provides a measurement of runway friction with any type of contaminant including rubber deposits. Typical CFME's consist of a fifth wheel under a vehicle that continuously monitors pavement friction. The conditions are then reported through the NOTAM system as M_u readings.

The M_u that is noted above is the measure of friction and ranges from 0 to 100 with 0 equating to no traction. When the M_u measures less than 40, airports are required to report this through a NOTAM. M_u values only reported on surfaces that are used by commercial service aircraft. Surfaces on the airport (runways, taxiways, aprons, etc.) used exclusively by general aviation are reported with braking actions noted as good, fair, poor, and nill (*with no M_u* value). Per FAA guidelines, when the M_u measures less than 26, corrective action must be taken which is usually prescribed in the airport's Snow and Ice Control Plan. However, airports can adjust when they take corrective action in their SICP by increasing

the M_u value (27 or higher), as long as it is more restrictive than FAA guidelines. Treatment can include clearing, chemicals, sand (meeting FAA size requirements), etc.

SRE Storage Building(s)

Sidney-Richland Municipal Airport stores and maintains the snow and ice control equipment and material in the airport maintenance building. This building has been efficient in running both ARFF and SRE storage and operations, and accommodates the needs of the airport at present and through the planning period.

Any additional information regarding future Snow Removal Equipment or SRE storage needs are included in the airport's Capital Improvement Plan included in this Master Plan.

Airport Operations

Whether operating as a general aviation airport or as a commercial service airport licensed by FAR Part 139, each airport is a conglomeration of infrastructure, buildings, property, and services that are used daily by the flying public. Behind the scenes of the airport, there is a mixture of staff, contractors, and tenants who keep things running. The focus of this section is on how the airport oversees and directs the behind the scenes support for facilities that the airport maintains, not including tenant-maintained facilities. Sidney-Richland Municipal Airport operations are conducted through the airport's most recent Airport Certification Manual (ACM) and is in-line with Part 139 operating requirements.

Facilities

The airport staff occupies the airport's commercial service terminal, as well as the maintenance building. The existing facilities have met the needs of the airport and current operations today. As the airport grows, and realizing its location to the Bakken, this airport may need to explore options to accommodate additional operations facilities in the future. This flexibility has been built in to the preferred airside alternative identified in this master plan.

Facility needs are included in the airport's Capital Improvement Plan included in this Master Plan.

Other Buildings

Other buildings on the airfield consist of two Fixed-Base Operators (Richland Aviation and Sidney Air Service) and provide a variety of services. These services include fueling, aircraft sales, charters, hangars, flight training, aircraft rental, aircraft maintenance, aircraft tiedown spots, pilot supplies, and courtesy transportation.

Fueling Operations

In order to support the activities at the airport, there is a need to store and deliver fuel to aircraft and ground vehicles. These facilities can be owned by the airport or private entities. Even if the facility is owned by the airport, it is common for the airport to lease the fuel facilities to an FBO.

Aircraft Fueling

Sidney-Richland Municipal Airport has two FBOs providing fuel service on the airfield. Richland Aviation has an above-ground storage facility that contains 10,000 gallons Jet-A, and 22,000 gallons of 100LL. Sidney Air Service provides 100LL fuel service with an underground storage tank, and contains 12,000 gallons. Table 4 provides a detailed listing of fueling facilities at the airport. This listing includes fuel facilities for self-fuelers in addition to fuel dispensed to the public. Self-fuelers are people/companies who have chosen to fuel their own aircraft and have constructed their own facilities and use these facilities with only their own personnel and only on their own aircraft. In addition to fuel storage tanks, fuel trucks are required to dispense fuel around the airport where aircraft are parked. Table 5 provides a listing of fuel trucks at the airport for servicing aircraft, including those used by 'self-fuelers' and not dispensing to the public.

Table 5 Aircraft Fueling Facilities

Location	Fuel Type	Capacity (gallons)	Above /Under Ground	Self-Fueling Pump	Use / Condition	Owner
Richland Aviation	100LL	22,000	Above	N*	FBO	Richland Aviation
Richland Aviation	JetA	10,000	Above	N*	FBO	Richland Aviation
Sidney Flying Service	100LL	12,000	Under	Y	FBO	Sidney Flying Service

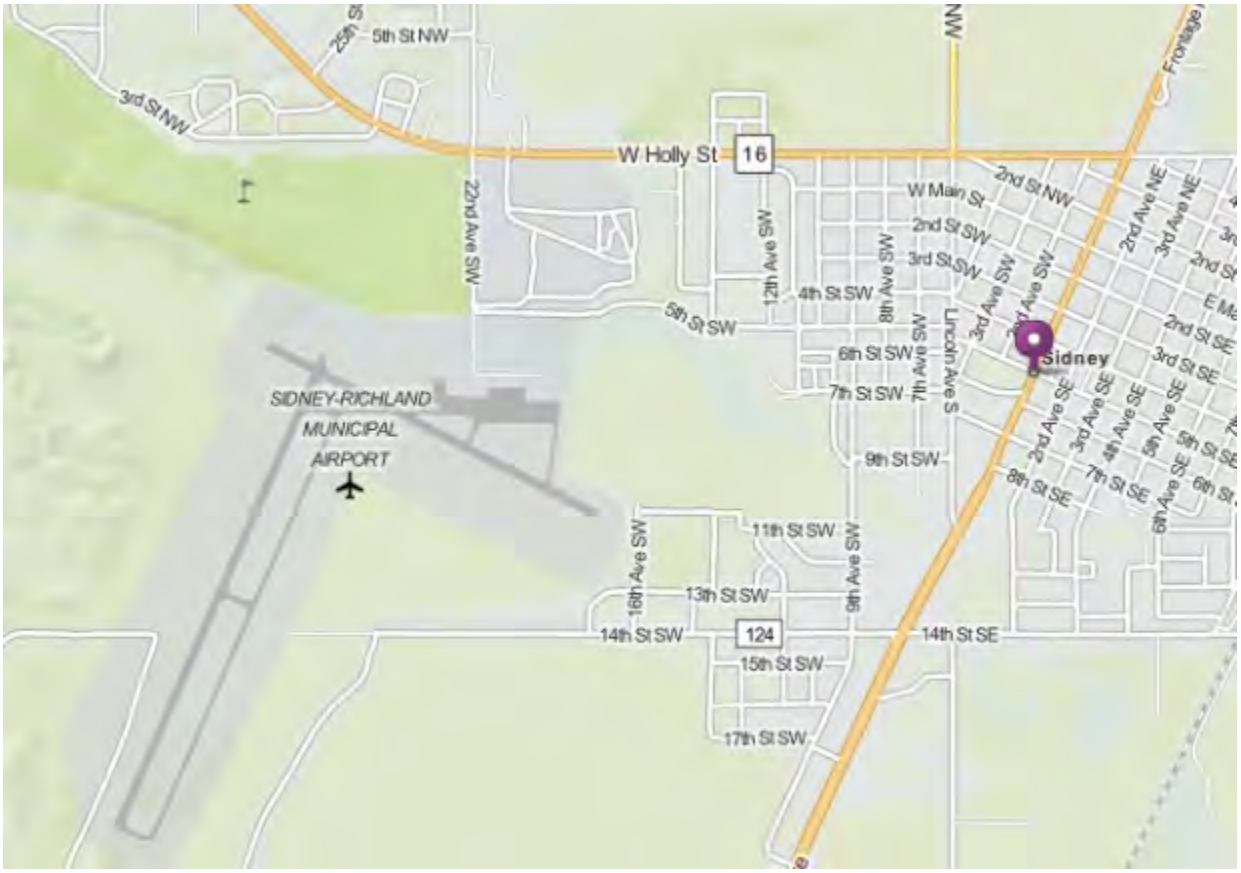
Source: Sidney-Richland Municipal Airport Authority

**Fuel service provided with fuel trucks*

Fuel facility needs are included in the airports Capital Improvement Plan included in this Master Plan.

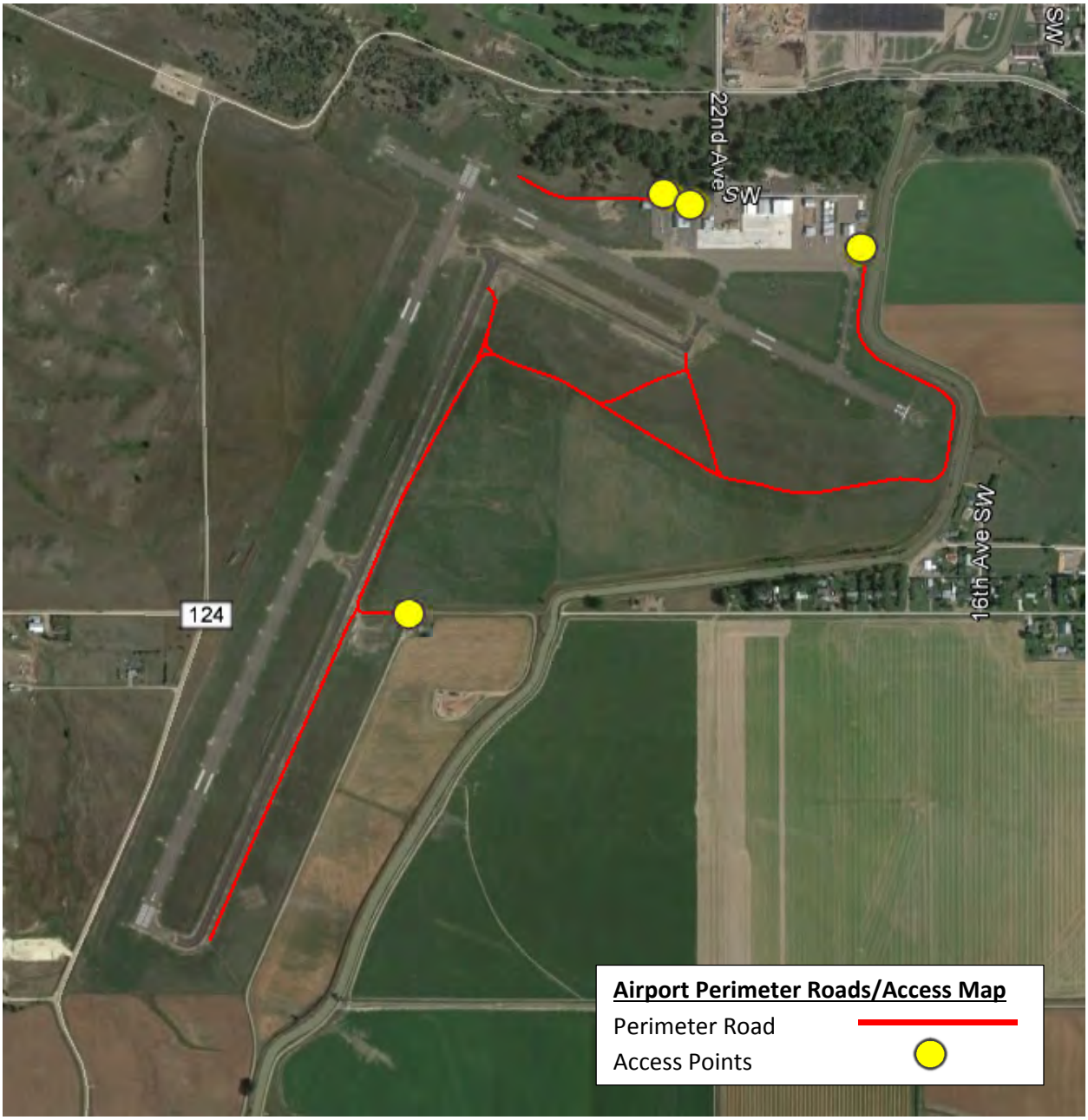
Ground Access

The airport provides the air accessibility for the community but once an aircraft arrives, its passengers and cargo rely upon the airport's connectivity to the road network to get to their final destination. Sidney-Municipal Airport is connected to Sidney by 22nd Ave SW. The airport is closest to Highway 16 (W. Holly Street) which is 1 mile away.



Inside of the airfield, there is a need for vehicles to move around without impeding aircraft movements. This includes FAA NAVAID maintenance, airport maintenance, airport operations and others. Airport perimeter roads provide a means for vehicles to move around the airport in all weather conditions and not impede aircraft movement or landings and takeoffs. In order to allow all-weather operation of the airfield, the roads should be clear of all protective areas on the airfield. Depending upon the amount of use, these perimeter roads may be paved or unpaved and may be needed to support equipment as large as ARFF and SRE equipment. When an unpaved surface is used, it is recommended a 'lead-in' portion of pavement be constructed within 300 feet of any taxiways, aprons, or runways to eliminate any debris from being tracked onto the aircraft movement areas.

Since the airport perimeter road is interior to the airfield, it is imperative that appropriate security measures such as gates and limited access points be established to restrict access to only those persons with a need and sufficient training to be inside the airfield.



Fencing/Security

Sidney-Richland Municipal Airport has a perimeter fence that currently meets the needs of the airport. This fence provides security for the airport, as well as wildlife mitigation to enhance airfield safety and limit access to only those who have need or permission to use the airfield. The fencing and gate access is maintained and operated by the airport staff.

Appendix H – Navigational Aids

Introduction

This appendix discusses the existing and required airport navigational aids (NAVAIDs) at the Sidney-Richland Municipal Airport. NAVAIDs are any ground or satellite based electronic or visual device to assist pilots with airport operations. They provide for the safe and efficient operations of aircraft on an airport or within the vicinity of an airport. NAVAID types at or near the airport evaluated in this appendix include:

- Area Navigation
- Runway Approach
- Airfield Visual
- Meteorological
- Communications

The type of NAVAIDS required on an airport are determined by FAA guidance based on an airport's location, activity and usage type. Available FAA guidance can be found by reviewing the latest Advisory Circulars, Handbooks and Orders.

Area Navigation NAVAIDs

There are several different types of ground and/or satellite based NAVAIDs that provide guidance to aircraft in the air. The FAA owns and maintains the majority of the navigational aids in the United States; however, some are owned and maintained by state or local agencies. En-route NAVAIDs provide navigation assistance to aircraft along a route of flight.

The FAA is updating the nation's air transportation infrastructure through the Next Generation Air Transportation System (NextGen) program. New procedures and technology are to be implemented to improve the efficiency and safety of the national air transportation system. For area navigation, satellite-based NAVAIDs will primarily be used for air navigation with ground-based NAVAIDs used for secondary purposes. Other initiatives include implementing a new surveillance technology for tracking aircraft known as Automatic Dependent Surveillance-Broadcast (ADS-B) to improve position accuracy reporting and supplement ground radar data for air traffic control.

The following Area NAVAIDs are used by aircraft in and around the Sidney-Richland Municipal Airport.

Global Positioning System (GPS)

GPS is a ground and satellite-based navigation system comprised of a network of satellites that transmit radio signals to provide triangulation to ground or air based receivers. Through this triangulation, longitude, latitude, altitude and speed can all be determined. A GPS procedure uses area navigation (RNAV) to help aircraft navigate on a horizontal course through pre-defined GPS waypoints. A series of ground-based transmitters, known as Wide Area Augmentation System (WAAS), enhances the precision of this system allowing receivers

to accurately determine the position of a vehicle within a few horizontal and vertical feet of actual location. This enables precision-like approaches with vertical and horizontal guidance to a runway end. GPS, RNAV and WAAS are used by equipped aircraft for en-route and approach navigation and are widely available for navigation throughout the contiguous United States. This new technology is allowing required navigation performance (RNP) procedures to be developed with three-dimensional waypoints. Future development of Local Area Augmentation System (LAAS) may provide even higher accuracy requirements.

Very-high Frequency Omni-directional Range (VOR)

A VOR is a ground-based NAVAID used for en-route and approach course navigation. The radio beacon has the longest range of currently utilized ground based NAVAIDs. Aircraft can navigate to and from this beacon using compatible airborne receivers to receive the radio signals. It gives pilots a direct indication of bearing relative to the facility. With VORs that are collocated with distance measuring equipment (DME), certain aircraft navigation radios can triangulate the signal between several different VOR/DME stations to choose a direct course of flight on a desired heading. The widespread use of satellite based GPS technology has caused FAA to review decommissioning a large portion of existing VORs.

There are no existing VOR facilities on the airfield at SDY. Moreover, VORs are not used for approaches at SDY.

Distance Measuring Equipment (DME)

DME is usually co-located with another ground-based facility such as a VOR or Instrument Landing System (ILS). DME propagates radio signals that are captured by on-board equipment to determine slant range distance measurement to the station, measured in nautical miles. DME is an alternate source for distance measurements for GPS.

A DME does not exist at Sidney-Richland Municipal Airport, and DME is not used for approaches to the airport.

Non-Directional Beacon (NDB)

This beacon is one of the oldest types of navigational technology still used in aircraft navigation. A NDB is simply a low power AM radio station. Aircraft have equipment called Automatic Direction Finder (ADF) which allows the aircraft to tune into the frequency that the NDB is transmitting, and a dial that points a needle to the location of the NDB. NDBs are subject to lightning, precipitation static, and other disturbances that may result in erroneous navigation information. As a result of this and their replacement by GPS, NDB facilities are being decommissioned by FAA. When the NDB is installed in conjunction with an ILS (Instrument Landing System) marker, the NDB is called a locator outer marker (LOM).

Sidney-Richland Municipal Airport has an existing NDB approach for both Runway 1 and 19 ends. This is not the airport's primary approach navigation system.

Radar

An Airport Surveillance Radar (ASR) facility provides primary and secondary surveillance radar to air traffic controllers to detect the position of aircraft within the surrounding terminal

airspace, generally within 60 miles. Select civilian facilities operating ASR-8 and -9 facilities are being upgraded to a newer ASR-11 digital system compatible with ADS-B as part of the FAA's NextGen initiative. Long-range radar, known as Air Route Surveillance Radar (ARSR), provides coverage over 200 miles from the radar site for air traffic controllers responsible for large areas of airspace. Over time, ASR and ARSR will be replaced by the use of ADS-B technology as identified in FAA's NextGen implementation plan.

The closest RADAR facility to Sidney-Richland Municipal Airport is an ARSR-4, and is located in Watford City, ND (Roughly 60 driving miles). There is no ASR serving the area at this time.

Recommendations

Through the planning cycle at SDY, the airport should plan for the decommissioning of the NDB system on the airfield. The FAA feels this type of equipment is outdated, and may discontinue funding the maintenance/up-keep of this equipment.

Runway Approach NAVAIDs

Other NAVAIDs are developed specifically to provide "approach" navigation guidance, which assists aircraft in landing at a specific airport or runway. These NAVAIDs are electronic or visual in type.

Instrument Landing System (ILS)

An ILS is a ground-based system that provides precision instrument guidance to aircraft approaching and landing on a runway. ILS approaches enable a safe landing in Instrument Meteorological Conditions (IMC) with low cloud ceiling and/or visibility. An ILS operates through emitting radio beams that define the horizontal and vertical path to the runway landing threshold. Horizontal guidance is available up to 18 nautical miles and vertical guidance available up to 10 nautical miles from a runway end. Major components of ILS include:

- Localizer (LOC) antenna emitting a lateral signal providing pilots with horizontal position information relative to extended runway centerline
- Glide Slope (GS) antenna emitting a glide path (typically 3 degrees) providing pilots with vertical guidance information relative to the runway landing threshold.
- Inner Marker (IM) and/or Middle Marker (MM) and Outer Marker (OM) beacons notifying pilots at critical points along the approach with an aural signal. IMs are only used for Category II and higher ILS systems.
- Locator Outer Marker (LOM) is co-located with an NDB and identifies the point on the final approach course that the aircraft intercepts the glide slope and may begin descent to the runway.
- Approach Lighting System (ALS) visual aid providing high intensity visual lighting array.

The FAA in the middle of decommissioning ILS marker beacon systems and is moving to replace these and NDB-based markers with GPS fixes.

There are three categories of ILS systems, each capable of supporting approaches in equipped aircraft with lower weather minimums. Each category also requires an increasing complexity of airport equipment as well as aircraft and flight crew certifications.

Exhibit AX-5 – Standard ILS Categories

Standard ILS Categories		
ILS Category	**Decision Height (ft.)**	**Runway Visual Range (ft.)**
Category I	200	2,400/1,800
Category II	100	1,000
Category IIIa	0-100	700
Category IIIb	0-50	150
Category IIIc	0	0

Source: FAA Aeronautical Information Manual

Currently, SDY does not have an ILS located on the airfield. The nearest airport, with an ILS, is Sloulin Field in Williston, ND. This ILS (Runway 29) has approach minimums down to 200 ft and ½ mile visibility.

Visual Guidance Slope Indicator (VGSI)

A VGSI system provides visual descent guidance to aircraft on approach to landing. There are several types of VGSI systems available. Examples include a Precision Approach Path Indicator (PAPI) system and a Visual Approach Slope Indicator (VASI). Each system directs beams of red and white light along the approach glide path set at different locations and/or angles to provide pilots with a visual indication of the aircraft's position relative to the designated approach slope for a runway. VGSI systems have a five mile range during the day and a 20 mile range at night. These systems are typically installed on runway ends with instrument approaches, but are also installed for visual runways. PAPI systems, a newer technology, consist of 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 approach path to the runway.

Per the most recent FAA Airport 5010 Report, the Sidney-Richland Municipal Airport has Precision Approach Path Indicators (PAPIs) on all four runway ends. The classification of these PAPI systems are P2L, as a result of their system having two lights for each system.

Runway End Identifier Lights (REIL)

REILs consist of high-intensity flashing white strobe lights located on the approach ends of runways. These lights are aimed directionally into the approach zone of aircraft to assist the pilot in early identification of the runway threshold at night or in poor visibility conditions. Additionally, these are typically installed on runways that are surrounded by a preponderance of other lights or if the runway lacks contrast with surrounding terrain. REILs are unidirectional for the designated runway approach or omnidirectional to provide good circling guidance.

Per the most recent FAA Airport 5010 Report, the Sidney-Richland Municipal Airport has REILs on the Runway 1 and Runway 19 approaches. There are no REILs for the crosswind Runway.

Approach Lighting System (ALS)

ALS are required for runway ends which have published precision instrument approach procedures and these systems help pilots transition from instrument flight to visual flight for landing. The ALS extends beyond the approach end of the runway to provide a lighted "lead-in" for pilots to the runway threshold to transition from reference to instruments to a visual landing. There are various configurations, lighting types and complexities of these systems. The requirement for an airport runway end is dependent upon the type of precision approach and visibility minimums of the approach. Common types of ALS include:

- Omnidirectional Approach Lighting System (ODALS) consisting of seven omnidirectional sequenced strobe lights along runway approach centerline providing visual guidance to non-precision runways.
- Medium-intensity Approach Lighting System with Sequenced Flashing Lights (MALSF) is a system of seven rows of lights, three flashing lights and a row of steady burning green lights prior to runway threshold. The system is 1,400 feet in overall length.
- Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) consists of seven rows of lights, five flashing lights and a row of steady burning green lights prior to runway threshold. The system is 2,400 feet in total length and is commonly used for Category I precision approaches.
- Approach Lighting System with Sequenced Flashing Lights (ALSF) is a more complex lighting system used for Category II or III precision approaches. The system includes a green threshold bar, 15 total rows of white lights, nine side rows bars along centerline, and sequenced flashing white lights.

SDY does not have an existing approach with an ALS.

Recommendations

Because Runway 1 is used the most frequently, an ALS is recommended in the ultimate planning period. Typical triggering events for an ALS would be when 1) approach minimums decrease and it is required or 2) weather historically starts to cause issues with aircraft using the airfield.

For approach minimums to justify an ALS, minimums must decrease to below ¾ mile. This would require the need for implementing an ALS. However, an ALS can aid in lowering approach minimums from 1 mile to greater than ¾ mile. With the existing approach minimums being 1 mile, it is recommended an Omni-Directional Approach Lighting System (ODAL) be planned for

Airfield Visual NAVAIDs

Visual NAVAIDs provide airport users with visual references within the airport environment. They consist of lighting, signage and pavement markings on an airport. Visual NAVAIDS are necessary airport facility components on the airfield, promoting enhancing situational awareness, operational capability and safety.

Airport Beacon

An airport beacon is rotating light that projects a beam of alternating green and white light which appears as a series of flashes to approaching pilots. The airport beacon serves as the airport identification light so approaching pilots can identify the airport location during night and instrument flight rule conditions. The beacon is known to be visible from 40 miles away at night. The brightness or intensity of beacons can vary by airport. The intensity is dependent upon the amount of ambient light present in the area at night and the runway lighting system installed.

The Sidney-Richland Municipal Airport has an airport beacon located near the existing commercial service terminal area. This beacon flashes green & white, and signifies a civilian airport.

Runway Lighting

Runway edge lights are placed off the edge of the landing surface of a runway. The lights help pilots define the edges and end of the runway during night and low visibility conditions. These lights are spaced at equal distances along a runway, and perpendicular from side to side of a runway. These lights are generally white in color. The runway end lights appear red to a pilot approaching the end of the runway, and green as aircraft approach the runway from the air. Instrument runways have a row of eight lights at the end of a runway while visual runways have four. For medium and high intensity systems, the last 2,000 feet of each runway with instrument approaches have amber lights to caution pilots that the end of the runway is approaching. The light intensity can be adjusted by use of a radio controlled switch (pilot controlled lighting) on an airport frequency or manually by airport attendants and/or air traffic controllers. Runway lights are classified according to the intensity of light they produce:

- High Intensity Runway Lights (HIRL) are generally installed on precision instrument runways
- Medium Intensity Runway Lights (MIRL) are installed on visual or non-precision instrument runways
- Low Intensity Runway Lights (LIRL) installed on visual runways at small airports

SDY has MIRL systems for both Runway 1/19 and 11/29.

Other runway lights are installed at airports to facilitate the safe and efficient operation of aircraft. These include:

- Runway Centerline Lighting (RCL) are flush-mounted in-pavement lights placed at 50 foot intervals along the runway centerline. The lights are white in color except for the last 3,000 feet of runway to warn pilots of the impending runway end.
- Touchdown Zone Lighting (TDZE) consist of in-pavement unidirectional white light bars installed to indicate the touchdown zone, typically the first 3,000 feet of runway.
- Land and hold short lighting systems (LAHSO) consist of a row of at least six in-pavement unidirectional pulsing white lights across a runway to designate a hold-short point from another crossing runway, taxiway or other predetermined point.

- Runway Status Light (RWSL) system is typically an FAA owned and operated system to prevent runway incursions. The system consists of Runway Entrance Lights (RELs) located along taxiway centerline between the runway holding points, Takeoff Hold Lights (THLs) along the runway to indicate the runway is unsafe for takeoff, and Runway Intersection Lights (RILs) adjacent to the runway centerline indicating an approaching intersecting runway.

These types of systems are not located at SDY.

Taxiway Lighting

Taxiway edge lighting delineates the taxiway and apron edges. Taxiway lights are blue in color and spaced according to FAA standards. Taxiway lights are, by design, of lower intensity than runway lights. The FAA standard taxiway edge lighting system is Medium Intensity Taxiway Lights (MITL).

An economical alternative to taxiway lighting at general aviation airports is the use of retro-reflective markers. These markers are plastic and have blue reflective material designed to reflect light back toward its source.

SDY has Medium Intensity Taxiway Lights located on the airfield.

Other taxiway lights are installed at airports to promote safe operations. These include:

- Taxiway Centerline Lighting are flush-mounted in-pavement green, green/yellow or yellow lights placed at regular intervals along the taxiway centerline. These lights are installed on taxiways to provide guidance between the runway and apron areas.
- Runway Guard Lights (RGL) are elevated and/or in-pavement unidirectional yellow lights installed along the taxiway indicating the runway holding position. The lights alternately illuminate to provide a visual indication of a nearby active runway.
- Runway Stop Bar consists of a row of unidirectional in-pavement red lights and an elevated red light on each side of the taxiway indicating the runway hold position location. Stop bars are controlled by local air traffic control and installed for low visibility operations or to prevent runway incursions.
- Clearance Bar is a row of three in-pavement yellow lights that indicate a low visibility hold point along the taxiway.

These types of taxiway lighting systems do not exist at SDY. While these enhance the safety of the airport, they are more common at airports with frequent runway incursions or those with low-visibility.

Airfield Signage

Airfield signage is essential for the safe and efficient operation of aircraft and ground vehicles on the airport movement area. Signs are located adjacent to the edge of runways, taxiway and aprons. There are several types of signs that each serve a unique purpose. Common signs include:

- Mandatory Instruction Signs are red with white text denoting taxiway/runway intersections, runway/runway intersections, ILS critical areas and other critical areas.
- Location Signs are black with yellow text and identify the taxiway or runway where the aircraft or vehicle is located.
- Boundary Signs are yellow with black text and identify the location of a critical area for a pilot exiting a runway.
- Direction / Destination Signs are yellow with black text containing arrows to indicate the direction of taxiways or general direction to a location.
- Information Signs are yellow with black text and provide additional information to pilots.
- Runway Distance Remaining Signs are black with white numbers and provide runway distance remaining during takeoff and landing operations with a white number on black background.

There are no known signage deficiencies.

Pavement Markings

Pavement markings help airport users visually identify important features on the airfield. Pavement markings are installed on the runways, taxiways and aprons. FAA has defined numerous different pavement markings to promote safety and situational awareness.

Runway

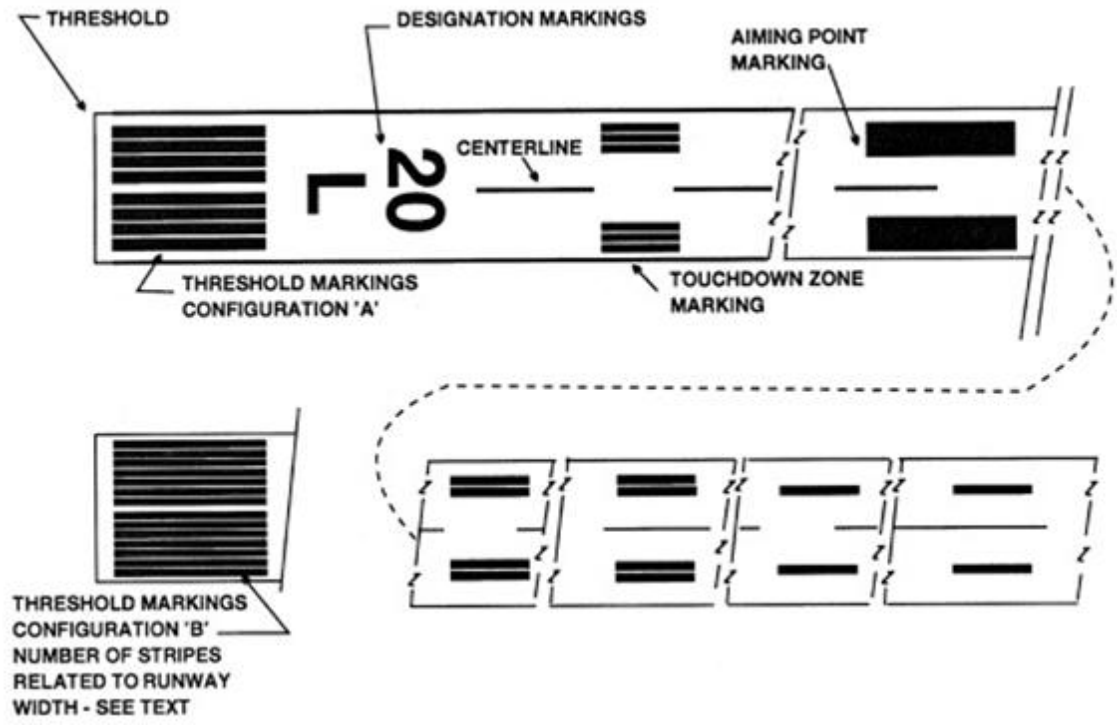
Runway pavement markings are white in color. The type and complexity of the markings are determined by the approach threshold category to the runway end. The minimum required runway markings for a standard runway are as follows:

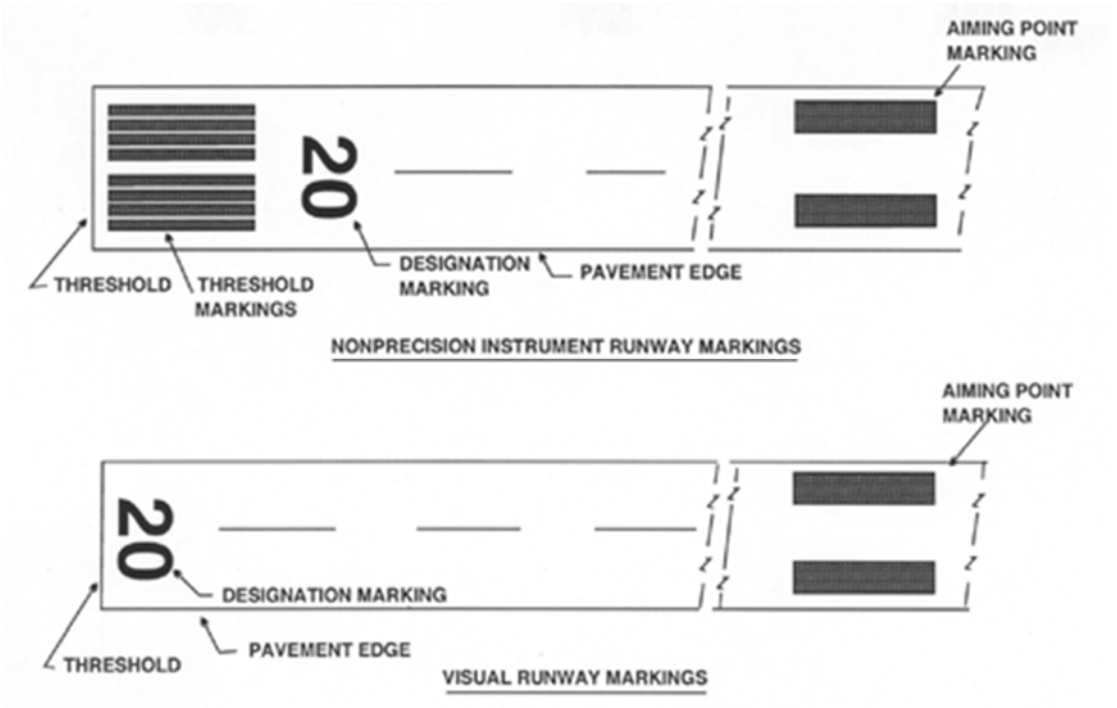
- Visual (landing designator, centerline)
- Non-Precision (landing designator, centerline, threshold)
- Precision (landing designator, centerline, threshold, aiming point, touchdown zone, edge)

Additional runway markings for a displaced threshold, blast pad, stopway or shoulders may also be required for an airport. Cone markers may be used to identify the edges and ends of turf runways.

Runway 1/19 is marked with Non-precision runway markings, and Runway 11/29 is marked with visual runway markings. However, Runway 11/29 does also have aiming points marked for both Runway 11 and Runway 29 approaches.

Exhibit AX-2 – Runway Markings





Source: FAA Airmen Informational Manual (AIM), Chapter 2

Taxiway & Apron

Taxiway and apron markings are important for directional guidance for taxiing aircraft and ground vehicles. Common taxiway and apron markings include:

- Holding Position Markings are a visual reference to prevent aircraft and vehicles from entering critical areas such as an active runway environment. These markings consist on yellow bars and dashes on a black background.
- Taxiway/Taxilane Centerline is a solid yellow stripe along the designated centerline.
- Taxiway/Taxilane Edge markings are solid or dashed yellow stripes delineating the edge of usable taxiway.
- Non-Movement Area markings delineate the edge of the area controlled by local air traffic control or available for parked aircraft or objects.

At Part 139 (Commercial Service) Airports, enhanced taxiway markings are required to further provide additional visual cues to an aircraft or vehicles approaching a runway holding position. Other markings include surface painted signs, geographic position markings and vehicle roadways.

The Sidney-Richland Municipal Airport has enhanced taxiway centerline markings on all runway/taxiway intersections.

Pavement markings should have black borders to help delineate their existence on airport pavements. Some markings require glass beads for enhanced reflectivity.

Meteorological Aids

Aircraft operating to and from an airport require meteorological aids to provide current weather data. Weather information helps pilots make informed decision about flight operations. Airports have various aids installed providing local weather information.

Surface Weather Observation

There are various types of surface weather observation stations. An Automated Surface Observation System (ASOS) is a Federal weather reporting station at airports. It provides continuous 24-hour observations and reporting for the FAA, National Weather Service (NWS) and Department of Defense (DoD). The suite of sensors provide temperature, dew point, wind speed and direction, visibility, cloud ceiling and precipitation information. Some stations have optional freezing rain and thunderstorm sensors. An Automated Weather Observation System (AWOS) broadcasts and reports current weather conditions each minute. The suite of sensors varies by type of AWOS. AWOS can be FAA-owned or non-Federally owned. Weather observing systems are recommended to be kept clear of agricultural operations within 100 feet, clear of objects above the 30 foot sensor height within 500 feet, and clear of high objects within 1,000 feet.

The Sidney-Richland Municipal Airport has an AWOS-3 on the airfield.

Wind Cone

Wind cones visually indicate the current wind direction and velocity on an airfield. A primary wind cone is located in a central visible location on the airport and is usually lighted for night operations. A segmented circle is installed around the wind cone to aid pilots in its

identification from the air. Supplemental wind cones are installed around the airfield to provide surface wind direction information to pilots where the primary wind cone is not visible. Wind cones must be lit for night air carrier operations.

Sidney-Richland Municipal Airport has a windcone, but does not have supplemental windcones.

Communication Aids

The ability for pilots to communicate with other pilots and air traffic control is critical for the safety and efficiency of the overall air transportation system.

At non-towered airports, pilots "see-and-avoid" other aircraft in the local area aided through the use of a series of position reports using the Common Traffic Advisory Frequency (CTAF). This frequency also can be used to select the intensity of the runway and approach lighting using the pilot controlled lighting system.

Sidney-Richland Municipal Airport is a non-towered airport. The airport operates a CTAF frequency for pilots to communicate with each other (122.800).

At non-towered airports, pilots open and close FAA flight plans on the ground through phone or internet, or through Flight Service Station (FSS) in the air. FSS provides various services including flight plan opening/cancelling, timely en-route weather information, Notices to Airmen (NOTAM), and Air Traffic Control advisories. A Remote Communications Outlet (RCO) provides a reliable link allowing aircraft to directly contact the FSS.

Opening and closing flight plans for SDY are completed from the FSS located in Great Falls, MT.

Exhibit AX-3 – NAVAID Summary

NAVAID Summary			
Type	**Existing**	**Future**	**Ultimate**
Meteorological	AWOS-3	AWOS-3	AWOS-3
Communication	Unicom 122.800	Unicom 122.800	Unicom 122.800
Runway Approach	RWY 1 – NP 1 Mile RWY 19 – NP 1 Mile RWY 11 – Visual RWY 29 - Visual	RWY 1 – NP 1 Mile RWY 19 – NP 1 Mile RWY 11 – Visual RWY 29 - Visual	RWY 1 – NP 3/4 Mile RWY 19 – NP 1 Mile RWY 11 – 1 Mile RWY 29 – 1 Mile

Appendix I – Instrument Procedures and Airspace

Introduction

This appendix discusses the existing and recommended instrument procedures and airspace at the Sidney-Richland Municipal Airport. Instrument procedures allow aircraft to operate by reference to flight instrument under Instrument Flight Rules (IFR). Airspace is an irreplaceable resource around the airport necessary for the safe and orderly operation of aircraft.

The appendix will review the existing and recommended instrument procedures necessary for the airport including:

- Standard Instrument Approach Procedures
- Departure Procedures
- Taxiway Procedures

A copy of the published instrument procedures for the airport is included at the end of this appendix. This document will also review the existing and recommended airspace standards necessary for the airport including:

- Airspace Classification
- Part 77 Civil Airport Imaginary Surfaces
- Runway Approach/Departure Surfaces
- Terminal Instrument Procedures (TERPS)
- One Engine Inoperative (OEI) Surfaces
- Other Airport Design Surfaces

The type of instrument procedures and airspace required on an airport are determined by FAA guidance from on the airport's design standards. Available FAA guidance can be found by reviewing the latest Advisory Circulars, Handbooks and Orders.

Instrument Procedures

Standard Instrument Approach Procedures

Standard Instrument Approach Procedures (SIAP) are used by landing aircraft to navigate to the airport during IFR weather conditions: periods of low flight visibility and/or low cloud ceilings. FAA publishes SIAPs defining the horizontal and vertical flight path to land at an airport. Each procedure has varying flight visibility and cloud ceiling weather "minimums" published defining the minimum conditions where a legal approach can be made. Weather minimums established for each SIAP based on the approach type, airport/runway design, navigational aids, airspace obstructions, aircraft equipment and flight crew certification.

The flight visibility minimums are one factor to determine what FAA design standards apply to the airport or a particular runway. As a general rule, instrument approaches that provide procedures for aircraft to land in lower visibility and lower ceilings require additional protection space and have "flatter" approach paths to airports which restrict the height of objects off the ends of the runways.

Although FAA flight rule weather minimums change based on the airspace classification, flights typically must be conducted under IFR if cloud ceilings are less than 1,000 feet above the ground and/or flight visibility less than 3 statute miles. Conditions exceeding this minimum can be conducted under Visual Flight Rules (VFR). Visual approaches to a runway require no published SIAP and can be conducted when the weather is acceptable for VFR flights.

FAA defines the types of SIAP:

- Non-Precision Approach (NPA) – A standard instrument approach procedure with horizontal course and no electronic vertical descent guidance. These approaches utilize satellite-based or ground-based navigational aids such as GPS, VOR or NDB.

- Approach with Vertical Guidance (APV) – An instrument approach procedure providing electronic course and vertical descent electronic guidance. These approaches utilize ground-based Glideslope (GS) navigational aids or satellite-based navigational aids such as a Localizer Performance with Vertical Guidance (LPV).

- Precision Approach (PA) – An instrument approach procedure with electronic course and vertical descent guidance and visibility minimums of less than ¾ mile visibility (4,000 foot Runway Visual Range - RVR). These approaches utilize ground-based navigational aids as part of an Instrument Landing System (ILS). The three components of an ILS are a Localizer (LOC) antenna for course guidance, a Glideslope (GS) antenna for vertical guidance and an Approach Lighting System (ALS).

See ***Appendix H*** for discussion of navigational aids.

Approaches may be conducted straight-in to a runway end or allow circling to the landing runway. Typical straight-in instrument approach weather minimums for runways that meet all requirements are outlined in the following table:

Exhibit AX-6 – Typical Instrument Approach Minimums

Typical Instrument Approach Minimums			
Approach Procedure	**Approach Type**	**Cloud Ceiling Minimum (HAT)**	**Visibility Minimum RVR, s.m.**
ILS - Category III[11]	Precision (PA)	≤ 100 feet	≤ 1200’ RVR
ILS - Category II	Precision (PA)	100 feet	1200’ RVR
ILS – Category I	Precision (PA)	200 feet	2400’/1800’ RVR
LPV	Approach with Vertical Guidance (APV)	250 feet*	1 mile*
LNAV/VNAV	Non-Precision (NPI)	400 feet	1 mile
LNAV	Non-Precision (NPI)	400 feet	1 mile
VOR	Non-Precision (NPI)	400 feet	1 mile
None	Visual	1,000 feet	3 miles

Note: HAT = Height Above Touchdown, RVR = Runway Visual Range, s.m. = statute miles (reported), ILS = Instrument Landing System, LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation, VOR = Very High Frequency Omni-Directional Range
**Lowest LPV minimums observed in United States is 200 feet cloud ceiling and ¾ mile visibility.*
Source: FAA Advisory Circular AC 150/5300-13A, FAA Aeronautical Information Manual, KLJ Analysis

FAA defines the minimum airport infrastructure standards for each type of instrument approach in Advisory Circular 150/5300-13A Airport Design.

[11] There are three different levels of Category III ILS approaches, each requiring a higher category of airborne equipment, crew training and airfield infrastructure requirements. Category A allows for a decision height below 100 feet with 700 feet RVR. Category B allows for a decision height below 50 feet with an RVR as low as 150 feet. Category C allows for zero decision height and zero RVR.

Exhibit AX-7 – Standards for PA and APV with <250 ft. HATh

Table 3-4. Standards for Precision Approach Procedures with Vertical Guidance (APV) Lower than 250 ft Height Above Threshold (HATh)

Visibility Minimums[1]	**< 3/4-statute mile**	**< 1-statute mile**
HATh[2]	200 ft	250 ft
TERPS GQS[3]	Table 3-2, row 8 Clear	
TERPS precision final surfaces	Clear	See Note 4
TERPS Chapter 3, Section 3	34:1 Clear	20:1 Clear
Precision Obstacle Free Zone (POFZ) 200 ft × 800 ft	Required	Not Required
ALP[5]	Required	
Minimum Runway Length	4,200 ft (Paved)	
Runway Markings (See AC 150/5340-1)	Precision	Non-precision
Holding Position Signs and Markings (See AC 150/5340-1 and AC 150/5340-18)	Precision	Non-precision
Runway Edge Lights[6]	HIRL / MIRL	
Parallel Taxiway[7]	Required	
Approach Lights[8]	MALSR, SSALR, or ALSF	Recommended
Applicable Runway Design Standards; e.g., OFZ	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums
Threshold Siting Criteria To Be Met[9]	Reference paragraph 303 and Table 3-2, rows 7 & 8	Reference paragraph 303 and Table 3-2, rows 6 & 8
Survey Required for Lowest Minimums	Vertically Guided Airport Airspace Analysis Survey criteria in AC 150/5300-18	

Notes:

1. Visibility minimums are subject to application of Order 8260.3 ("TERPS"), and associated orders or this table, whichever are higher.
2. The HATh indicated is for planning purposes only. Actual obtainable HATh is determined by TERPS.
3. The GQS is applicable to approach procedures providing vertical path guidance.
4. If the final surface is penetrated, HATh and visibility will be increased as required by TERPS.
5. An ALP is only required for airports in the NPIAS; it is recommended for all others.
6. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
7. A full-length parallel taxiway meeting separation requirements. See Table 3-8.
8. To achieve lower visibility minimums based on credit for lighting, an approach light system is required.
9. 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) criteria, and TERPS Chapter 3, Section 3.

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

Exhibit AX-8 – Standards for NPA and APV with ≥250 ft. HATh

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.

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

Existing

Sidney-Richland Municipal Airport experiences Instrument Flight Rules (IFR) or Marginal VFR (MVFR) weather approximately 10 percent of the time. Aircraft commonly conduct flights under IFR rules during Visual Flight Rules (VFR) as well.

Exhibit AX-9 – Meteorological Analysis

Meteorological Analysis			
Weather Condition	**Cloud Ceiling Minimum**	**Visibility Minimum**	**Observation Percentage**
Visual Flight Rules (VFR)	3,000 feet	5 miles	91.10%
Marginal Visual Flight Rules (MVFR)	1,000 feet	3 miles	5.85%
Instrument Flight Rules (IFR)	500 feet	1 mile	1.80%
Low Instrument Flight Rules (LIFR)	<500 feet	<1 mile	1.25%
TOTAL			**100.00%**

Source: National Climatic Data Center *data from Sidney-Richland Municipal Airport, AWOS (2004-2014)*

The Sidney-Richland Municipal Airport has 4 different instrument approaches procedures. The following table has the name of the approach, visibility and ceiling minimums for each approach. Copies of the current published SIAPs are located at the end of this appendix.

Exhibit AX-10 – Instrument Approach Procedures

Instrument Approach Procedures			
Approach Procedure	**Approach Type**	**Lowest Cloud Ceiling Minimum (HAT)**	**Lowest Visibility Minimum RVR, n.m.**
RNAV (GPS) RWY 1	LPV (DA)	2235' (300')	5000' RVR, 1 mile
RNAV (GPS) RWY 19	LPV (DA)	2231' (300')	5000' RVR, 1 mile
NDB RWY 1	S-1	2860' (900')	5000' RVR, 1 mile
NDB RWY 19	S-19	2920' (1000')	5000' RVR, 1 ¼ mile

Note: HAT = Height Above Touchdown, RVR = Runway Visual Range, n.m. = statute miles (reported), ILS = Instrument Landing System, LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation, VOR = Very High Frequency Omni-Directional Range
Source: FAA

Proposed

Proposed changes to approaches at SDY include the ultimate development of Non-Precision approaches for Runway 11 and Runway 29 ends. These Non-Precision approaches on the crosswind runway will be planned as GPS approaches with vertical-guidance (LPV). Moreover, taking the necessary steps to lower approach minimums on Runway 1 will be planned for in the ultimate time frame. It is anticipated this will be accomplished through the addition of an approach lighting system.

Exhibit AX-11 – Meteorological Analysis

Meteorological Analysis			
Approach Type	**Cloud Ceiling Minimum**	**Visibility Minimum/RVR**	**Observation Percentage***
RNAV (GPS) RWY 1 & 19	300 feet	1 mile	.98% *

NDB RWY 1	900 feet	1 mile	2.03% *
NDB RWY 19	1000 feet	1 ¼ mile	2.20% *

Source: National Climatic Data Center *data from Sidney-Richland Municipal Airport, AWOS (2004-2014)*
RVR = Runway Visual Range, n.m. = statute miles (reported), ILS = Instrument Landing System
**Percentage based on total weather observations below the specified approach minimums noted between 2004-2014 at SDY*

Departure Procedures

Departure procedures are established for an airport to allow aircraft to safely depart and climb out from the immediate airport environment to transition to an altitude that ensures sufficient obstacle clearance. Some airports may have prevailing obstacles in the departure corridor. These may require takeoff weather minimums for commercial flights, an increased rate of climb or special instructions for all flights. A standard climb rate gradient is 200 feet per nautical mile. Obstacles in the departure surface are noted to alert the pilot so they can be avoided.

Sidney-Richland Municipal has some special departure procedures that apply for various departures on their airfield. the exhibit depicted below shows these special departure procedures:

Exhibit AX-7 – Special Departure Procedures

SIDNEY, MT

SIDNEY-RICHLAND MUNI (SDY)

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES

AMDT 5 13010 (FAA)

TAKEOFF MINIMUMS: **Rwy 29**, 400-2½ or std. w/min. climb of 315' per NM to 2500.

DEPARTURE PROCEDURE: **Rwy 11,** climb heading 108° to 2700 before turning right. **Rwy 29,** climb heading 288° to 2800 before proceeding on course.

NOTE: **Rwy 1,** trees beginning 86' from DER, left and right of centerline, up to 30' AGL/2072' MSL. **Rwy 19,** trees beginning 245' from DER, 302' right of centerline, up to 30' AGL/2029' MSL. Vehicle on road beginning 5' from DER, 308' right of centerline, up to 17' AGL/2003' MSL. Pole, 21' from DER, 298' right of centerline, up to 10' AGL/1992' MSL. **Rwy 29,** terrain left and right of centerline beginning 962' from DER, up to 2126' MSL. Poles beginning 1196' from DER, left and right of centerline, up to 39' AGL/2181' MSL. Trees beginning 596' from DER, 165' right of centerline, up to 30' AGL/2026' MSL. Derrick 1452' from DER, 207' left of centerline, up to 47' AGL/2028' MSL. Vehicle on road 504' from DER, 15' right of centerline, up to 17' AGL/1998' MSL.

Source: Airnav, 2014

Taxi Procedures

Flights performed in visibility conditions less than 1,200 feet Runway Visual Range (RVR) require a Surface Movement Guidance Control System (SMGCS) developed for the airport. This program requires the creation of low visibility taxi plans and the development of enhanced infrastructure to help operators clearly identify taxi routes. Airport navigational aid enhancements may include stop bars, taxiway centerline lines, runway guard lights, geographic position markings and clearance bars.

Airspace

FAA grant assurances (obligations) require the airport sponsor to take appropriate action to assure that 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. Sufficiently clear airspace near the approach and departure ends and along extended centerline are vitally important for safe airport operations. This section identifies overall airspace standards as well as existing and future standards for Sidney-Richland Municipal Airport.

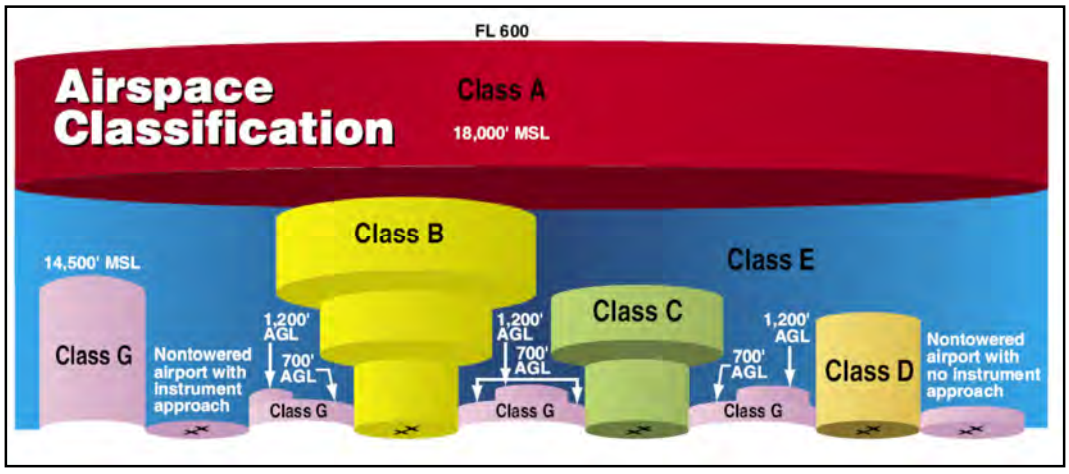
Airspace Classification

Airspace protection above and around airports is necessary for safe operation of aircraft. Airspace must be protected from obstructions in order to prevent any loss of the airport's ability to handle aircraft. Airspace classes, air traffic operating rules, navigation aids, other airports, obstructions and noise abatement procedures affect airspace.

The Federal Aviation Act of 1958 gave the Federal Aviation Administration (FAA), then known as the Federal Aviation Agency, the responsibility for control of navigable airspace and regulation of aircraft operations within the United States. Federal Aviation Regulations (FAR) Part 91, General Operating and Flight Rules, prescribes rules governing airspace.

The National Airspace System (NAS) consists of various classifications of airspace regulated by the FAA. Airspace classification ensures the safe separation of VFR and IFR aircraft. Airspace is separated into controlled, uncontrolled, special use, or other airspace. Controlled airspace is classified as A, B, C, D, or E. Uncontrolled airspace is classified as G. These classes specify appropriate minimum cloud clearances, visibility requirements, and other operating requirements for aircraft. The major difference between controlled and uncontrolled airspace is that the FAA does not exercise air traffic control over aircraft operating within uncontrolled airspace.

Exhibit AX-8 – FAA Airspace Classifications



Source: FAA Pilot's Handbook of Aeronautical Knowledge (2008)

Exhibit AX-9 – Visual Flight Rule Weather Minimums

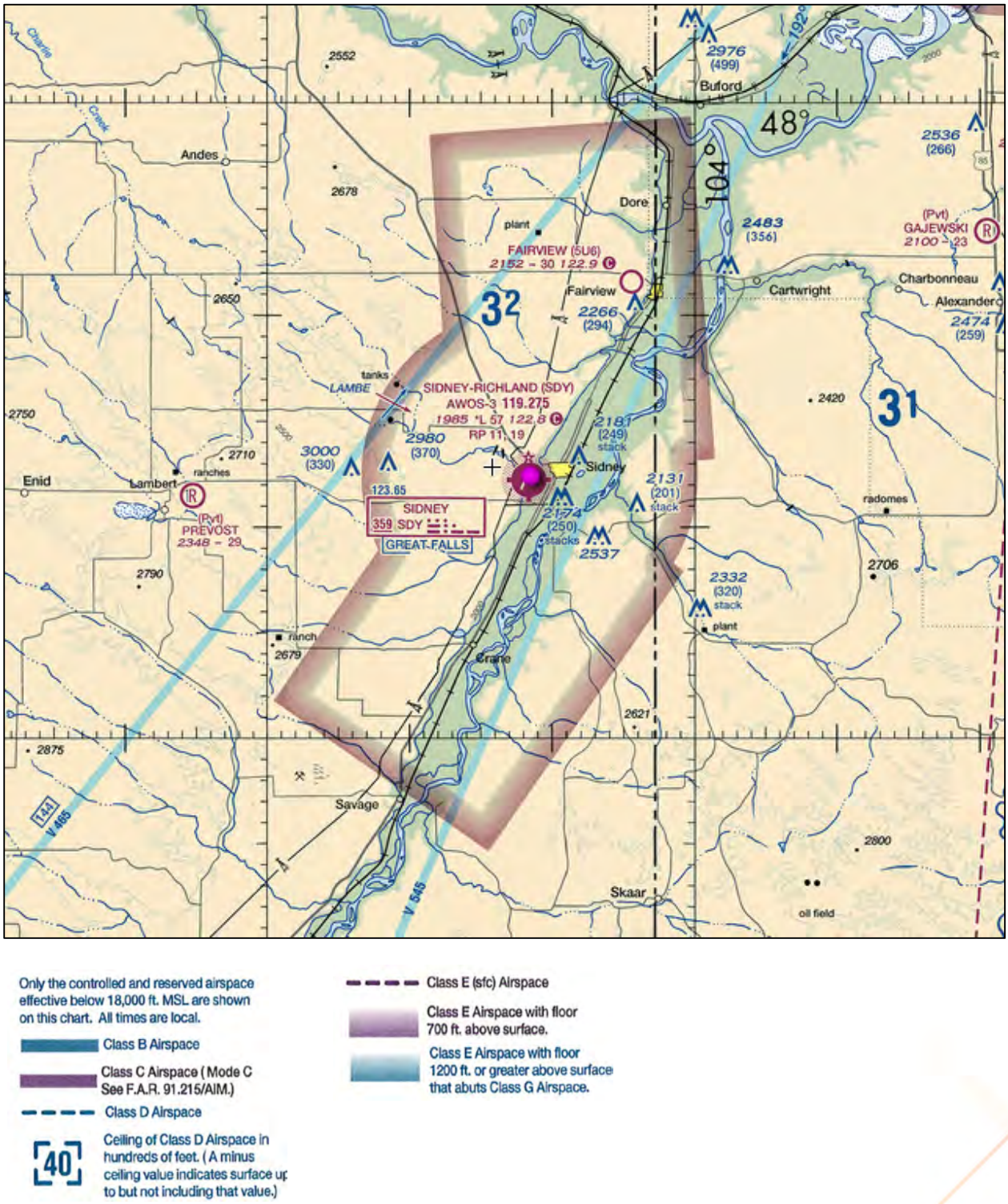
Airspace			Flight Visibility	Distance from Clouds
Class A			Not applicable	Not applicable
Class B			3 statute miles	Clear of clouds
Class C			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class D			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class E	At or above 10,000 feet MSL		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal
	Less than 10,000 feet MSL		3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class G	1,200 feet or less above the surface (regardless of MSL altitude).	Day, except as provided in section 91.155(b)	1 statute mile	Clear of clouds
		Night, except as provided in section 91.155(b)	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface but less than 10,000 feet MSL.	Day	1 statute mile	1,000 feet above 500 feet below 2,000 feet horizontal
		Night	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface and at or above 10,000 feet MSL.		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal

Source: FAA Pilot's Handbook of Aeronautical Knowledge (2008)

Existing & Proposed

The existing airspace at Sidney-Richland Municipal Airport is Class G to 700 feet Above-Ground Level (AGL). Above 700 feet, the airspace is classified as Class E. There are no near-term or long-term plans to change the airspace classification at SDY. Exhibit AX-10, Surrounding Airspace, depicts the airspace boundaries at SDY. ***Appendix H*** outlines the navigational aids available to support the airport and airspace classifications.

Exhibit AX-10 – Surrounding Airspace



Only the controlled and reserved airspace effective below 18,000 ft. MSL are shown on this chart. All times are local.

Class B Airspace

Class C Airspace (Mode C See F.A.R. 91.215/AIM.)

Class D Airspace

40 Ceiling of Class D Airspace in hundreds of feet. (A minus ceiling value indicates surface up to but not including that value.)

Class E (sfc) Airspace

Class E Airspace with floor 700 ft. above surface.

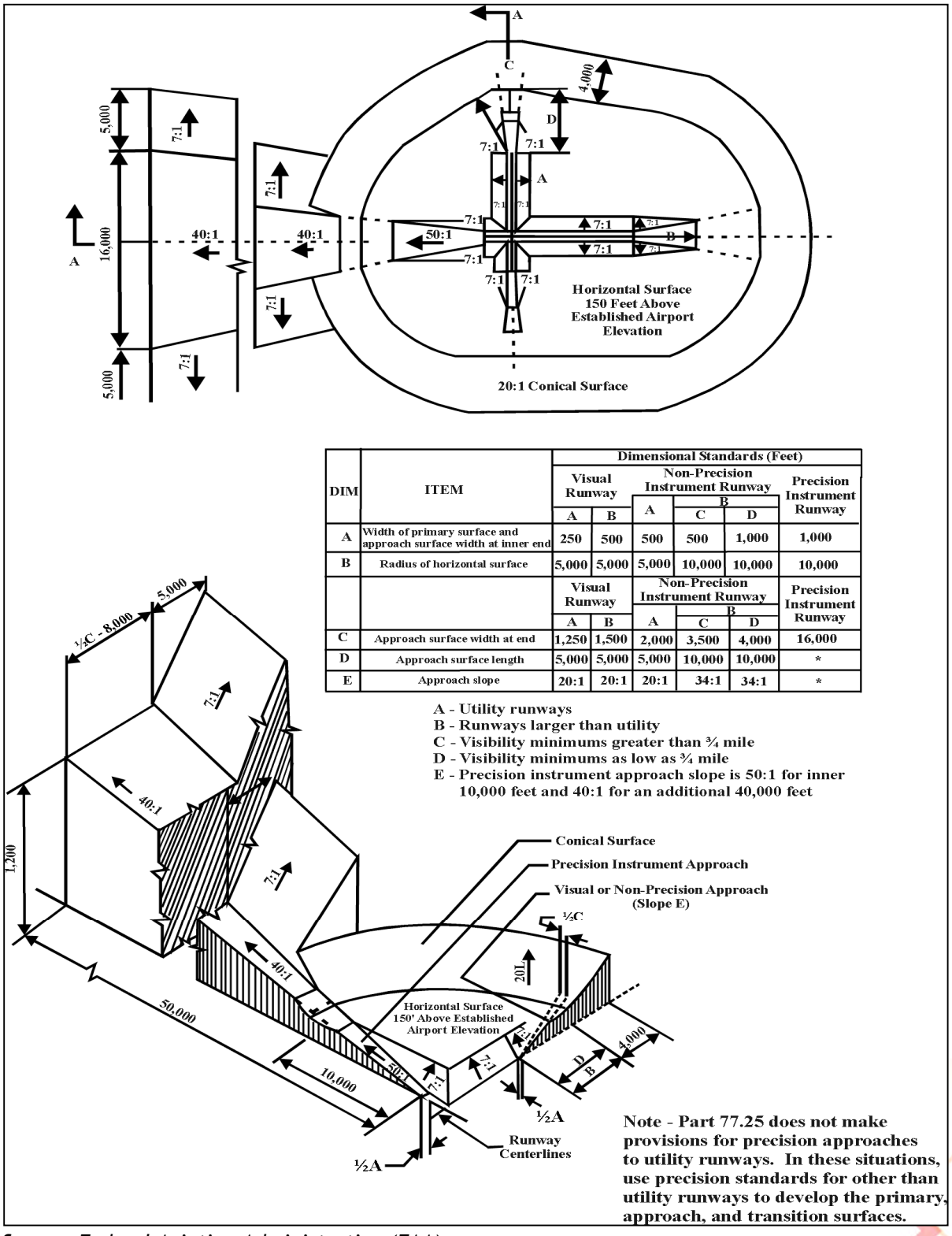
Class E Airspace with floor 1200 ft. or greater above surface that abuts Class G Airspace.

Source: Skyvector.com (January 2015) – NOT FOR NAVIGATION

Part 77 Civil Airport Imaginary Surfaces

Airspace is an important resource around airports that is very essential for safe flight operations. There are established standards to identify airspace obstructions around airports. 14 CFR (Code of Federal Regulations) Part 77 Safe, Efficient Use, and Preservation of the Navigable Airspace establishes various airspace surfaces in the vicinity of airports. Federal Aviation Regulation (FAR) Part 77 is used to determine and analyze obstruction data by evaluating objects that penetrate these "imaginary" three-dimensional surfaces. The FAR Part 77 surfaces are the protective surfaces most often used to provide height restriction zoning protection around an airport. These airspace surfaces include the primary, approach, transitional, horizontal and conical surfaces each with different standards. When evaluating objects, the FAA determines if an object is a hazard to air navigation and if corrective action is needed based on more in-depth minimum airspace standards (i.e. FAA Approach/Departure Surface). FAA notification criteria standards are also established in FAR Part 77. Examples of corrective action include removing, lowering, or obstruction lighting an object. A general diagram of the FAR Part 77 surfaces is shown in the following exhibit:

Exhibit AX-11 – FAR Part 77 Airspace



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

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

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

Source: Federal Aviation Administration (FAA)

FAR Part 77 surfaces are identified below:

- Primary Surface - Imaginary airspace surface centered along the runway centerline, ending at the 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 - A 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.

Sufficiently clear airspace is necessary for the safe and efficient use of aircraft arriving and departing an airport. FAR Part 77 airspace standards are defined by the most demanding approach to a runway. These definitions include:

Exhibit AX- 12 – FAR 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. Visibility minimums are typically 1 mile but as low as ¾ mile.
Precision (PIR)	Runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS) or other system with horizontal and vertical guidance. Visibility minimums are less than ¾ mile.
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.

Source: 14 CFR Part 77

Existing

The combination of the approach type and the runway classification defines the dimensional criteria for each approach. The Part 77 airspace dimensional criteria for Sidney-Richland Municipal Airport are identified in the table below.

Exhibit AX-13 – Existing Part 77 Approach Airspace Standards

Existing Part 77 Approach Standards					
Runway End	**Approach Standards**	**Inner Width***	**Outer Width**	**Length**	**Slope**
1	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1
19	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1
11	Visual Other-Than-Utility	500’	1,500’	5,000’	20:1
29	Visual Other-Than-Utility	500’	1,500’	5,000’	20:1

**Inner width is also the Primary Surface width driven by the most demanding approach to a runway.*
Source: 14 CFR Part 77, FAA Form 5010-1 Airport Master Record

According to the established rules, airspace 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.

Below is a list of the most critical airspace obstructions for each existing runway end as evaluated by FAA. Part 77 obstruction mitigation considerations include existing and future airport design standards, other airspace surfaces amount of penetration into the surface and the type of obstacle (natural, natural growth or man-made). An FAA airspace study is typically completed. A detailed obstruction identification and mitigation disposition is identified in the Airport Layout Plan Drawing Set.

Exhibit AX- 14 – Critical Part 77 Airspace Obstructions

FAA Form 5010 Airspace Obstructions					
Runway End	**Surface**	**Object Type**	**Distance from End**	**Location from Centerline**	**Slope to Clear (Required)**
1	None	-	-	-	-
19	Approach	Tree	956’	On Center	**26:1** (34:1)
11	Approach	Road*	489’	On Center	20:1 (20:1)
29	Approach	Road*	489’	315’ Right	29:1 (20:1)

*Notes: Penetration value estimated based. **RED** indicates does not meet current standards.*
Source: FAA Airport Master Record Form 5010 Report. Current as of 11/13/2014

Exhibit AX- 15 – Future/Ultimate Part 77 Approach Airspace Standards

Future/Ultimate Part 77 Approach Standards					
Runway End	**Approach Standards**	**Inner Width***	**Outer Width**	**Length**	**Slope**
Future Airport Configuration					
1	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1
19	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1
11	Visual Other-Than-Utility	500’	1,500’	5,000’	20:1
29	Visual Other-Than-Utility	500’	1,500’	5,000’	20:1
Ultimate Airport Configuration					
1	Non-Precision Other-Than-Utility ¾ mile	1,000’	4,000’	10,000’	34:1
19	Non-Precision Other-Than-Utility Greater than ¾ mile	1,000’	3,500’	10,000’	34:1
11	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1
29	Non-Precision Other-Than-Utility Greater than ¾ mile	500’	3,500’	10,000’	34:1

**Inner width is also the Primary Surface width driven by the most demanding approach to a runway.*
Source: 14 CFR Part 77, FAA Form 5010-1 Airport Master Record, KLJ Analysis

Runway Approach/Departure Surfaces

FAA identifies approach surfaces that must be cleared at an absolute minimum for safety for landing aircraft. These surfaces are identified in Table 3-2 of FAA Advisory Circular 150/5300-13A, Airport Design. All objects must clear the surface for the applicable runway operational design standard to meet minimum aviation safety standards for a given runway landing threshold location.

Approach airspace penetrations require mitigation which may include the removal of the object or the runway landing threshold to be shifted or displaced down the runway. Penetrations to the departure surface may simply require the obstacle to be published, or require mitigation including increasing the minimum aircraft climb rate or runway length operational restrictions. An FAA aeronautical study should be completed to determine the operations impacts and necessary mitigation. When usable landing or takeoff distances do not match the runway length, then a special application of declared distances should be used to meet operational safety requirements. Declared distances can be used to mitigate approach/departure obstructions, land use incompatibilities, or incompatible airport design areas.

Exhibit AX- 16 – Approach/Departure Standards Table

Table 3-2. Approach/departure standards table

	Runway Type	DIMENSIONAL STANDARDS* Feet (Meters) A	B	C	D	E	Slope/ OCS
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

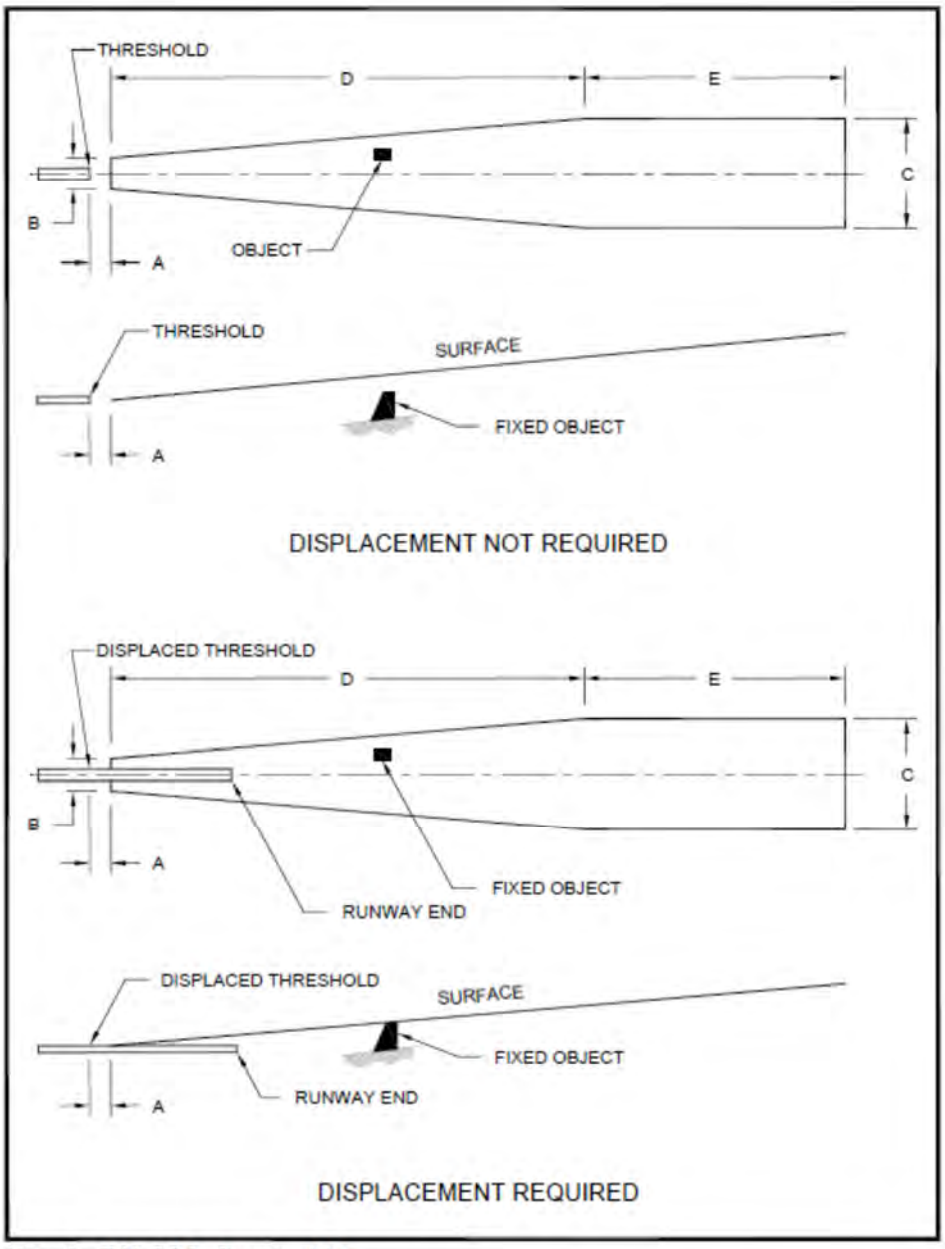
* The letters are keyed to those shown in Figure 3-2.

Notes:

1. Marking and lighting of obstacle penetrations to this surface or the use of a Visual Guidance Slope Indicator (VGSI), as defined by Order 8260.3, may avoid displacing the threshold.
2. 10,000 feet (3048 m) is a nominal value for planning purposes. The actual length of these areas is dependent upon the visual descent point position for 20:1 and 34:1, and DA point for the 30:1.
3. When objects exceed the height of the GQS, an APV (ILS, PAR, LPV, LNAV/VNAV, etc.) is not authorized. Refer to Table 3-4 and its footnote 3 for further information on GQS.
4. Dimension A is measured relative to TODA (to include clearway).
5. Surface dimensions / OCS slope represent a nominal approach with 3 degree Glide Path Angle (GPA), 50 feet (15 m) TCH, < 500 feet (152 m) HATh. For specific cases, refer to Order 8260.3. The OCS slope (30:1) supports a nominal approach of 3 degrees (also known as the GPA). This assumes a TCH of 50 feet (15 m). Three degrees is commonly used for ILS systems and VGSI aiming angles. This approximates a 30:1 approach slope that is between the 34:1 and the 20:1 approach surfaces of Part 77. Surfaces cleared to 34:1 should accommodate a 30:1 approach without any obstacle clearance problems.
6. For runways with vertically guided approaches the criteria in row 8 is in addition to the basic criteria established within the table, to ensure the protection of the GQS.
7. For planning purposes, determine a tentative DA based on a 3 degree GPA and a 50-foot (15 m) TCH.

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

Exhibit AX-127 – Threshold Siting Based on an Approach Slope



Note: See Table 3-2 for dimensional data.

Figure 3-2. Threshold siting based on approach slope

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

Exhibit AX- 18 – Existing Approach/Departures Surface Standards

Existing Approach/Departure Standards									
Runway End	Table 3-2 Standard								
	1	2	3	4	5	6	7	8	9
1				X				X	X
19				X				X	X
11			X						
29			X						

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

Exhibit AX-19 – Critical Approach/Departure Surface Airspace Obstructions

Critical Approach/Departure Surface Airspace Obstructions						
Runway End	Table 3-2 Row(s)	Object Type	Distance from End	Location from Centerline	Penetration	Slope to Clear (Required)

Notes: Penetration value estimated based. ***RED*** *indicates does not meet current standards.*

Exhibit AX-20 – Future & Ultimate Approach/Departures Surface Standards

Future & Ultimate Approach/Departure Standards									
Runway End	FAA Airport Design Table 3-2 Row/Line								
	1	2	3	4	5	6	7	8	9
1					X	X		X	X
19					X			X	X
11				X				X	X
29				X				X	X

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

Future and ultimate airport configurations plan to clear airspace to approach/departure surface standards for the planned utility of the runway.

Terminal Instrument Procedures (TERPS)

The FAA has established standards to develop instrument procedures in the United States. FAA Order 8260.3B, U.S. Standards for Terminal Instrument Procedures (TERPS) and related orders outlines these complex standards to develop departure, climb, en-route, approach, missed approach and holding standards for aircraft operating along a published route with different navigational equipment. Some critical obstruction clearance standards are integrated into the approach/departure surfaces identified in Airport Design including many final approach segments and the 40:1 sloped departure surface. Other important obstacle clearance surfaces within the inner airport environment identified in TERPS include the precision obstacle clearance surfaces and the missed approach surfaces. Some TERPS surfaces

may even be more restrictive that Part 77 standards. Penetrations to TERPS surfaces results in higher weather minimums or operations restrictions.

One Engine Inoperative (OEI) Surfaces

One Engine Inoperative (OEI) procedures are developed by air carriers to clear obstacles in situations where one engine becomes inoperative. OEI obstacle surfaces have shallow slopes to provide object clearance when aircraft climb performance is reduced as a result of engine power loss. OEI procedures are developed by each airline. Critical obstructions effect the utility of the runway by these aircraft. The FAA had required a clear 62.5:1 sloped surface to be kept clear of obstacles from departure ends. The 62.5:1 OEI surface is no longer required by FAA because of the large area covered, the scope of obstructions found and inability for airport sponsors to clear these areas. FAA is anticipated to publish new guidance by 2016.

Other Design Surfaces

Other airport design airspace surfaces considered protect navigational aids and identify airport data to populate FAA databases.

Inner-Approach/ Transitional Obstacle Free Zones

If an approach lighting system is installed, a clear inner-approach and inner-transitional Obstacle Free Zone (OFZ) is necessary. The inner-approach OFZ is a 50:1 sloped surface begins 200 feet from the runway threshold and extends 200 feet beyond the last approach light. The inner-transitional OFZ airspace surface is along the sides of the ROFZ. No objects not necessary for airport operations, including aircraft tails can penetrate this surface.

Precision Obstacle Free Zone (POFZ)

If a precision instrument approach is in existence there exists as POFZ which begins at the runway threshold as a flat surface 800 feet wide centered on the runway centerline and extending 200 feet to connect to the inner-approach OFZ. As with the OFZ, no objects not necessary for airport operations including aircraft or vehicles on the ground can penetrate this surface.

Visual Aids

Visual aids at an airport require clear obstacle clearance surface to provide sufficient guidance for pilots. These include approach lighting systems and visual guidance slope indicators. For a Precision Approach Path Indicator (PAPI) system, this surface begins 300 feet in front of the VGSI system and extends upward and outward at an angle 1 degree less than the lowest on-course aiming angle. The specific airspace standards for this and for approach lighting systems are defined in FAA Order 6850.2B.

FAA Aeronautical Surveys

The 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 to be collected using assembled aerial imagery for the airport. Special obstruction surfaces are used for this

effort to provide with FAA sufficient airport and obstacle information. This data is used in aeronautical publications and to develop instrument approach procedures.

Exhibit AX-21 - Runway 1 Non-Precision (LPV) Approach

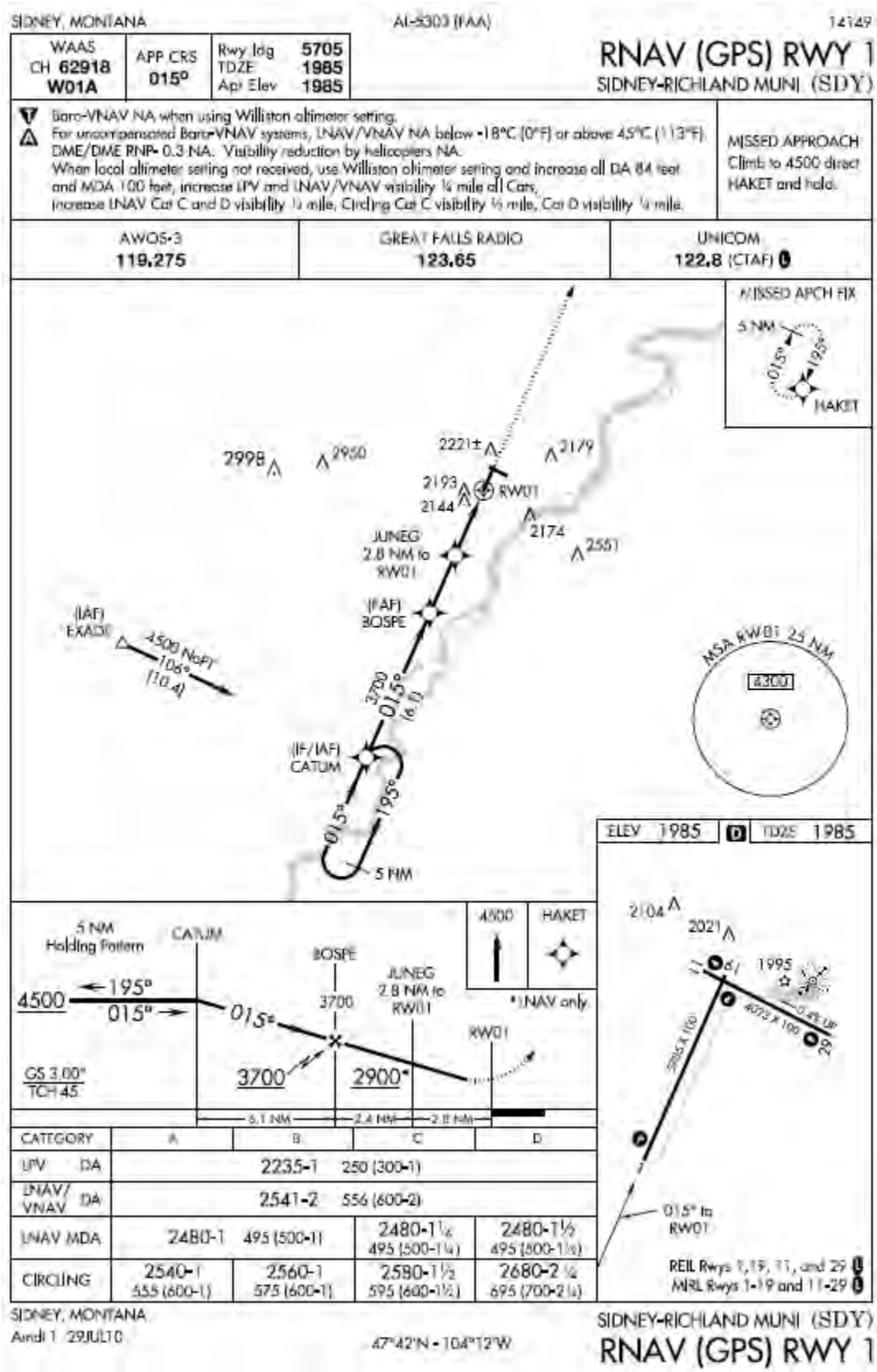


Exhibit AX-22 - Runway 19 Non-Precision (LPV) Approach

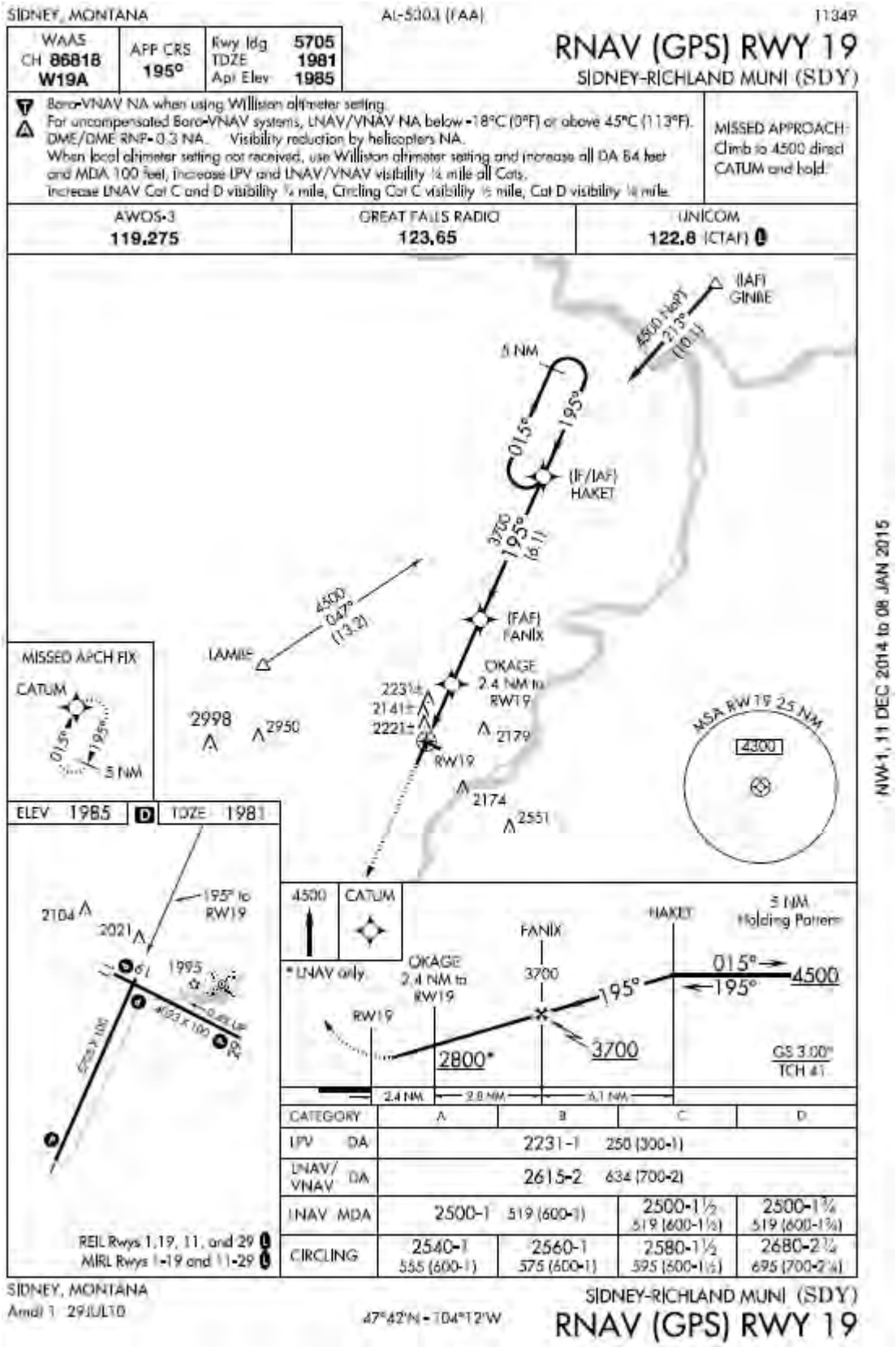


Exhibit AX-23 – Runway 1 NDB Approach

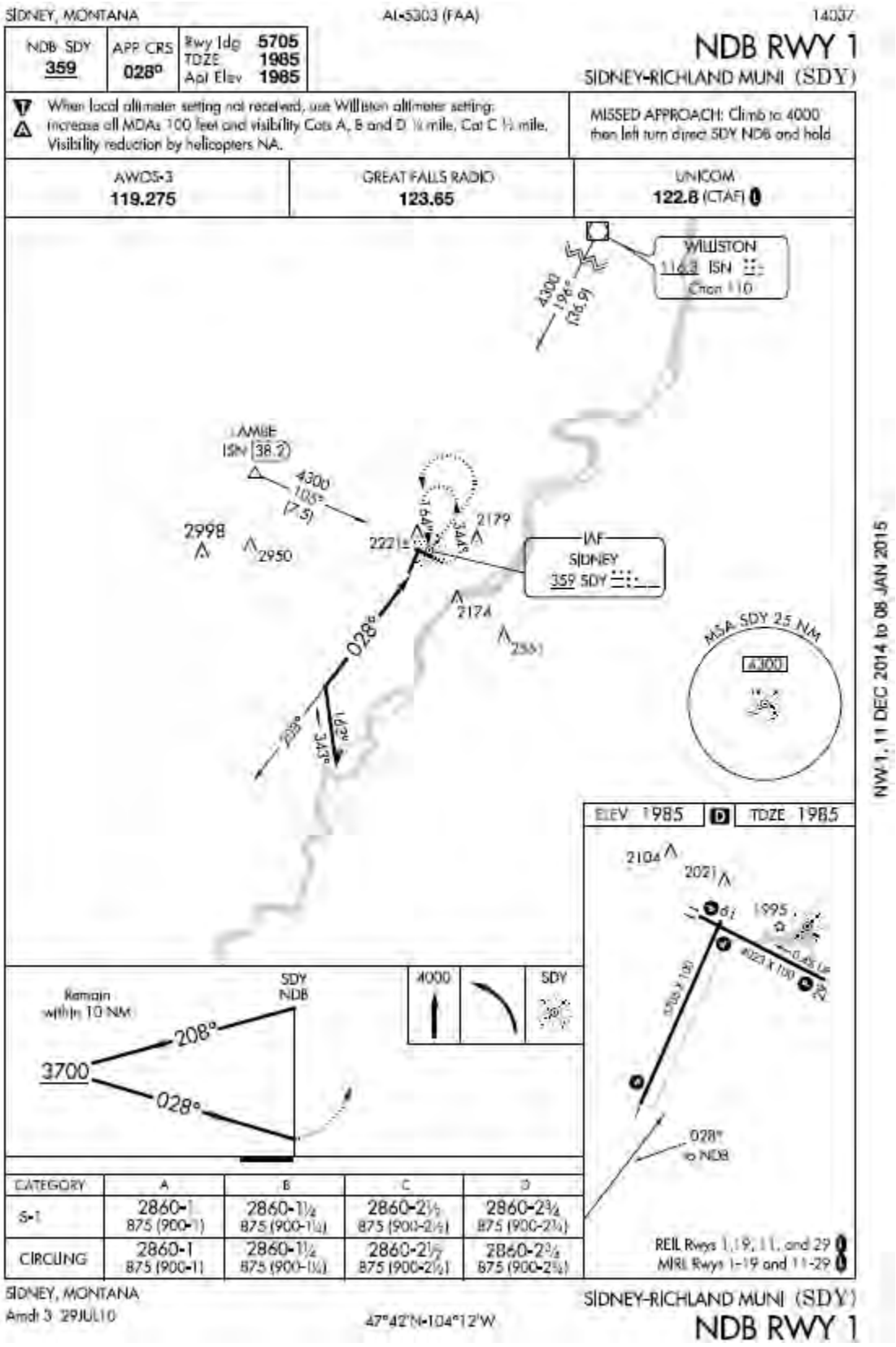
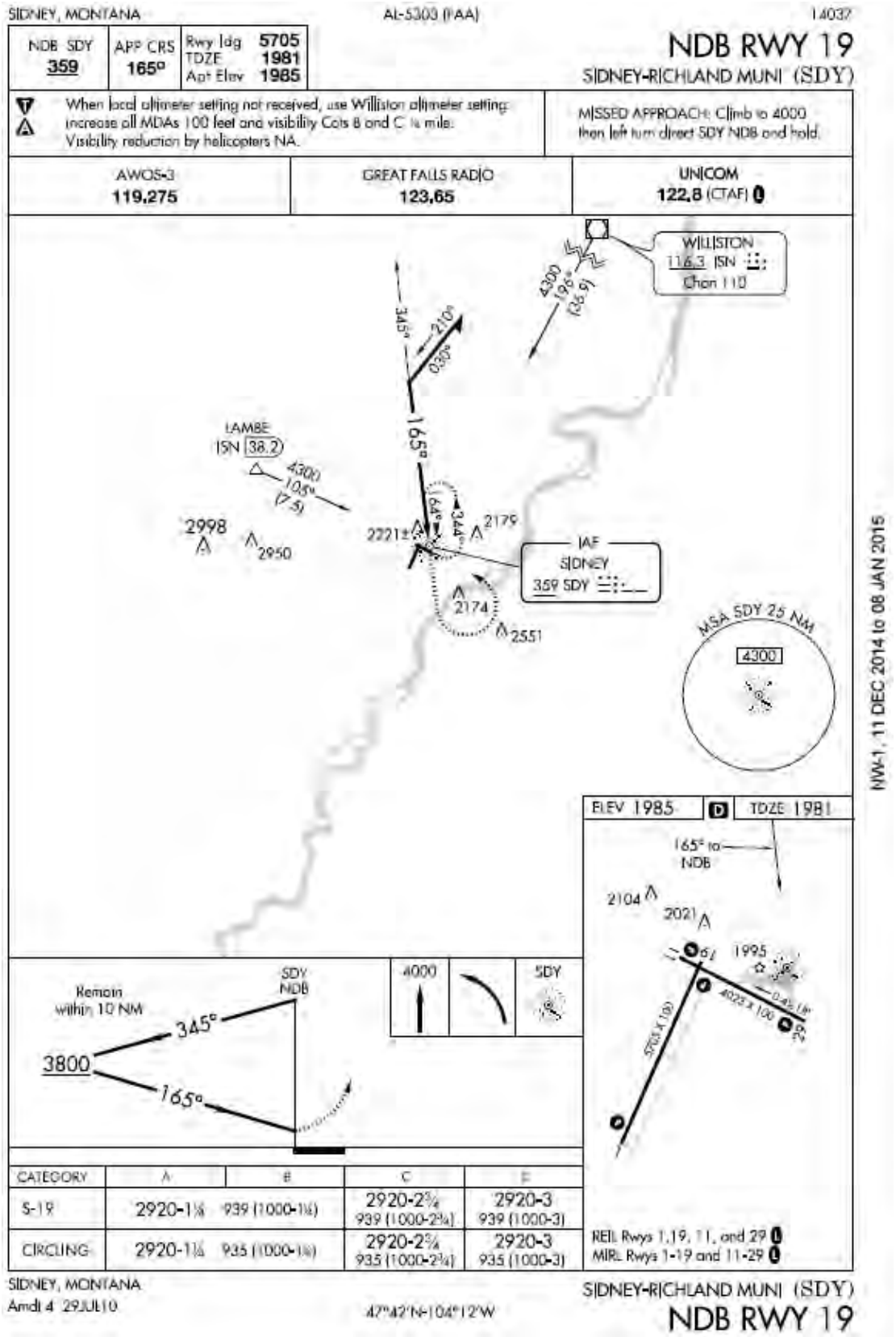


Exhibit AX-24 - Runway 19 NDB Approach



Appendix J – Airport Solid Waste Recycling

Introduction

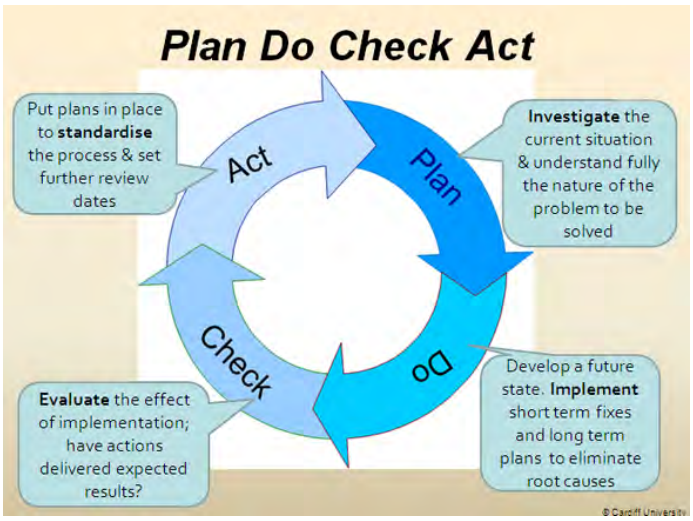
In the FAA Modernization and Reform Act of 2012 (Public Law 112-95), the Airport Improvement Program language was amended (49 USC Section 47106(a)) to include the evaluation of airport solid waste recycling. The change stipulates that the following issues will be addressed:

- Feasibility of Solid Waste Recycling at the Airport,
- Minimizing the Generation of Solid Waste at the Airport,
- Operation and Maintenance Requirements Related to Solid Waste,
- Review of Waste Management Contracts, and
- Potential Cost Savings or Generation of Revenue from Solid Waste Recycling.

To accomplish these objectives this appendix will include:

- Examination of Existing Solid Waste Handling and Recycling
    - Existing Practices including Operations and Maintenance Issues
    - Existing Waste Management Contracts
- Examination of Recycling Opportunities
- Alternatives to Minimize Generation of Solid Waste and
- Cost Savings/Revenue Potential from Recycling.

The FAA published "Recycling, Reuse and Waste Reduction at Airports – A Synthesis Document" April 24, 2013 which is an available resource for this plan. Please note, a Solid Waste Recycling plan is one element of an Environmental Management System (EMS). This appendix will not address all elements of an EMS but information regarding an EMS can be found in FAA AC 150/5050-8 "Environmental Management Systems for Airport Sponsors". The EMS concept follows the "Plan, Do, Check, Act" model which will also be the manner in which the Solid Waste Recycling can be continually evaluated and improved.



Existing Solid Waste Handling and Recycling

There are seven types of waste typically generated at an airport. These are: 1) municipal solid waste, 2) construction/demolition waste, 3) green waste, 4) food waste, 5) waste from aircraft flights, 6) lavatory waste, 7) spill cleanup/remediation waste, and 8) hazardous materials. These are further described in Table 1: Waste Types.

Table 1: Waste Types

Waste Type	Description
Municipal Solid (MSW)	Consists of everyday items that are used and then discarded, such as product packaging, furniture, clothing, bottles, food scraps, and newspapers.
Construction/Demolition (C&D)	Generally categorized as MSW. However, as it can be a major component of airport waste, it has been separated into its own category in this document. C&D waste is any non-hazardous solid waste from land clearing, excavation, and/or the construction, demolition, renovation or repair of structures, roads, and utilities. C&D waste commonly includes concrete, wood, metals, drywall, carpet, plastic, pipes, land clearing debris, cardboard, and salvaged building components. In some instances, C&D waste may be subject to special requirements (e.g., tar impregnated roofing materials, asbestos containing building materials, etc.).
Green	Categorized as MSW and is also referred to as yard waste. Green waste consists of tree, shrub and grass clippings, leaves, weeds, small branches, seeds, pods and similar debris generated by landscape maintenance activities.
Food	Food that is not consumed or is the waste generated and discarded during food preparation activities. Food wastes are also considered part of the MSW waste stream.

Deplaned	A type of MSW removed from passenger aircraft. These include bottles and cans, newspaper and mixed paper, plastic cups and service ware, food waste, food soiled paper, and paper towels. Waste that comes off the airplanes after flights can represent 20% of an airport's total municipal solid waste stream. The composition is roughly 30% each of paper waste, compostable food material, and non-recyclable materials, with the balance consisting of cups and beverage containers.
Lavatory	A type of special waste and is generated when the lavatory tanks of the airplanes are emptied via hose and pumped into a lavatory service vehicle, which can be either a self-powered truck or a lavatory cart pulled by a tug. After the aircraft's lavatory tanks are emptied, they are refilled with a mixture of water and a disinfecting concentrate, commonly called "blue juice." The lavatory waste removed from the aircraft is transported to a triturator facility, generally located airside near airline operations, for pretreatment prior to discharge to the sanitary sewage system and publicly owned treatment works (POTW). In the U.S., waste from international flights, except Canada, needs to be processed separately as the waste can potentially introduce plant pests and diseases. International waste is governed by the United States Department of Agriculture and must follow the handling procedures found in the Manual for Agricultural Clearance.
Spill Cleanup/Remediation	Another type of special waste. This is generated during cleanup of spills and/or the remediation of contamination from various sites on an airport. Care must be taken to ensure that these waste materials are not co-mingled with other waste streams and that storage and disposal procedures comply with applicable regulatory requirements.
Hazardous	Must be handled in accordance with stringent federal regulations. Wastes designated as "hazardous" are covered by regulations outlining legal handling, treatment or disposal. Hazardous wastes are either specifically "listed" in the regulation (40 CFR 261.31-.33), or are ignitable, corrosive, toxic or reactive (as defined in 40 CFR 261.21 -.24). For details, see the Resource Conservation and Recovery Act ("RCRA") and its amendments and the regulations 40 CFR Subtitle C, Parts 260–270.

Source: FAA "Recycling, Reuse and Waste Reduction at Airports – A Synthesis Document" April 24, 2013

For Sidney-Richland Regional Airport there is waste generated primarily from construction projects and the general aviation area. This waste is generated from these normal activities around the airport and collected by airport staff and the general aviation community.

Existing Practices

At the Sidney-Richland Regional Airport trash is disposed of in the general aviation pilot lounge or in the dumpster located off of the ramp. Trash is not sorted and there are no recycling efforts currently in place. The Airport has not kept logs of how much trash has been collected. In the following paragraphs we will outline some simple practices which should help increase recycling at the airport.

Existing Waste Management Contracts

The disposal of waste is a specialized service not regularly performed by airports. At the Sidney-Richland Regional Airport Richland County picks up the trash. The dumpster is emptied weekly. Richland County Sanitations does not offer recycling; recycling options are not being considered at this time.

Recycling Opportunities

The first option for airports regarding recyclables depends upon private/public parties that accept certain types of recyclable material in the nearby area. As stated above, Richland County does not provide the ability to recycle. If the community makes a decision to start recycling, the airport should become involved in this effort.



Alternatives to Minimize Generation of Solid Waste

The common theme for this is “Reduce, Reuse, Recycle”.

One of the methods that Miles City Airport incorporates is reuse. When construction projects occur, any debris that can be reused in the project such as recycled asphalt it is reused when possible. The airport has also identified several areas for clean fill (usually compactable soil or construction debris with no solid or hazardous waste) where debris can be disposed and compacted to create future developable areas.

Steps to Minimize Waste (and Costs) Moving Forward

Here are several steps Sidney-Richland Regional Airport can take to minimize waste and costs:

1. The Airport should work with the County whenever recycling is started. This will ensure that opeartors at the airport have the ability to recycle whatever is accepted by the County.
2. The Airport should invest in a building audit, which will look at window replacement, insulation and other methods to reduce heating and cooling (solar panels, solar walls, ground source heat pumps, etc.)
3. The Airport should look into changing out all of the light bulbs in the office space to LED bulbs. The average savings (2013) over the life of a typical LED light compared to using traditional light bulbs is approximately $600.
4. The Airport should encourage individual hangar owners to replace light fixtures within hangars with compact fluorescent bulbs.

Appendix K – Existing Airport Zoning Ordinance

Sidney–Richland Airport
Airport Zoning Commission

Final Report

October 21, 1999

a report to recommend the boundaries of
the various zones to be established
and the regulations to be adopted

(revised draft ordinance)

DRAFT ZONING ORDINANCE TO LIMIT HEIGHT OF OBJECTS AROUND SIDNEY-RICHLAND AIRPORT

AN ORDINANCE REGULATING AND RESTRICTING THE HEIGHT OF STRUCTURES AND OBJECTS OF NATURAL GROWTH, AND OTHERWISE REGULATING THE USE OF PROPERTY, IN THE VICINITY OF THE SIDNEY-RICHLAND AIRPORT BY CREATING THE APPROPRIATE ZONES AND ESTABLISHING THE BOUNDARIES THEREOF; PROVIDING FOR CHANGES IN THE RESTRICTIONS AND BOUNDARIES OF SUCH ZONES; DEFINING CERTAIN TERMS USED HEREIN; REFERRING TO THE SIDNEY-RICHLAND AIRPORT ZONING MAP WHICH IS INCORPORATED IN AND MADE A PART OF THIS ORDINANCE; PROVIDING FOR ENFORCEMENT; ESTABLISHING A BOARD OF ADJUSTMENT; AND IMPOSING PENALTIES.

This Ordinance is adopted pursuant to the authority conferred by Montana Codes Annotated, Title 67, Chapters 4, 5, and 6. It is hereby found that an obstruction has the potential for endangering the lives and property of users of the Sidney-Richland Airport, and property or occupants of land in its vicinity; that an obstruction may affect existing and future approach minimums of Sidney-Richland Airport; and that an obstruction may reduce the size of areas available for landing, takeoff, and maneuvering of aircraft, thus tending to destroy or impair the utility of Sidney-Richland Airport and the public investment therein. Accordingly it is declared:

(1) that the creation or establishment of an obstruction has the potential of being a public nuisance and may injure the region served by Sidney-Richland Airport;

(2) that it is necessary in the interest of the public health, public safety, and general welfare that the creation or establishment of obstructions that are a hazard to air navigation be prevented; and

(3) that the prevention of these obstructions should be accomplished, to the extent legally possible, by the exercise of the police power without compensation.

It is further declared that the prevention of the creation or establishment of hazards to air navigation, the elimination, removal, alteration or mitigation of hazards to air navigation, or marking and lighting of obstructions are public purposes for which a political subdivision may raise and expend public funds and acquire land or interests in land.

IT IS HEREBY RESOLVED BY THE SIDNEY-RICHLAND AIRPORT AUTHORITY, AS FOLLOWS:

SECTION I: SHORT TITLE

This Ordinance shall be known and may be cited as Sidney-Richland Airport Zoning Ordinance.

SECTION II: DEFINITIONS

As used in this Ordinance, unless the context otherwise requires:

1. AIRPORT - means Sidney-Richland Airport.

2. AIRPORT ELEVATION - 1,984 feet above mean sea level, which is the highest point of an airport's useable landing area measured in feet from sea level.

3. APPROACH SURFACE - A surface longitudinally centered on the extended runway centerline, extending outward and upward from the end of the primary surface and at the same slope as the approach zone height limitation slope set forth in Section IV of this Ordinance. In plan the perimeter of the approach surface coincides with the perimeter of the approach zone.

4. APPROACH, TRANSITIONAL, HORIZONTAL, AND CONICAL ZONES - These zones are set forth in Section III of this Ordinance.

5. BOARD OF ADJUSTMENT - A board consisting of five (5) members appointed by the Sidney-Richland Airport Authority as provided for in Sections 67-4-312, 67-6-206 and Sections 76-2-321 through 76-2-328 Montana Codes annotated.

6. CONICAL SURFACE - A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

7. HAZARD TO AIR NAVIGATION - An obstruction determined to have a substantial adverse effect on the safe and efficient utilization of the navigable airspace.

8. HEIGHT - For the purpose of determining the height limits in all zones set forth in this Ordinance and shown on the zoning map, the datum shall be mean sea level elevation unless otherwise specified.

9. HORIZONTAL SURFACE - A horizontal plane 150 feet above the established airport elevation, the perimeter of which in plan coincides with the perimeter of the horizontal zone.

10. LARGER THAN UTILITY RUNWAY - A runway that is constructed for and intended to be used by propeller driven aircraft of greater than 12,500 pounds maximum gross weight and jet powered aircraft.

11. NONCONFORMING USE - Any pre-existing structure, object of natural growth, or use of land which is inconsistent with the provisions of this Ordinance or an amendment

thereto.

12. NON-PRECISION INSTRUMENT RUNWAY A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in non-precision instrument approach procedure has been approved or planned.

13. OBSTRUCTION - Any structure, growth, or other object, including a mobile object, which exceeds a limiting height set forth in Section IV of this Ordinance.

14. PERSON - An individual, firm, partnership, corporation, company, association, joint stock association or governmental entity; includes a trustee, a receiver, an assignee, or a similar representative of any of them.

15. PRECISION INSTRUMENT RUNWAY - A runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS) or a Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated on an approved airport layout plan or any other planning document.

16. PRIMARY SURFACE - A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway; when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The width of the primary surface is set forth in Section III of this Ordinance. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline.

17. RUNWAY - A defined area on an airport prepared for landing and takeoff of aircraft along its length.

18. STRUCTURE - An object, including a mobile object, constructed or installed by man, including but without limitation, buildings, towers, cranes, smokestacks, earth formation, and overhead transmission lines.

19. TRANSITIONAL SURFACES - These surfaces extend outward at 90 degree angles to the runway centerline and the runway centerline extended at a slope of seven (7) feet horizontally for each foot vertically from the sides of the primary and approach surfaces to where they intersect the horizontal and conical surfaces. Transitional surfaces for those portions of the precision approach surfaces, which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at 90 degree angles to the extended runway centerline.

20. TREE - Any object of natural growth.

21. UTILITY RUNWAY - A runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.

22. VISUAL RUNWAY - A runway intended solely for the operation of aircraft using visual approach procedures.

SECTION III: AIRPORT ZONES

In order to carry out the provisions of this Ordinance, there are hereby created and established certain zones which include all of the land lying beneath the approach surfaces, transitional surfaces, horizontal surfaces, and conical surfaces as they apply to the Sidney-Richland Airport. Such zones are shown on the Sidney-Richland Airport Zoning Maps consisting of two corresponding Airspace Drawings of the existing Airport Layout Plan (ALP), prepared by the Sidney-Richland Airport Authority labeled Sheet No. A-2 dated 9-15-98 and Sheet No. A-3 dated 7-22-98. When the existing ALP Airspace Drawings are updated, the new versions will replace the existing Sidney-Richland Airport Zoning Maps concurrent with ALP approval by the Federal Aviation Administration. The current versions of the ALP Airspace Drawings are attached to this Ordinance and made a part hereof. An area located in more than one (1) of the following zones is considered to be only in the zone with more restrictive height limitation. The various zones are hereby established and defined as follows:

1. Runway Larger Than Utility Visual Approach Zone - The inner edge of this approach zone coincides with the width of the primary surface and is 500 feet wide. The approach zone expands outward uniformly to a width of 1,500 feet at a horizontal distance of 5,000 feet from the primary surface. Its centerline is the continuation of the centerline of the runway.

2. Runway Larger Than Utility With A Visibility Minimum Greater Than 3/4 Mile Non-precision Instrument Approach Zone - The inner edge of this approach zone coincides with the width of the primary surface and is 500 feet wide. The approach zone expands outward uniformly to a width of 3,500 feet at a horizontal distance of 10,000 feet from the primary surface. Its centerline is the continuation of the centerline of the runway.

3. Precision Instrument Runway Approach Zone - The inner edge of this approach zone coincides with the width of the primary surface and is 1,000 feet wide. The approach zone expands outward uniformly to a width of 16,000 feet at a horizontal distance of 50,000 feet from the primary surface. Its centerline is the continuation of the centerline of the runway.

4. Transitional Zones - The transitional zones are the areas beneath the transitional surfaces.

5. Horizontal Zone - The horizontal zone is established by swinging arcs from the center of each end of the primary surface of each runway and connecting the adjacent arcs by drawing lines tangent to those arcs. The radius of arc is:

a. 5,000 feet for all runways designated utility or visual

b. 10,000 feet for all others.

The radius of the arc for each end of the runway shall be the same. The radius used shall be the longest determined for either end. The horizontal zone does not include the approach and transitional zones.

6. Conical Zone - The conical zone is established as the area that commences at the periphery of the horizontal zone and extends outward therefrom a horizontal distance of 4,000 feet.

SECTION IV: AIRPORT ZONE HEIGHT LIMITATIONS

Except as otherwise provided in this Ordinance, no structure shall be erected, altered, or maintained, and no tree shall be allowed to grow in any zone created by this Ordinance to a height in excess of the applicable height limit herein established for such zone. Such applicable height limitations are hereby established for each of the zones in question as follows:

1. Runway Larger Than Utility Visual Approach Zone - Slopes twenty (20) feet outward for each foot upward beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of 5,000 feet along the extended runway centerline.

2. Runway Larger Than Utility With A Visibility Minimum Greater Than 3/4 Mile Non-precision Instrument Approach Zone - Slopes thirty four (34) feet outward for each foot upward beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of 10,000 feet along the extended runway centerline.

3. Precision Instrument Runway Approach Zone - Slopes fifty (50) feet outward for each foot upward beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of 10,000 feet along the extended runway centerline; thence slopes upward forty (40) feet horizontally for each foot vertically to an additional horizontal distance of 40,000 feet along the extended runway centerline.

4. Transitional Zones Slope seven (7) feet outward for each foot upward beginning at the sides of and at the same elevation as the primary surface and the approach surface, and extending to a height of 150 feet above the airport elevation which is 1,984 feet above mean sea level. In addition to the foregoing, there are established height limits sloping seven (7) feet outward for each foot upward beginning at the sides of and at the same elevation as the approach surface, and extending to where they intersect the conical surface. Where the precision instrument runway approach zone projects beyond the conical zone, there are established height limits sloping seven (7) feet outward for each foot upward beginning at the sides of and at the same elevation as the approach surface, and extending a horizontal distance of 5,000 feet measured at 90 degree angles

to the extended runway centerline.

5. Horizontal Zone - Established at 150 feet above the airport elevation or at a height of 2,134 feet above mean sea level.

6. Conical Zone - slopes 20 feet outward for each foot upward beginning at the periphery of the horizontal zone and at 150 feet above the airport elevation and extending to a height of 350 feet above the airport elevation.

7. Excepted Height Limitations - Nothing in this Ordinance shall be construed as prohibiting the construction or maintenance of any structure, or growth of any tree to a height up to 50 feet above the surface of the land.

SECTION V: USE RESTRICTIONS

Notwithstanding any other provisions of this Ordinance, no use may be made of land or water within any zone established by this Ordinance in such a manner as to create electrical interference with navigational signals or radio communication between the airport and aircraft, make it difficult for pilots to distinguish between airport lights and others, result in glare in the eyes of pilots using the airport, impair visibility in the vicinity of the airport, create bird strike hazards, or otherwise in any way endanger or interfere with the landing, takeoff, or maneuvering of aircraft intending to use the airport.

SECTION VI: NONCONFORMING USES

1. Regulations Not Retroactive - The regulations prescribed by this Ordinance shall not be construed to require the removal, lowering, or other change or alteration of any structure or tree not conforming to the regulations as of the effective date of this Ordinance, or otherwise interfere with the continuance of a nonconforming use. Nothing contained herein shall require any change in the construction, alteration, or intended use of any structure, the construction or alteration of which was begun prior to the effective date of this Ordinance, and is diligently prosecuted.

2. Marking and Lighting - Notwithstanding the preceding provision of this Section, the owner of any existing nonconforming structure or tree is hereby required to permit the installation, operation, and maintenance thereon of such markers and lights as shall be deemed necessary by the Sidney-Richland Airport Manager to indicate to the operators of aircraft in the vicinity of the airport the presence of such airport obstruction. Such markers and lights shall be installed, operated, and maintained at the expense of the Sidney-Richland Airport Authority.

SECTION VII: PERMITS

1. Future Uses - Except as specifically provided in a, b, and c hereunder, no material change shall be made in the use of land, no structure shall be erected or otherwise established, and no tree shall be planted in any zone hereby created unless a permit therefore shall have been applied for and granted. Each application for a permit shall indicate the purpose for which the permit is desired, with sufficient particularity to permit it to be determined whether the resulting use, structure, or tree would conform to the regulations herein prescribed. If such determination is in the affirmative, the permit shall be granted. No permit for a use inconsistent with the provisions of this Ordinance shall be granted unless a variance has been approved in accordance with Section VII, 4.

   a. In the area lying within the limits of the horizontal zone and conical zone, no permit shall be required for any tree or structure less than seventy-five feet of vertical height above the ground, except when, because of terrain, land contour, or topographic features, such tree or structure would extend above the height limits prescribed for such zones.

   b. In areas lying within the limits of the approach zones, but at a horizontal distance of not less than 4,200 feet from each end of the runway, no permit shall be required for any tree or structure less than seventy-five feet of vertical height above the ground, except when such tree or structure would extend above the height limit prescribed for such approach zones.

   c. In the areas lying within the limits of the transition zones beyond the perimeter of the horizontal zone, no permit shall be required for any tree or structure less than seventy-five feet of vertical height above the ground, except when such tree or structure, because of terrain, land contour, or topographic features, would extend above the height limit prescribed for such transition zones.

   Nothing contained in any of the foregoing exceptions shall be construed as permitting or intending to permit any construction, or alteration of any structure, or growth of any tree in excess of any of the height limits established by this Ordinance except as set forth in Section VII, 4.

2. Existing Uses - No permit shall be granted that would allow the establishment or creation of an obstruction or permit a nonconforming use, structure, or tree to become a greater hazard to air navigation than it was on the effective date of this Ordinance or any amendments thereto or than it is when the application for a permit is made. Except as indicated, all applications for such a permit shall be granted.

3. Nonconforming Uses Abandoned or Destroyed - Whenever the Sidney-Richland Airport Manager determines that a nonconforming tree or structure has been abandoned or more than 80 percent torn down, physically deteriorated, or decayed, no permit shall be granted that would allow such structure or tree to exceed the applicable height limit or otherwise deviate from the zoning regulations.

4. Variances - Any person desiring to erect or increase the height of any structure, or permit the growth of any tree, or use property, not in accordance with the regulations prescribed in this Ordinance, may apply to the Board of Adjustment for a variance from such regulations. The application for variance shall be accompanied by a determination from the Federal Aviation Administration as to the effect of the proposal on the operation of air navigation facilities and the safe, efficient use of navigable air space. Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations will result in unnecessary hardship and relief granted, will not be contrary to the public interest, will not create a hazard to air; navigation, will do substantial justice, and will be in accordance with the spirit of this Ordinance. Additionally, no application for variance to the requirements of this Ordinance may be considered by the Board of Adjustment unless a copy of the application has been furnished to the Sidney-Richland Airport Authority for advice as to the aeronautical effects of the variance. If the Sidney-Richland Airport Authority does not respond to the application within fifteen (15) days after receipt, the Board of Adjustment may act on its own to grant or deny said application.

5. Obstruction Marking and Lighting - Any permit or variance granted may, if such action is deemed advisable to effectuate the purpose of this Ordinance and be reasonable in the circumstances, be so conditioned as to require the owner of the structure or tree in question to install, operate, and maintain, at the owner's expense, such markings and lights as may be necessary. If deemed proper by the Board of Adjustment, this condition may be modified to require the owner to permit the Sidney-Richland Airport Authority at its own expense, to install, operate, and maintain the necessary markings and lights.

SECTION VIII: ENFORCEMENT

It shall be the duty of the Sidney-Richland Airport Manager to administer and enforce the regulations prescribed herein. Applications for permits and variances shall be made to the Sidney-Richland Airport Manager upon a form published for that purpose. Applications required by this Ordinance to be submitted to the Sidney-Richland Airport Manager shall be promptly considered and granted or denied. Application for action by the Board of Adjustment shall be forthwith transmitted by the Sidney-Richland Airport Manager.

SECTION IX: BOARD OF ADJUSTMENT

1. There is hereby created a Board of Adjustment to have and exercise the following powers: (1) to hear and decide appeals from any order, requirement, decision, or determination made by the Sidney-Richland Airport Manager, in the enforcement of this Ordinance; (2) to hear and decide special exceptions to the terms of this Ordinance upon which such Board of Adjustment under such regulations may be required to pass; and (3) to hear and decide specific variances.

2. The Board of Adjustment shall be as provided for in Sections 67-4-321, 67-6-206 and 76-2-321 through 76-2-328 Montana Codes Annotated.

SECTION X: APPEALS

1. Any person aggrieved, or any taxpayer affected, by any decision made in the administration of the Ordinance, may appeal to the Board of Adjustment.

2. All appeals hereunder must be taken within a reasonable time as provided by the rules of the Board of Adjustment, filing with the Sidney-Richland Airport Manager a notice of appeal specifying the grounds thereof. The Sidney-Richland Airport Manager shall forthwith transmit to the Board of Adjustment all the papers constituting the record upon which the action appealed from was taken.

3. An appeal shall stay all proceedings in furtherance of the action appealed from unless the Sidney-Richland Airport Manager, certifies to the Board of Adjustment, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate a stay would in the opinion of the Sidney-Richland Airport Manager cause imminent peril to life or property. In such case, proceedings shall not be stayed except by order of the Board of Adjustment or notice to the Sidney-Richland Airport Manager and on due cause shown.

4. The Board of Adjustment shall fix a reasonable time for hearing appeals, give public notice and due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing, any party may appear in person or by agent or by attorney.

5. The Board of Adjustment may, in conformity with the provisions of this Ordinance, reverse or affirm, in whole or in part, or modify the order, requirement, decision, or determination appealed from and may make such order, requirement, decision or determination as may be appropriate under the circumstances.

SECTION XI: JUDICIAL REVIEW

Any person aggrieved, or any taxpayer affected, by any decision of the Board of Adjustment, may appeal to the appropriate Court as provided in the Public Laws of the State of Montana.

SECTION XII: PENALTIES

Each violation of this Ordinance or of any regulation, order, or ruling promulgated hereunder shall be prosecuted in compliance with Montana Codes Annotated, Title 67, Chapters 4, 5, and 6.

SECTION III: CONFLICTING REGULATIONS

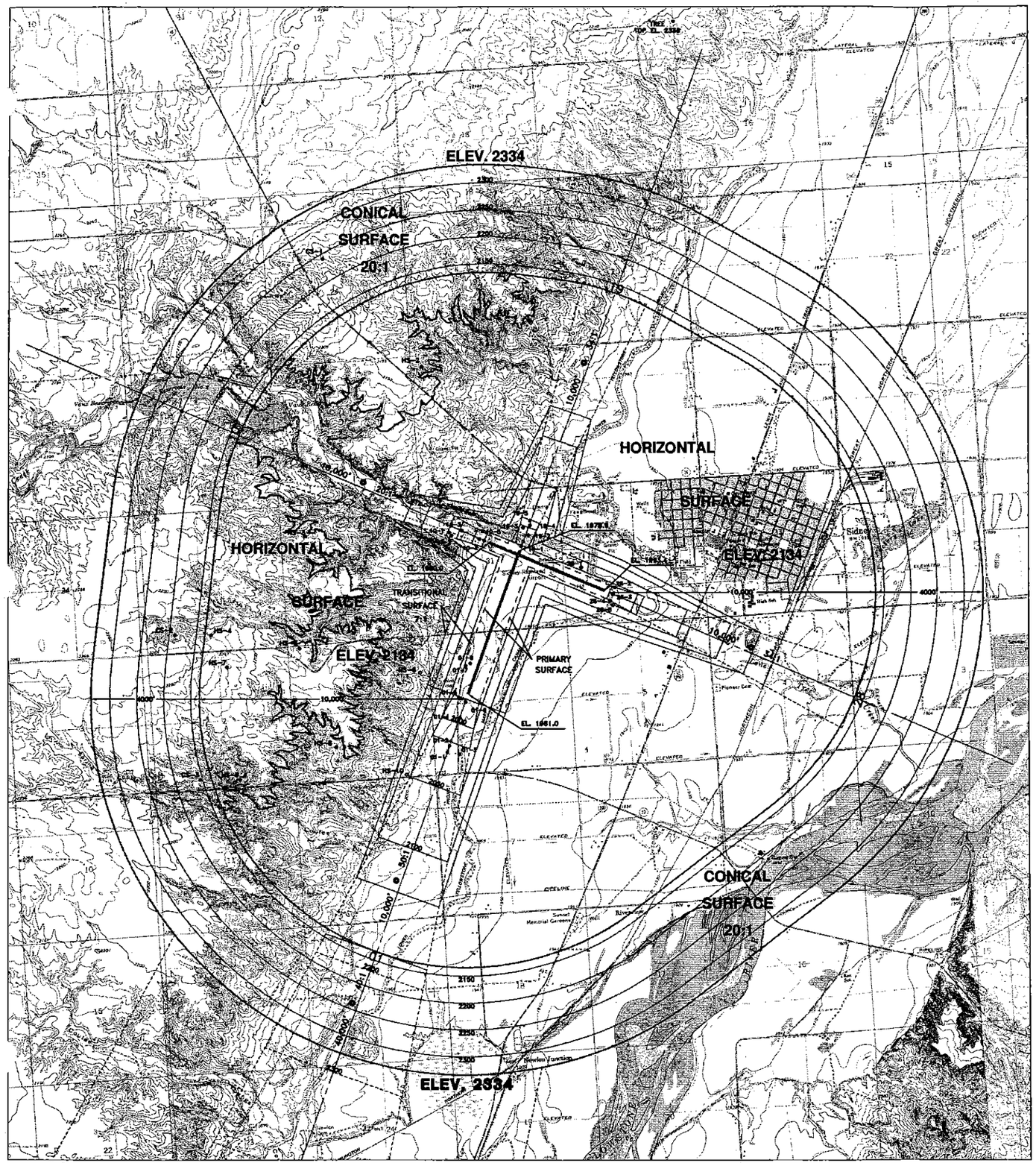
Where there exists a conflict between any of the regulations or limitations prescribed in this Ordinance and any other regulations applicable to the same area, whether the conflict be with respect to the height of structures or trees, and the use of land, or any other matter, the more stringent limitation or requirement shall govern and prevail.

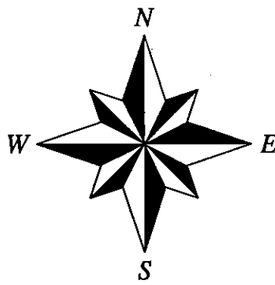
SECTION XIV: SEVERABILITY

If any of the provisions of this Ordinance or the application thereof to any person or circumstances are held invalid, such invalidity shall not affect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end, the provisions of this Ordinance are declared to be severable.

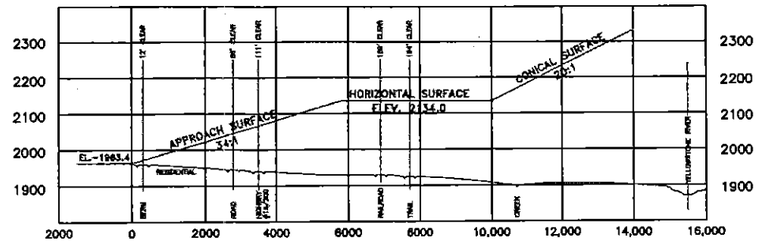
SECTION XV: EFFECTIVE DATE

WHEREAS, the immediate operation of the provisions of this Ordinance is necessary for the preservation of the public health, public safety, and general welfare, an EMERGENCY is hereby declared to exist, and this Ordinance shall be in full force and effect from and after its passage by the Sidney-Richland Airport Authority and publication and posting as required by law. Adopted by the Sidney-Richland Airport Authority, Sidney City Council and the Richland County Commissioners this _____ day of _____ , 1999.

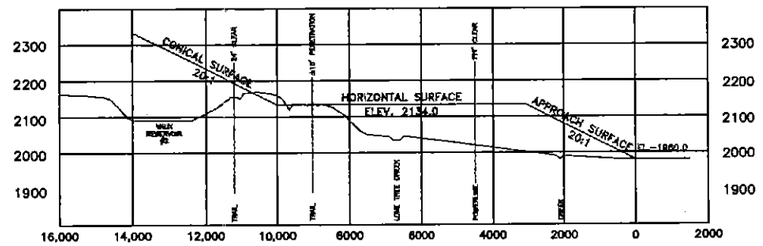




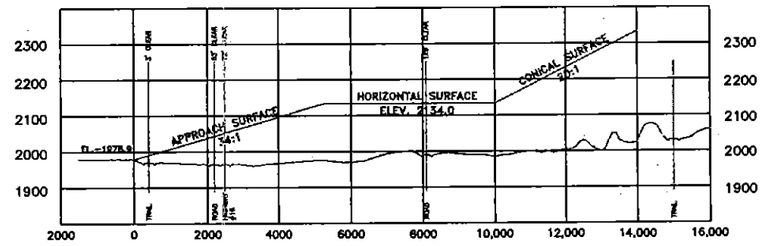
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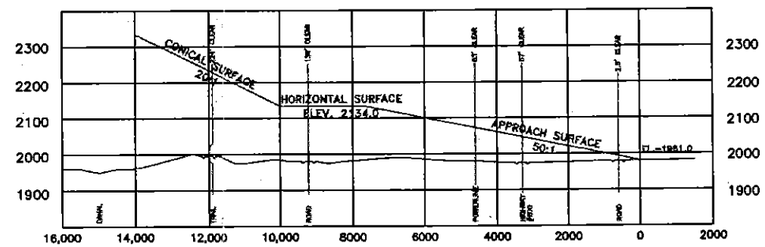
APPROACH TO RUNWAY – 28



APPROACH TO RUNWAY – 10



APPROACH TO RUNWAY – 19



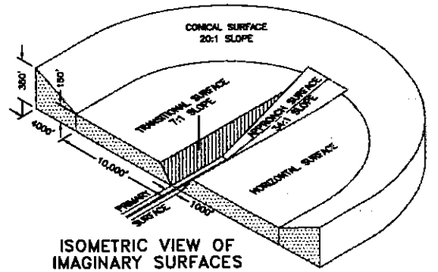
APPROACH TO RUNWAY – 01

LEGEND



CONTOUR LINE DEFINING PENETRATION INTO HORIZONTAL SURFACE

HS-6 ELEVATED OBJECT WITHIN PART 77 AIRSPACE



ISOMETRIC VIEW OF IMAGINARY SURFACES

THIS DRAWING WAS PRODUCED IN PART FROM A PHOTOGRAPHIC REPRODUCTION OF THE CURRENT U.S.G.S. QUAD MAPS THAT COVER THIS AREA.

ALL AIR CLEARANCE DATA APPLIED TO THIS DRAWING WAS TAKEN FROM PART 77 OF THE F.A.R.'s.

Rev'd.	Date	Description	Dwn.	Chk.	Appv.

SIDNEY–RICHLAND AIRPORT
SIDNEY–RICHLAND AIRPORT AUTHORITY
SIDNEY, MONTANA

SHEET NO. A-2

Kadrmas Lee & Jackson
Consulting Engineers and Surveyors

AIRSPACE PLAN (PART 77)

DSGN. BY	DRWN. BY	CHK'D BY	CHK'R. NO.	DATE
	C.A.S.		1598400	09/15/98

©Kadrmas, Lee & Jackson, P.C. 1998



SCHEDULE OF OBSTRUCTIONS

* PENETRATES OBJECT FREE AREA
** LIGHTING OF OBJECT REQUIRED

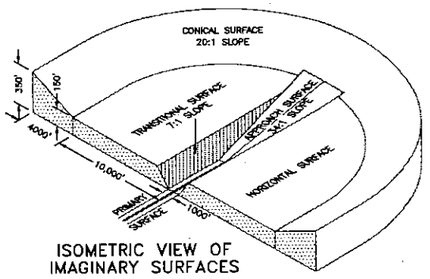
(A) = ABOVE APPROACH SURFACES
(B) = BELOW APPROACH SURFACES

OBSTRUCTION		CHARACTERISTICS			
KEY No.	DESCRIPTION	OBJECT ELEV. (ft)	PART 77 SURFACE	OBJECT PENETRATION	FUTURE DISPOSITION
01-1	TREE	2008.8	50:1 APPROACH SURFACE	17.7'(B)	TO REMAIN
01-2	TREE	2004.8	50:1 APPROACH SURFACE	18.7'(B)	TO REMAIN
01-3	TREE	2017.8	20:1 APPROACH SURFACE	8.3'(B)	TO REMAIN
01-4	ROAD	1894.7	50:1 APPROACH SURFACE	2.8'(B)	TO REMAIN
01-5	ROAD	2001.8	50:1 APPROACH SURFACE	10.5'(A)	TO RELOCATE
01-6	FENCE	1986.0	50:1 APPROACH SURFACE	1.0'(B)	TO REMAIN
01-7	HOUSE	2010.3	TRANSITIONAL SURFACE	8.27'(B)	TO REMAIN
01-8	HOUSE	2007.7	TRANSITIONAL SURFACE	12.73'(A)**	TO REMAIN
19-1	FENCE	1978.8	34:1 APPROACH SURFACE	2.6'(B)	TO REMAIN
19-2	ROAD	1978.3	34:1 APPROACH SURFACE	3.0'(B)	TO REMAIN
19-3	TREE	2015.3	34:1 APPROACH SURFACE	13.0'(A)	REMOVE
19-4	TREE	2013.6	34:1 APPROACH SURFACE	8.8'(A)	REMOVE
19-5	TREE	2014.9	34:1 APPROACH SURFACE	6.7'(A)	REMOVE
19-7	ROAD	1982.0	34:1 APPROACH SURFACE	1.5'(A)	TO REMAIN
19-8	ROAD	1978.0	34:1 APPROACH SURFACE	5.0'(B)	TO REMAIN
10-1	OIL WELL	2034.8	20:1 APPROACH SURFACE	26.1'(A)	RELOCATE
10-2	TANK	2023.8	20:1 APPROACH SURFACE	11.8'(A)	RELOCATE
10-3	UTILITY POLE	2025.3	20:1 APPROACH SURFACE	25.0'(A)	RELOCATE
10-4	ROAD CL	1983.4	PRIMARY SURFACE	13.4'(A)	RELOCATE
10-5	FENCE	1987.0	PRIMARY SURFACE	7.2'(A)	RELOCATE
28-1	WINDSOCK	1977.0	TRANSITIONAL SURFACE	5.3'(B)	FIXED BY FUNCTION
28-2	BERM	1977.2	34:1 APPROACH SURFACE	9.8'(B)	TO REMAIN
28-3	BERM	1976.8	34:1 APPROACH SURFACE	14.3'(B)	TO REMAIN
28-4	BERM	1976.7	34:1 APPROACH SURFACE	17.8'(B)	TO REMAIN
28-5	HOUSE	1972.1	TRANSITIONAL SURFACE	13.8'(B)	TO REMAIN
HS-1	POLE	2231.8	HORIZONTAL SURFACE	97.0'(A)	TO REMAIN
HS-2	RADIO TOWER	2237.0	HORIZONTAL SURFACE	103.0'(A)	TO REMAIN
HS-3	STORAGE TANK	2238.0	HORIZONTAL SURFACE	105.0'(A)	TO REMAIN
HS-4	POLE	2236.0	HORIZONTAL SURFACE	102.0'(A)	TO REMAIN
HS-5	POLE	2208.0	HORIZONTAL SURFACE	73.0'(A)	TO REMAIN
HS-6	POLE	2095.0	HORIZONTAL SURFACE	39.0'(B)	TO REMAIN
HS-7	STORAGE TANK	2214.0	HORIZONTAL SURFACE	80.0'(A)	TO REMAIN
HS-8	TREE	2288.0	HORIZONTAL SURFACE	136.0'(A)	TO REMAIN
HS-9	POLE	2235.0	HORIZONTAL SURFACE	91.0'(A)	TO REMAIN
HS-10	POLE	2054.0	HORIZONTAL SURFACE	80.0'(B)	TO REMAIN
CS-1	RADIO TOWER	2347.0	CONICAL SURFACE	108.0'(A)	TO REMAIN
CS-2	POLE	2292.0	CONICAL SURFACE	163.0'(A)	TO REMAIN
CS-3	POLE	2234.0	CONICAL SURFACE	70.0'(A)	TO REMAIN

LEGEND

CONTOUR LINE DEFINING PENETRATION INTO HORIZONTAL SURFACE

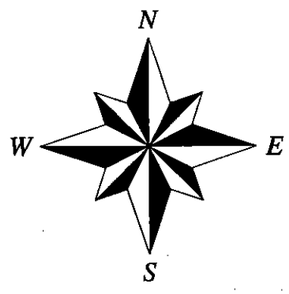
HS-8 • ELEVATED OBJECT WITHIN PART 77 AIRSPACE



ISOMETRIC VIEW OF IMAGINARY SURFACES

THIS DRAWING WAS PRODUCED IN PART FROM A PHOTOGRAPHIC REPRODUCTION OF THE CURRENT U.S.G.S. QUAD MAPS THAT COVER THIS AREA.

ALL AIR CLEARANCE DATA APPLIED TO THIS DRAWING WAS TAKEN FROM PART 77 OF THE F.A.R.'s.



SCALE: 1"=4000'

J:\AIRPORT\1598400\ALP_ALP_A03.DWG

Rev'd.	Date	Description	Dwn.	Chk.	Appv.

SIDNEY–RICHLAND AIRPORT
SIDNEY–RICHLAND AIRPORT AUTHORITY
SIDNEY, MONTANA

SHEET NO. A-3

Kadrmas Lee & Jackson
Consulting Engineers and Surveyors

EXTENDED GLIDE PATH (PART 77)

DRWN. BY	CHK'D BY	CMPR. NO.	DATE
C.A.S.		1598400	07/22/98

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Appendix L - Letters of Interest

February 11, 2015

RE: Intent to Build Corporate Hanger Facility

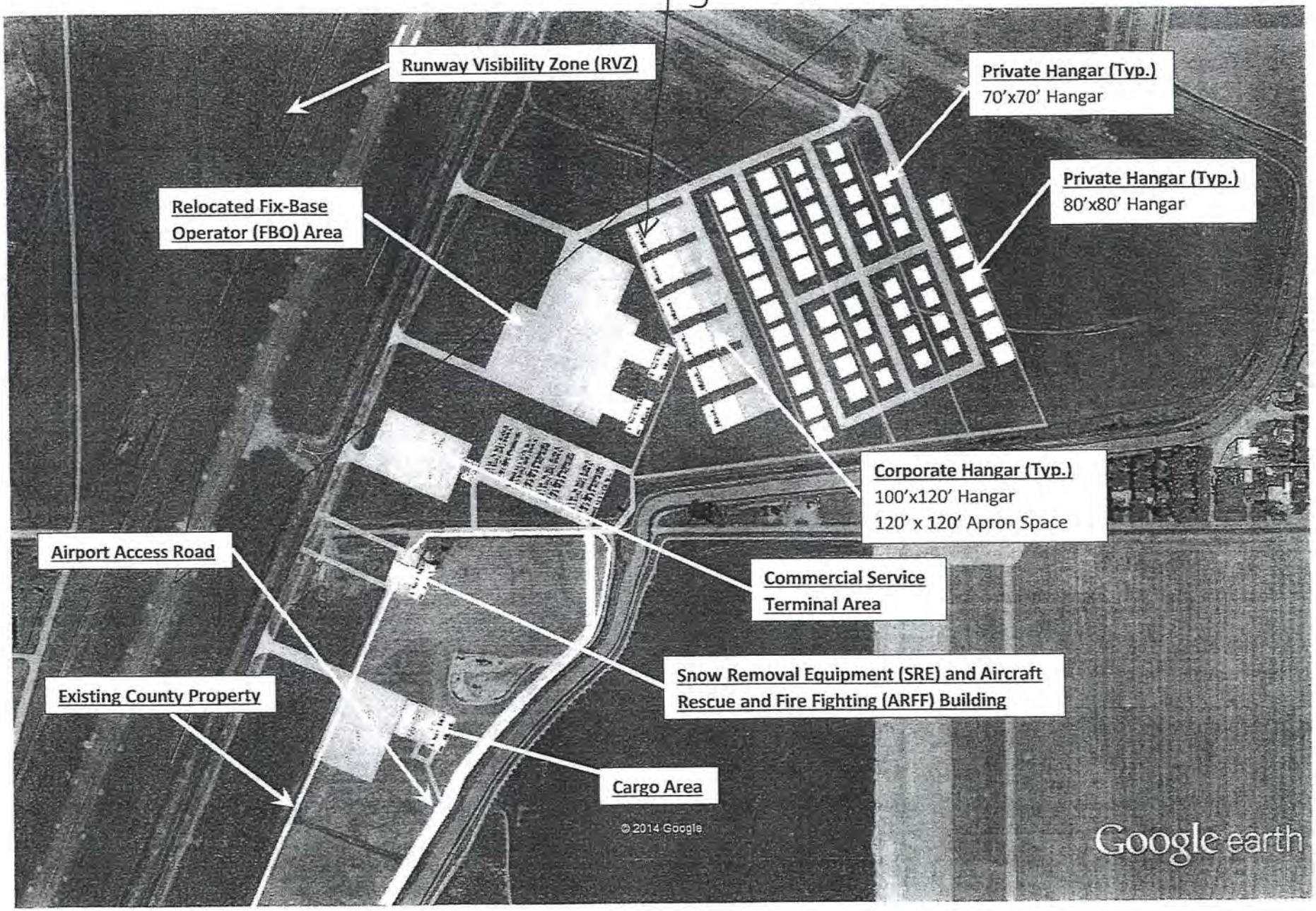
Dear Sidney Richland Airport Authority, KLJ, F.A.A., Montana Aeronautics Division,

It is my intention to build a large corporate hanger in the northernmost location shown in **[Alternative Plan A]**. This building dimensions will approximately be 100 (L) x 120 (W). This building will contain a small office, bathroom and will have a large East facing door.

Respectfully,

Les Shandy

Shandy Hanger



Sidney-Richland Municipal Airport

Hangar Area Development – Alternative IV(A) (Ultimate) – Accounts for Ultimate Runway 1/19 Extension to 7,700' (Runway 1 end)

KLJ

Sidney Air Service Inc.
P.O. Box 355 Sidney, MT 59270
Phone: (406) 488-4031 Email: sasi@midrivers.com

February 11, 2015

RE: Intent to Build FBO Facility

Dear Sidney Richland Airport Authority, KLJ, F.A.A., Montana Aeronautics Division,

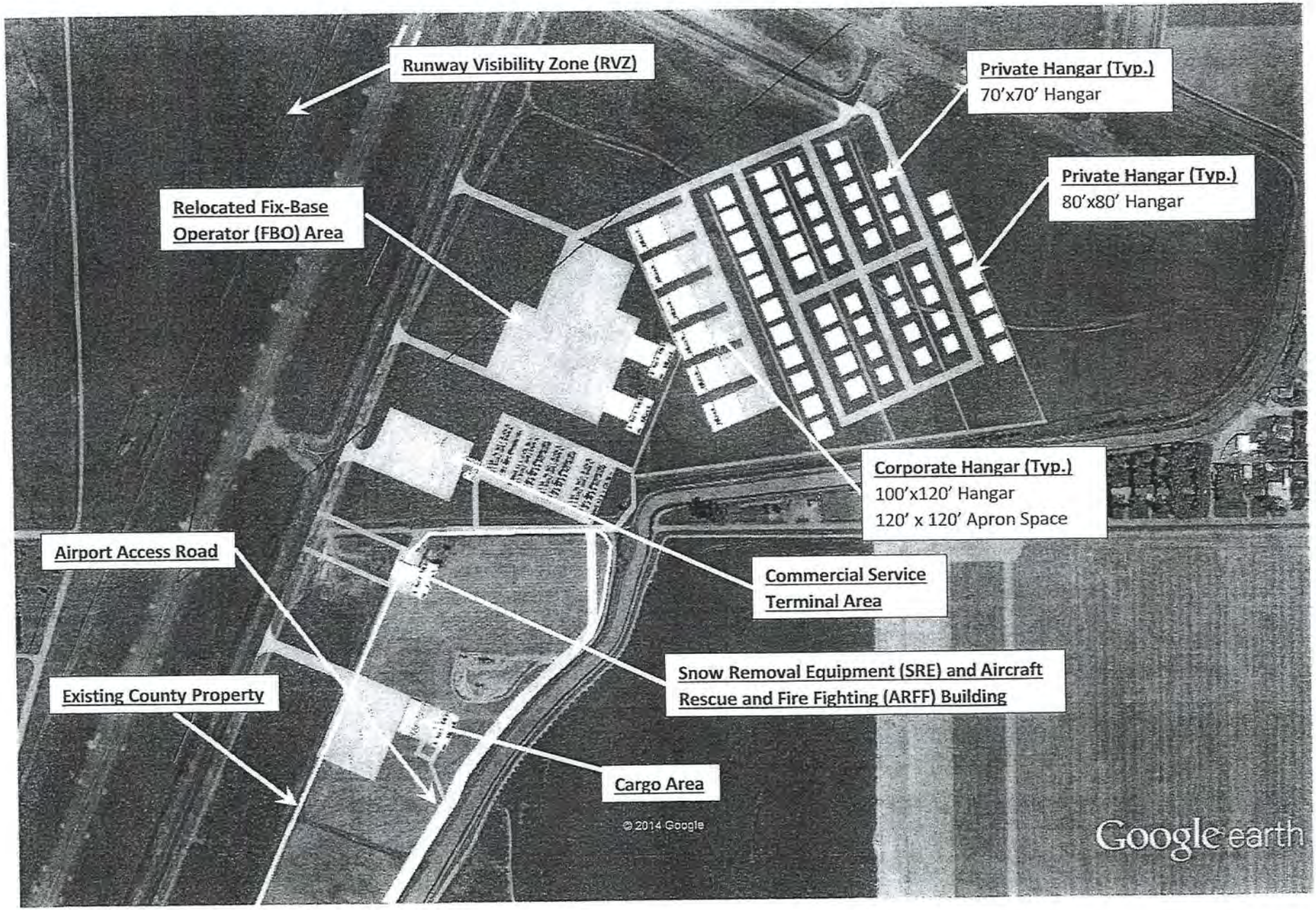
It is our intent to build a large hanger / FBO facility in the FBO location shown in **[Alternative Plan A]** which places the FBO near Runway 01/19. This hanger will have an attached 2-story office, observation deck and the main hanger door will be orientated to the South. See previously submitted drawing for dimensions of the hanger.

It is not Sidney Air Service Inc. intention to build any facilities on **[Alternative Plan B]** which places the FBO's near the approach end of runway 29.

Respectfully,

Barry Holzworth, President

Barry Holzworth, President
Sidney Air Service Inc.



Sidney-Richland Municipal Airport

Hangar Area Development – Alternative IV(A) (Ultimate) – Accounts for Ultimate Runway 1/19 Extension to 7,700'
(Runway 1 end)

KLJ

Appendix M – Trillion Report

Introduction

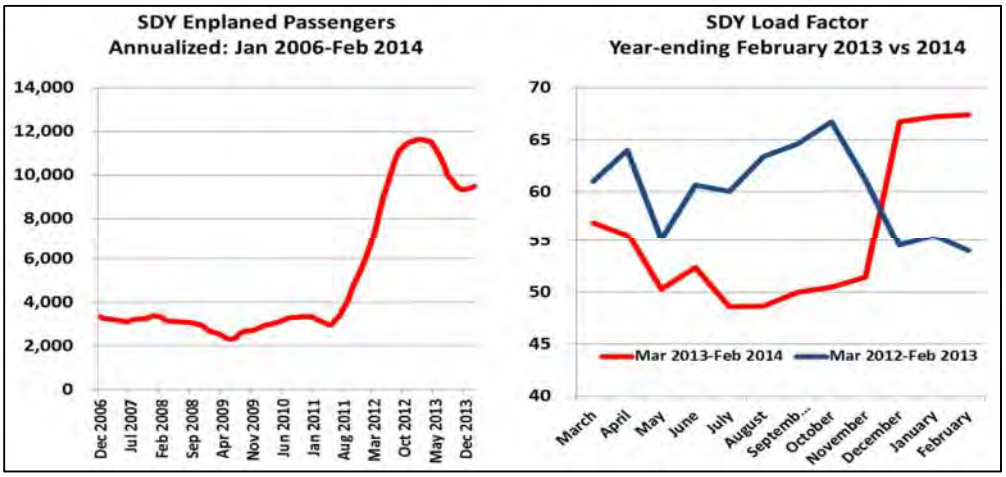
This paper will overview the air service prospects from Sidney, Montana (SDY), focusing upon: 1) The impact of the new Williston Airport (ISN) that will likely be completed later this decade and 2) SDY's air service prospects over the next 20 years.

SDY Air Service Review

SDY is located in far eastern Montana, almost on the Montana/North Dakota state line. Sidney is approximately 45 miles (or a 1 hour drive) from Williston, which is also has the closest commercial airport. The next closest commercial airport is Billings (BIL) International Airport, which is approximately 271 miles from Sidney, or an almost 4 hour drive.

SDY air service has historically been subsidized as part of the Essential Air Service program (EAS). The current subsidy per enplaned passenger stands at $237.

SDY serves the Montana counties of Richland, Roosevelt and Dawson. The cumulative population in these counties is 31,784 (source: 2010 U.S. Census) and the population base within 30 miles of Sidney is 10,768. A very rough rule of thumb for air travel is that trips per capita for a market like Sidney approximates .75 (it is higher for metropolitan/high income areas). In the absence of booking data, this would indicate that there are almost 24,000 booked enplaned passengers from this catchment area. Based upon current enplaned passenger volume of about 10,000, this indicates "leakage" is about 60%.



Source: U.S. DOT Report T-100

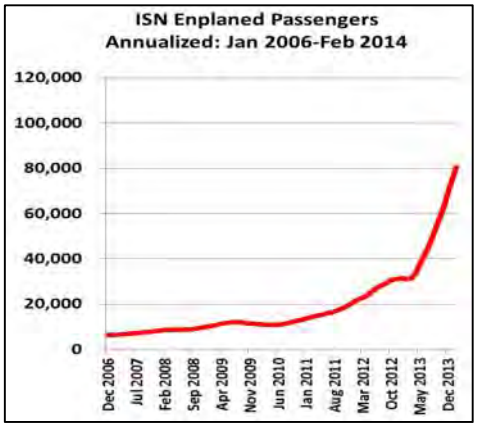
Historically, SDY was served by Big Sky Airlines (GQ), operating intra-Montana service to a variety of destinations until February 2008. Subsequently, Great Lakes Aviation (ZK) served SDY from September 2008 to October 2011. Both airlines operated exclusively with 19-seat aircraft and generated load factors that were typically below 30%.

Next was Silver Airways (3M), who served the market from August 2011 to December 2013. Silver also operated 19-seat aircraft. 3M initially generated load factors in the range of 55%-65%, dependent upon the time of the year. Cape Air started service in December 2013, currently operating 5 flights per day to

Billings on 9-seat Cessna 402 aircraft. To-date, Cape Air has averaged a 68% load factor. Much of Cape's appeal is driven by good operational performance and low air fares ($49 one-way).
Enplaned passengers at the airport have grown significantly since Silver & eventually Cape Air started service. Annual enplaned passengers increased from about 3,000 annually, peaking at approximately 13,000 in 2012 and now stand at about 10,000 enplaned passengers (annualized).

Effect of a new Williston Airport (ISN) upon Sidney (SDY)

The graph below illustrates enplaned passenger trends from ISN. Prior to the fall of 2012, ISN had one airline, Great Lakes Aviation (ZK) operating 34-seat aircraft to Denver. Beginning in the fall of 2012, new air service was initiated by both Delta Connection and United Express. Both operate 50-seat CRJ aircraft with 2x daily service. Delta's service is to Minneapolis-St. Paul (MSP), while UA's service is to Denver (DEN). Since the initial start-up, both Delta and United have doubled service. Also, UA just announced new Houston (IAH) service from ISN. It is estimated that ISN will enplane well over 120,000 passengers in 2014.



Source: U.S. Department of Transportation, Report T100

ISN is also considered one of the highest (if not THE highest) yielding markets in the U.S. and based upon Operating Margin, is the most profitable market in UA's DEN network and quite possibly, DL's MSP network. These results are being driven by the highest mileage-adjusted air fares in the U.S. Oil companies are typically among the least price-sensitive customers in the U.S. and this is being reflected in ISN's extremely high air fares, which averaged over $800 in the latest report by the U.S. Department of Transportation (4Q13).

As noted earlier, ISN is currently served by 50-seat regional jets (CRJ/ERJs). This is due to significant runway constraints that will not allow for larger aircraft until the new ISN airport is completed later this decade. Once the new runway is completed, ISN will garner additional air service.

First, Allegiant Airlines will likely add 2x weekly service to both Las Vegas and Phoenix-Mesa. This flying will likely be done by either MD88 or A319 aircraft. Eventually, it is likely that Allegiant will eventually serve destinations in Florida and possibly other markets. Allegiant has been interested in ISN for some time. This interest is in part being driven by their relative results in nearby Minot (MOT). MOT is currently the most profitable (margin) market in the Allegiant Airlines system. Given proximity of oil finds to-date, it is expected that Williston would do even better.

Second, current 50-seat regional jets would likely be upgraded to 76-seat regional jets. This is a function of both industry trends (most 50-seat jets are expected to be retired around 2019) and current results at ISN. Tied to this, 50-seat jets are inefficient on missions such as ISN-DEN, ISN-MSP and particularly ISN-IAH. It is just a matter of time until aircraft upgrades take place on this flying. Discussions with airlines have confirmed this. Additional frequencies to IAH will also be highly likely.

Third, given continued economic growth estimates from region, it is likely that additional new market flying will also take place from ISN. Service to Dallas-Fort Worth (DFW) would appear likely, particularly given current demand to DFW from the region and connectivity to key oil belt markets over DFW.

While ISN will almost assuredly continue to be one of the fastest growing airports in the U.S. in the coming years, it is not clear that this will have a profound impact upon SDY.

- Allegiant service at ISN. This will significantly lower air fares to aforementioned leisure destinations and stimulate demand – including travelers from Eastern Montana. But, it is unlikely that the current Cape Air traffic base is this sort of traveler. It is likely that this passenger is already driving to a market like MOT.

- Additional air service on Delta, United and American will potentially have a moderate, downward impact on ISN air fares. But, the ISN air fares (currently the highest in the U.S.), even with moderate declines will remain among the highest in the U.S. As SDY benefits from (subsidized) low air fares from Cape Air, it is unlikely that leakage would worsen materially.

- Currently, ISN has single connecting options to most major markets across the U.S. While additional air service would entail connection improvements, it would be relatively incremental improvements in most cases. So, while some additional leakage could entail, it shouldn't have a major impact.

In summary, the new ISN airport would not be expected to greatly impact SDY's current traffic base. Where it could have an impact is if Sidney's economic conditions changed dramatically, resulting in significant economic growth (such as had occurred recently in Western North Dakota). Then, the new ISN airport would likely attract this new air travel demand much in the way that MOT prospered from 2009-12 (traffic tripled from 70,000 to 220,000 annual enplanements) at the expense of ISN. That said, without that, it's unlikely that the new ISN airport will have a major impact upon SDY.

The bigger risk to SDY air service is EAS. SDY has been dependent upon EAS and should EAS ever see a significant funding cut or discontinuation of the program, the result could be a blow for SDY's air service future including discontinuation of all air service.

Potential for Air Service growth at SDY

Earlier, a review of SDY's historical service was undertaken. Even on 19-seat aircraft, carrier load factors were extremely low (for current airline standards) and not indicative of an airline being able to be profitable from the market. Even today, Cape Air isn't profitable flying a 9-seat aircraft (instead requiring a $237/passenger subsidy).

Outside of an oil-driven renaissance consistent with what has been experienced in Western North Dakota, it is hard to envision a scenario where SDY is positioned for any (unsubsidized) air service growth.

Even with significant oil finds and related economic growth from nearby SDY, it is hard to predict much carrier interest in SDY, given its close proximity to ISN and airport runway limitations - the industry is expected to veer away from all 50-seat jet flying later this decade and SDY's runway would likely not be able to support 76-seat jets. While carriers such as Allegiant often will fly to airports within 60 miles of another airport it serves, the runway limitations and the closer proximity of SDY to ISN would limit this opportunity. Therefore, significant infrastructure investment and economic growth would be required of SDY to begin the process of attracting limited air service gains.

Appendix N – Public Involvement

Introduction

The Sidney-Richland Regional Airport understands the importance of public involvement in the Master Plan Update process. During the scoping meeting, the Airport and KLJ designed a transparent process that allows opportunities for stakeholders to be actively engaged. The Airport also believes that members of the public should have an opportunity to comment on decisions about actions that could affect their lives. This involvement took place in the form of public open houses, website information sessions, and stakeholder outreach efforts. The Airport appreciates that public participation improves the decision-making process by recognizing and communicating the needs and interests of all participants. As a result of the public participation process we feel that the airport master plan offers a valuable path for developing the Sidney-Richland Regional Airport.

Stakeholders

As part of the planning process the following groups/people were contacted for their insight into the Sidney-Richland Regional Airport:

1. Airport Management
    a. Bill Henderson -Airport Director
2. Airport Board
    a. Walt McNutt
    b. John Olson
    c. Troy Jensen
    d. Russ Huotari
    e. Alan Siefreid
3. FAA HLN-ADO
    a. Jason Garwood–ADO Program Manager
    b. Scott Eaton-ADO Planner

For this master planning effort it was determined that the use of a technical advisory group would provide the best results. The following is a breakout of the technical advisory group:

1. Shane Gorder
2. Tami Christensen
3. Leslie Messer
4. David Seitz
5. Randy Olson
6. Russ Atkins
7. Bill Henderson

The technical advisory group was contacted/involved throughout the master planning process. Below is a list of outreach efforts conducted:

- March 25, 2014 at 11:00 Go-To-Meeting introducing the TAC to the master planning process
- June 5, 2014 email to TAC members with the draft chapters of 1, 2, and the forecast findings. This email also requested the TAC members to attend the Board meeting on June 18, 2014 where Eric Gilles, Craig Canfield and Ben Mello presented the first 2 chapters, the forecast findings (FAA members were present as well) and preliminary alternatives for the area south of Runway 11-29
- November 25, 2014 email to the TAC to inform TAC that the draft chapters were available on the web (richlandplan.com/airport)
- January 16, 2015 email to the TAC requesting TAC to review the Facility Requirements Chapter
- March 10, 2015 email to the TAC requesting TAC to review the Alternatives Chapter –received comments from Russ and Walt
- April 17, 2015 email to the TAC requesting TAC to attend the Public Open House
- May 20, 2015 email to the TAC requesting a Go-To-Meeting to go over the Implementation Chapter –included Implementation Chapter
- June 9, 2015 email sent to the TAC requesting TAC to attend the Public Meeting held at June 18, 2015

Key Issues

This planning effort completed typical aspects of airport master plans from reviewing existing conditions to forecasts to alternative development, but also focused on key issues which we learned from our scoping meeting. These issues were as follows:

- Examine existing areas which are located on the north side of Runway 11-29
- Examine how the area south of Runway 11-29 should be developed,
- Determine the correct vehicular access point into the airport when the area south of Runway 11-29 is developed,
- Determine how the new Williston, ND Airport could affect Sidney-Richland Regional Airport,
- Determine the possibility of another air carrier (United, Sky West, other)

During the scoping meeting, the airport explained that they would like the public to become aware of the projects completed or projected needed. A goal was established to inform the general public. Outreach efforts included, airport board meetings, public open houses and the creation of an airport website (http://www.richlandplan.com/airport.html).

Public Meetings

Two (2) public meetings were held throughout the planning process. One meeting was held on June 18, 2014. This meeting was held at the Sidney-Richland Regional Airport Board room at noon. Besides the Airport Board members, KLJ members, and airports tenants, this meeting was attended by two (2) FAA officials- Helena ADO Program Manager Jason Garwood and Helena ADO Community Planner Dave Noble. The intent of this meeting was to receive airport approval on the aviation forecasts, which is what occurred at the end of the meeting. As this meeting general concepts were identified and presented to the airport board.

The other public meeting was held on June 18, 2015. This meeting was held at Montana State University Eastern Agricultural Research Center at 6:00 PM. Including board members and KLJ personnel there were 15 people in attendance. The intent of this meeting was to present the draft master plan document and the draft airport layout plan and to receive comments from the general public. Comment cards and a sign in sheet were prepared (as follows).

Sidney-Richland Regional Airport

Airport Master Plan – Public Meeting

June 18, 2015 –Montana State University Eastern Agricultural Research Center

KLJ

ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:

Sidney-Richland Regional Airport



Thursday June 18, 2015 - 6:00 PM - Montana State University Eastern Agricultural Research Center

Please use the space below to provide comments on the Sidney-Richland Regional Airport Master Plan.

PLEASE PRINT

Name: _____

Address: _____

E-mail: _____

Please leave comments with meeting conductor, mail or email comments to:

Benjamin Mello, KLJ Airport Planner
409 E. Coeur d'Alene Ave Suite C
Coeur d'Alene, ID 83814
Email: ben.mello@kljeng.com

Before including your address, phone number, email address or other personal identifying information in your comment, be advised your entire comment, including your personal identifying information may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee we will be able to do so.