

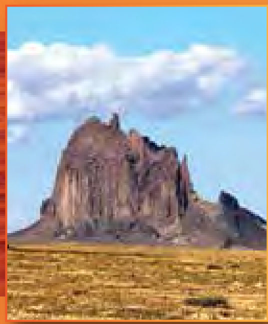

NAVAJO NATION

AIRPORT SYSTEM MASTER PLAN

Working Paper No. 1

NAVAJO DIVISION OF TRANSPORTATION

WINDOW ROCK, AZ | SEPTEMBER 2014

ARMSTRONG

Navajo Nation Airport System Master Plan

Working Paper No. 1

Prepared for
Navajo Division of Transportation

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Chapter One

AIRPORT SYSTEM MASTER PLAN OVERVIEW

CHAPTER 1 - AIRPORT SYSTEM MASTER PLAN OVERVIEW

1.1 INTRODUCTION

The Navajo Division of Transportation (Navajo DOT) has committed to an important study of the Navajo Nation airport system. The Navajo Nation Airport System Master Plan (NNASMP) focuses on five airports within the Navajo Nation which are currently included in the Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS). The airports included in the study span across two states (Arizona and New Mexico); three Arizona and two New Mexico airports are included.

1.2 PURPOSE OF THE STUDY

The purpose of the study is to create a roadmap for future development at these airports and provide opportunities for Navajo Nation citizens that use the airports to participate and collaborate on the important role the airport system plays in their lives. The study describes and depicts the overall concept for the short-term development of each airport. It presents the concepts in a written report and graphically in the Airport Layout Plan (ALP) drawing set. The study also identifies and prioritizes the improvements and the investments needed to enhance safety at the airports and improve operating conditions. Once identified, the goal is to provide direction for the future airport system development in a financially feasible manner which meets the needs of the Navajo Nation.

1.3 PUBLIC OUTREACH

A comprehensive public outreach program is an essential part of the study. The goal of the outreach program is to listen to the public, collect ideas, and review the input that will ultimately be used by the Navajo DOT to drive the preparation of the Airport System Master Plan.

A workshop style methodology has been chosen as the preferred format to engage the public for collecting valuable feedback and educating participants about the process. In addition, a Planning Advisory Committee (PAC) has been formed comprised of an Information Subcommittee and a Technical Subcommittee. The Information Subcommittee will provide a forum for elected officials and appointed Navajo Nation representatives to provide input and guide the preparation of the study, and the Technical Subcommittee will include representatives from various divisions and agencies, and others who will to provide technical expertise at various stages of the process.

The initial Chapter workshops were held in each of the five chapters where the existing NPIAS airports are located. The goal of each of these workshops was to collect ideas from the public and explain the planning process. A second series of workshops are planned to present the proposed development plans for each airport and obtain feedback from the communities.

Awareness building is a vital part of every public outreach program. To help raise awareness in addition to the workshops and PAC meetings, publicity for the Airport System Master Plan included:

- Comment cards

- Brochures
- A dedicated NNASMP website
- Public Service Announcements (print and radio media)
- A toll-free information help line

FIGURE 1-1 CHINLE CHAPTER HOUSE WORKSHOP

Source: Armstrong Consultants, Inc. (ACI), August 2014

1.3.1 ESTABLISHMENT OF THE CHAPTER HOUSE WITHIN THE NAVAJO NATION

There are five airports included in the NNASMP, each residing in five different Navajo Nation Chapters. To provide context and clarity for the study, it is important that the history and culture of each of the five Navajo Nation Chapter Houses associated with each airport be explored and presented in a way that respects the Navajo people. This greater understanding will result in a more meaningful development plan for each airport in the study.

The Navajo Nation extends into the states of Utah, Arizona, and New Mexico covering over 27,000 square miles of unparalleled beauty. Diné Bikéyah, or Navajoland, is larger than 10 of the 50 states in America. According to the Navajo Tourism Office, “Today the Navajo Nation is striving to sustain a viable economy for an ever increasing population that now surpasses 250,000. In years past, Navajoland often appeared to be little more than a desolate section of the Southwest, but it was only a matter of time before the Navajo Nation became known as a wealthy nation in a world of its own.”

The discovery of oil on Navajoland in the early 1920s promoted the need for a more systematic form of government. Chapter government is a branch of the Navajo Nation government which exercises varied delegated powers and governmental authority in accordance with Navajo statutory, regulatory, and common law. John G. Hunter, superintendent of the Leupp Agency, is generally given credit for the establishment of the Chapter system starting in 1922 in an effort to bolster Navajo self-determination and local governance. Later the Chapter became the basic political subdivision of Navajo Tribal Government. The Chapters elect representatives to the Navajo Tribal Council, the legislative branch of Navajo government. The Nation’s inherent right to self-govern is sacred and demonstrated through daily governmental actions. Today, the Navajo Nation is comprised of 110 Chapters. The historic legislation, the Local Governance Act (LGA) granted chapters, among other things, similar authorities that off-reservation municipalities now have. The LGA allows the chapters to develop local governments, to do their own land-use planning, and also gives the authority to business site lease approvals, zoning, taxation, revenue generation, bonding, ordinance development, and infrastructure development. This authority provides chapters with significant leverage when it comes to economic development.

1.3.2 Associated Chapter House

The chapters where an airport is located within their boundaries play a large role in the local community, and essentially the development of the airport. The following is meant to communicate the unique and significant perspective that each Chapter has on the Navajo Nation.

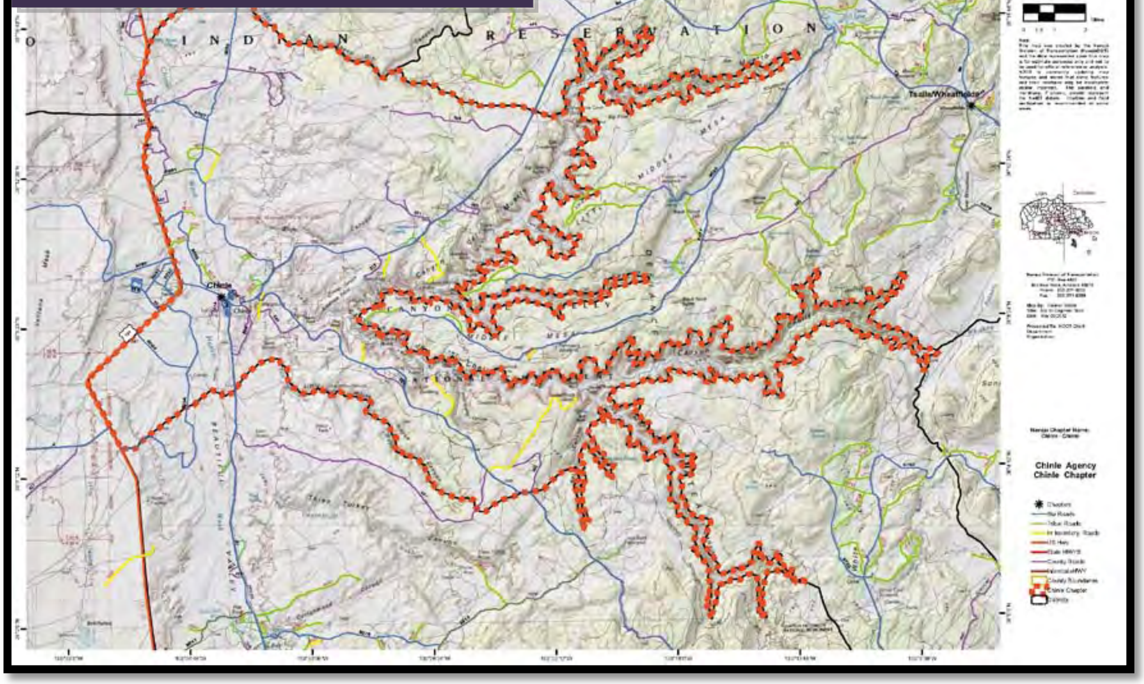
1.3.2-1 Chinle Chapter

The Navajo name for Chinle is Ch'ini'li, meaning “flowing out,” like how a stream might flow from the mouth of a canyon. Chinle Chapter is situated in the center of the Navajo Nation near the scenic area Canyon De Chelly. The Canyon De Chelly National Monument provides a steady influx of tourism into the community throughout the year. In the late 1800s and early 1900s, Chinle was known for its agriculture and grazing activities; these trades are still practiced by the local Navajo farmers influencing nearby areas such as Many Farms and the Chinle Valley.

The Chinle Chapter Government is a local government that was established as a Chapter under the Navajo Nation on February 14, 1956; it is the 32nd Chapter to be certified as one of the 110 Navajo Nation Chapters. On December 21, 2010, the Chinle Chapter became a Local Governance Act Certified Chapter, which is a milestone for Navajo Nation Chapters to achieve. Chinle Chapter is one of the larger Chapters on the Navajo Nation with over 3,800 registered voters and a service area of Chinle, Arizona and smaller surrounding communities such as Del Muerto, Spider Rock, and Valley Store, to name a few.

A great highlight of Chinle, Arizona is the Chinle Comprehensive Health Care Facility, which was opened in August 1983. The facility boasts a myriad of services which are available 24 hours a day. Emergency medical evacuation (medevac) flights play a large role in the overall service the facility provides to the community. **Figure 1-2** illustrates the location and boundary of the Chinle Chapter.

FIGURE 1-2 CHINLE CHAPTER BOUNDARY

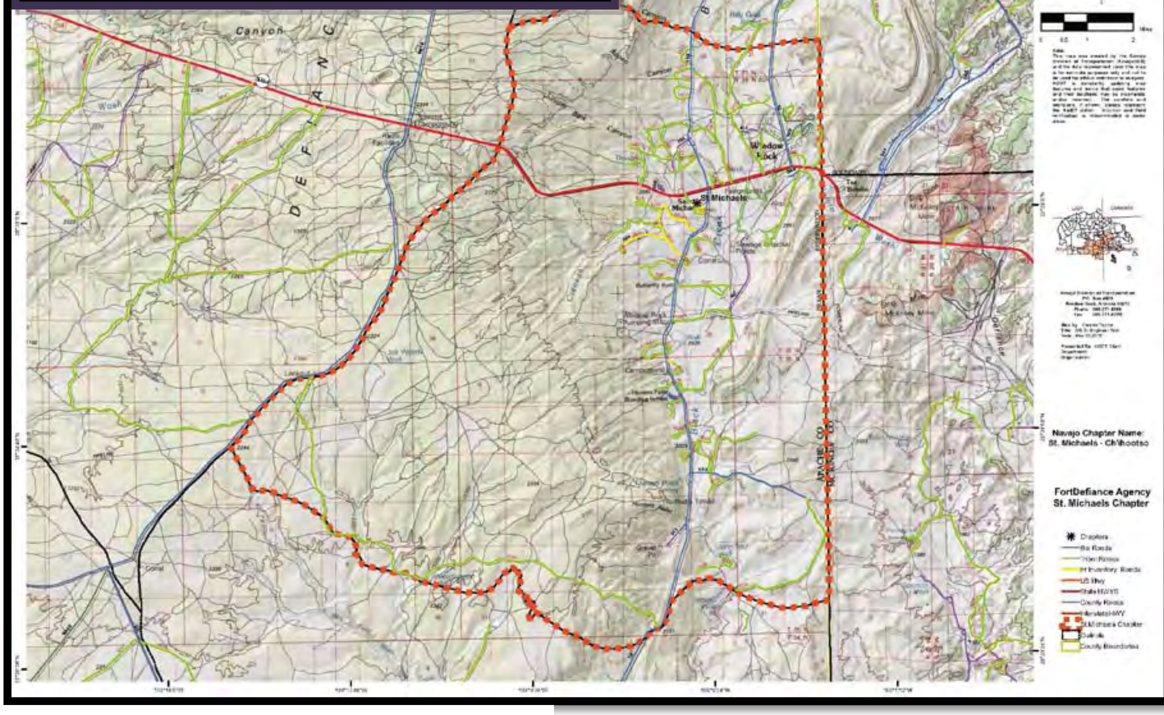


Source: http://navajochapters.org, retrieved August 2014

1.3.2-2 ST. MICHAELS CHAPTER

The St. Michaels Chapter was named after the Catholic mission of St. Michael, which was established by Mother Katharine Drexel in 1898. The Navajo name for this area is Ts'ihootso, meaning "green meadow." The Nation's capital of Window Rock is located within the Chapter. Also located within the St. Michaels Chapter boundary are the Window Rock Navajo Tribal Park, the Veterans' Memorial, Navajo tribal offices, the Navajo Nation Museum, and the Navajo Nation Zoological and Botanical Gardens. The Chapter also contains two hotels, multiple restaurants, two grocery stores, several service stations, a thriving daily flea market, and a host of small businesses. A number of employment opportunities, both public and private, are available within the St. Michaels Chapter, and the potential for continued development is very probable. **Figure 1-3** illustrates the location and boundary of the St. Michaels Chapter.

FIGURE 1-3 ST. MICHAELS CHAPTER BOUNDARY



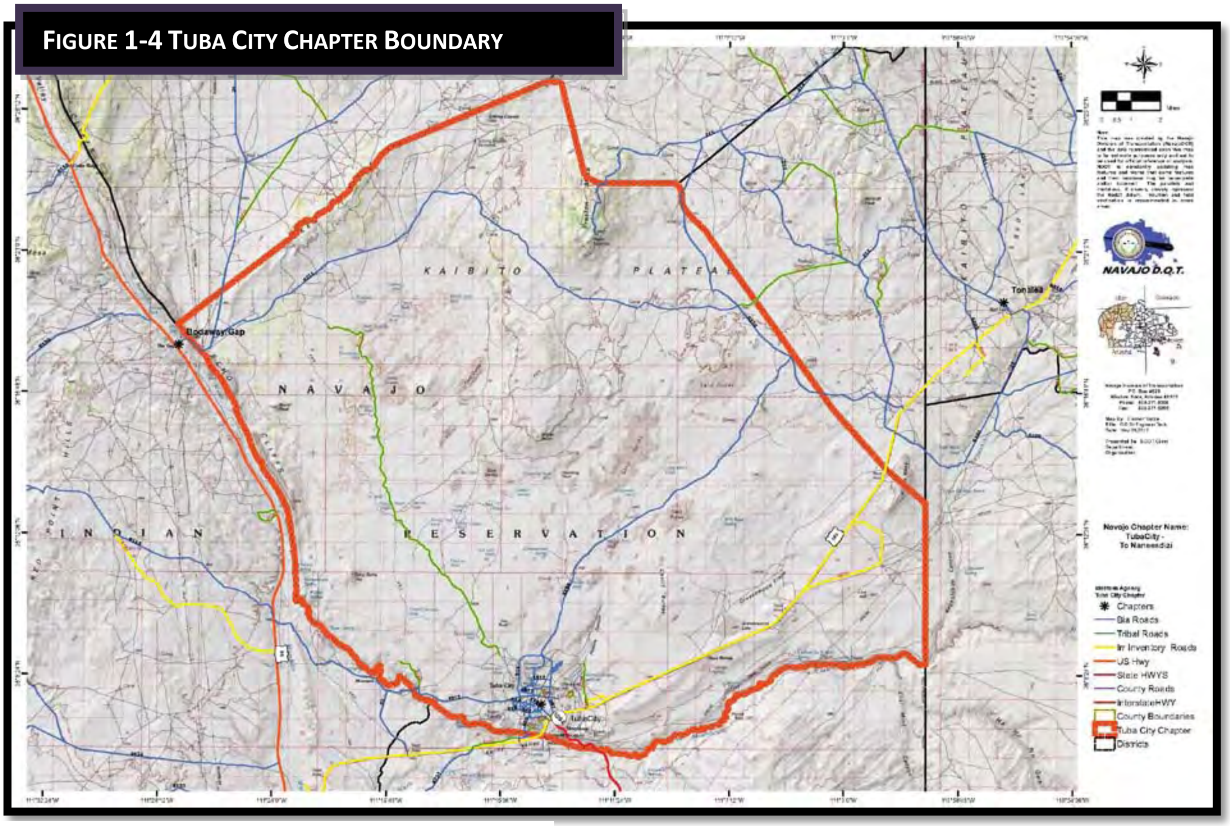
Source: http://navajochapters.org, retrieved August 2014

1.3.2-3 TUBA CITY CHAPTER

Tuba City was founded by the Mormons in 1872. The name of the town honors Tuuvi, a Hopi headman from Oraibi who converted to Mormonism. The Navajo name for Tuba City, *Tó Naneesdizí* translates as "tangled waters," which most likely refers to the many springs below the surface of the ground which are the source of several reservoirs. Tuba City drew Hopi, Navajo and Paiute Indians to the area because of its natural springs. In 1956, Tuba City became a uranium boomtown; the regional office for the Rare Metals Corporation and the Atomic Energy Commission were both located here. However, the mill closed in 1966, and reclamation of the mill-site and tailings pile was completed in 1990.

To'Nanees'Dizi Local Government (formerly known as Tuba City Chapter) is located within the western edge of the Navajo Nation within the Painted Desert region. It is the Navajo Nation's largest community, slightly larger than Shiprock, New Mexico, and the headquarters of the Western Navajo Agency. Some area attractions include the Explore Navajo Interactive Museum, Coal Mine Canyon, and Hahonogeh Canyon. **Figure 1-4** illustrates the location and boundary of the Tuba City Chapter.

FIGURE 1-4 TUBA CITY CHAPTER BOUNDARY



Source: http://navajochapters.org, retrieved August 2014

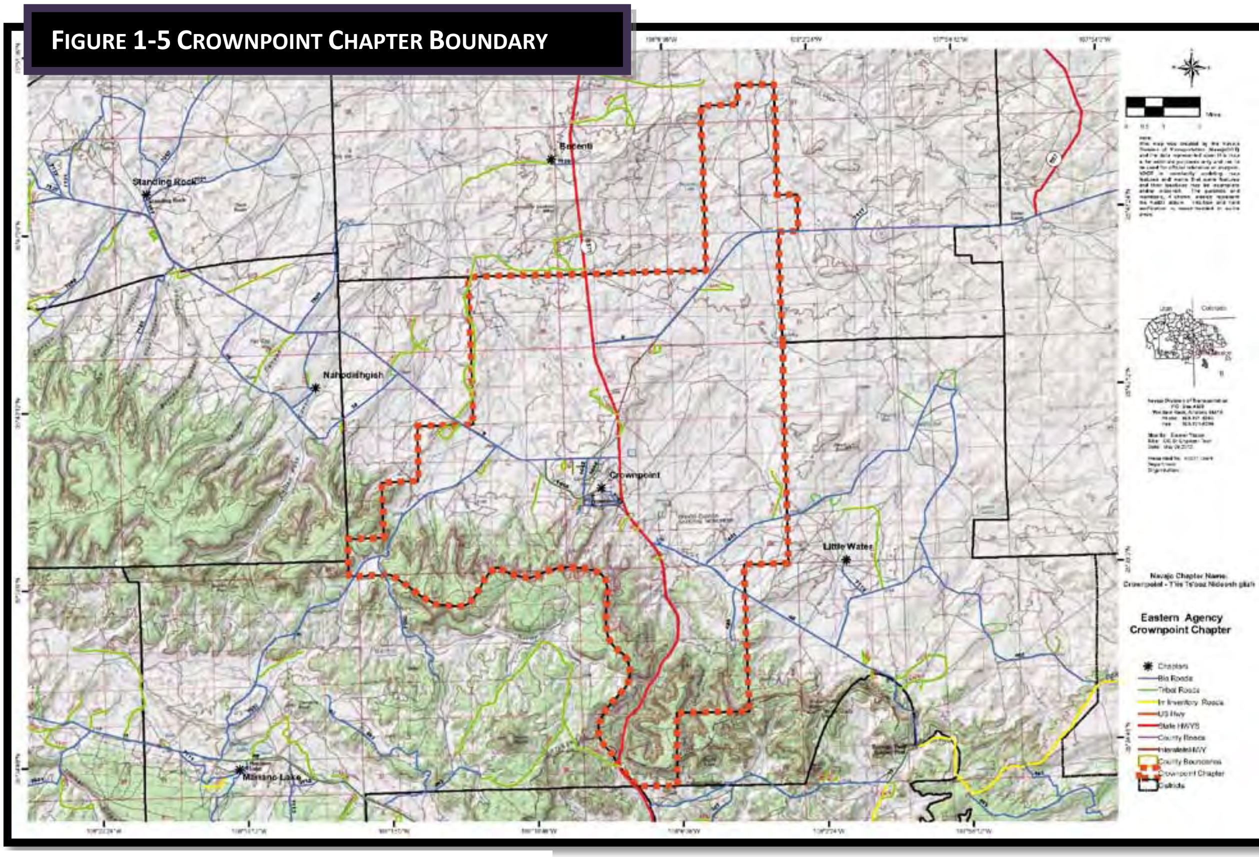
1.3.2-4 CROWNPOINT CHAPTER

The history of Crownpoint goes back to the first inhabitants, the Anasazi, and then later the Dine, who lived in the local area. They called this area T'iis ts'ooz nideeshgiizh, which means “narrow trees in the canyon,” because of the greasewood and cottonwood trees which grew in the back canyons. Farming, hunting, and other social activities were practiced by both early inhabitants. In recent times, Crownpoint mirrored other Nation communities and formed a formal government. After relocating to the area from Idaho, Samuel F. Stacher established the new government agency and became the first Superintendent for the Eastern Navajo Agency in 1910. Around the same time, he also established the Pueblo Bonito Boarding School. The community continued to grow, and shortly after a trading post, a church, and other residential housing were built in the area.

The Chapter was established in 1965. The Crownpoint Chapter is currently working on its Chapter Certification in compliance with the Local Governance Act. The Crownpoint Chapter Community Land-use Planning Committee was certified in December 30, 2004, and is working diligently to assist with the development of the community thru economic development.

The Crownpoint community is located in the Northwestern region of New Mexico approximately 55 miles northeast of Gallup, New Mexico. The New Mexico State Vietnam Veterans Memorial Highway 371 travels through Crownpoint, connecting it with Farmington (82 miles to the north) and Thoreau, New Mexico (24 miles to the south). Since its completion in 1980, the highway has increased traffic volume in the area by 125 percent. This highway is also a part of the Scenic Byway, which connects tourists to cultural and historic scenic areas within the Navajo Nation. The Crownpoint Airport is located in close proximity to the central business district of Crownpoint and Highway 371. **Figure 1-5** illustrates the location and boundary of the Crownpoint Chapter.

FIGURE 1-5 CROWNPOINT CHAPTER BOUNDARY



Source: http://navajochapters.org, retrieved August 2014

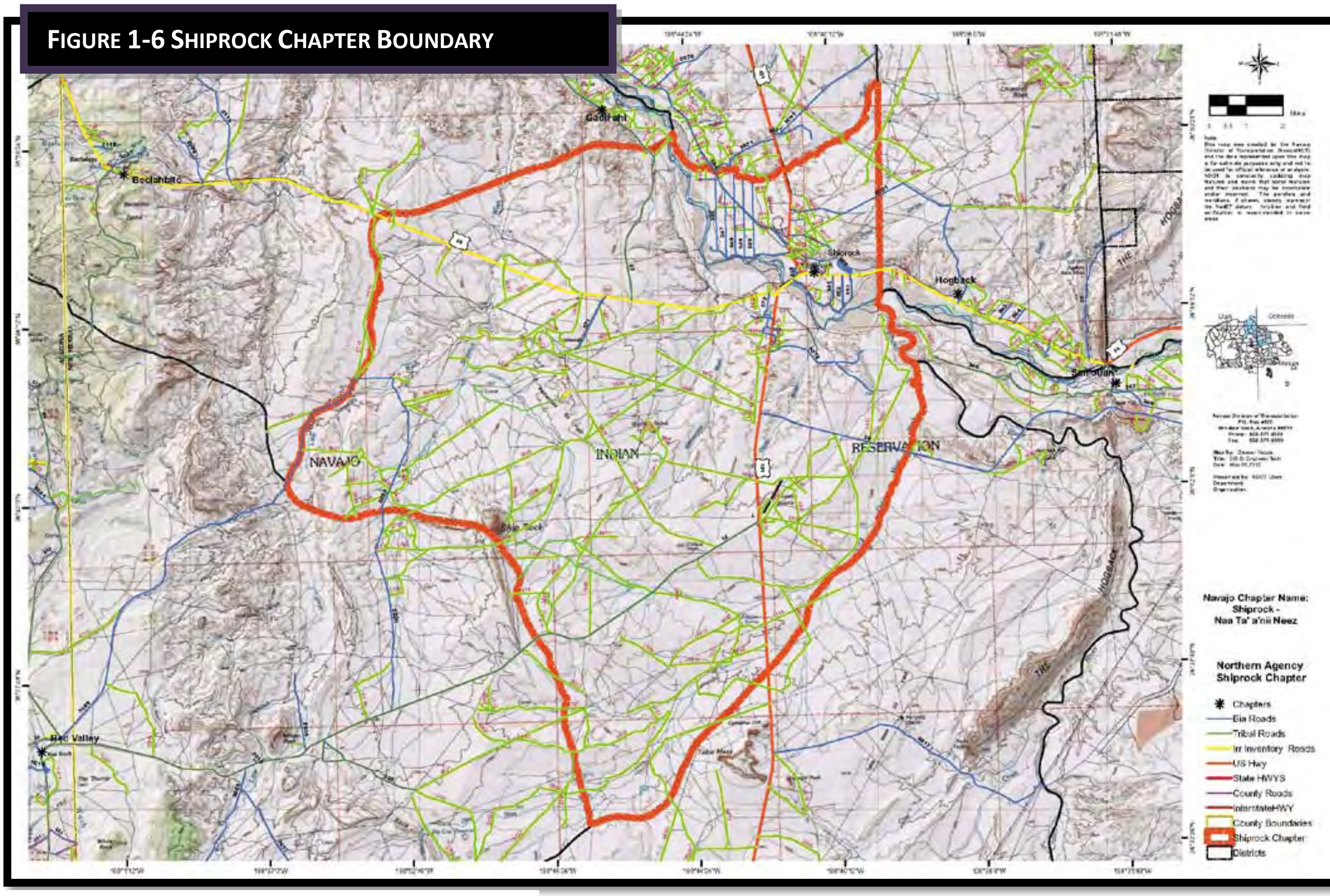
1.3.2-5 SHIPROCK CHAPTER

Shiprock was originally named Naat'áanii Nééz, meaning “tall Chief,” after Superintendent William T. Shelton, who founded Shiprock as a government settlement for the San Juan School and Agency in 1903. Now known as Tse' Bit' ai', meaning "the winged rock," Shiprock is named after the nearby Shiprock rock formation.

Shiprock is the largest Navajo community on the Navajo Nation and is located 28 miles west of Farmington, New Mexico. It is home to the annual Northern Navajo Fair, held every October. Since 1984, the community has been the host of the Shiprock Marathon and Relay. It is also home to a campus of Diné College, a tribally controlled community college with seven other campuses across the Nation. It is the site of a Chapter House, a Bureau of Indian Affairs agency, an Indian Health Service hospital, and a branch of Farmington Public Library. Shiprock is a key road junction for truck traffic and tourists visiting the Four Corners, Mesa Verde, Shiprock, and the Grand Canyon. The town lies at the intersection of U.S. Highway 64 and U.S. Highway 491.

The Shiprock Chapter Government of the Navajo Nation conducts monthly meetings to keep residents informed; residents have a forum to express their opinions to their Chapter Officers and Navajo Nation Council Delegate to decide on matters concerning their chapter. **Figure 1-6** illustrates the location and boundary of the Crownpoint Chapter.

FIGURE 1-6 SHIPROCK CHAPTER BOUNDARY



Source: http://navajochapters.org, retrieved August 2014

1.4 Airport System Vision, Goals, and Objectives

Understanding the local Chapter governments and each of their unique perspectives assisted with the development of the airport system vision. A clear and concise vision creates the framework for the development of the airport system plan study. To provide context and to help guide the decision making process, the Navajo DOT, the Planning Advisory Committee (PAC), along with the community, will be asked to support a vision for their airport system. The following is a draft vision statement for consideration by the PAC and community:

A safe, efficient, and fiscally responsible airport system will further enhance sustainability and self-sufficiency of our great Navajo Nation benefiting all Diné people.

With consensus around a vision for the airport system, the next step is to develop goals and objectives that support the vision. Focused and meaningful goals will form the basis for the proposed development for the Navajo Nation system of airports.

Specific goals and objectives for the system of airports will be established with input and guidance from the Navajo DOT. They represent how the Navajo DOT will develop their system of airports to be in alignment with the vision they have set out for themselves. The following are draft goals and objectives for consideration by the PAC and community:

Goals:

- Provide a safe and efficient system of airports for people living, working, and visiting the Navajo Nation over the next 5 to 10 years.

Objectives:

- Actively seek funding from federal and state agencies to help develop the system of airports;
- Prioritize projects and phase development to be in alignment with available funding; and
- Develop the system of airports over time in such a manner that the desire of each community is achieved.

The value of understanding how a community feels about their airport was a major goal for the Workshop presentations. Using questionnaires and comment cards, the team asked all Chapter House participants to provide their input on the most important functions of their airport, their thoughts on priorities, individual comments, and suggestions.

The questionnaire also asked the community about their satisfaction with the airport's name. The name of an airport can be very important to a community. Renaming an airport is a process that airports across the country do from time-to-time for various reasons. As part of the outreach program, a questionnaire was made available during the Chapter workshops asking the community how they feel about the name of their airports. Based on the feedback received and discussion with the Navajo DOT, the some of the airport names may be modified as part of the final report.

Most of the community feedback centered on how the individual airports could be improved to enhance economic development. The physical conditions of the airports, the need for improvements, and land withdrawal were all tied to providing the most optimal use for each airport. Each workshop exhibited these recurring themes, however, because of the individuality of each airport's physical location, many comments were specific to the exact location of each airport within the boundaries of their Chapters.

As a result of the workshops and other outreach efforts, the following is a summary of the comments received from the communities:

- Infrastructure improvements
- Economic development
- Land withdrawal
- Time frame of development
- Security
- Local presence, management, and maintenance

- Participation by the community in airport development
- Self-sufficiency education and training (generation of aviation professionals within the Nation)

While each of these common themes are more fully described in **Appendix B,** it is important to note that economic development and the prospect of future funding and improvements were the most significant comments received from the workshops. Everything from tourism, improvement of health care delivery, and infrastructure development is centered on improving the airport system infrastructure to enhance economic development.

1.5 SUMMARY

The comprehensive public outreach program that has been established along with the Airport System vision, goals, and objectives will help guide and inform the development of the Navajo Nation Airport System Master Plan and is an essential part of the study. Future PAC meetings and workshops are planned to provide the communities and stakeholders more opportunities to provide input into the study.

Chapter Two

NAVAJO NATION AIRPORT SYSTEM

CHAPTER 2 - NAVAJO NATION AIRPORT SYSTEM

2.1 NAVAJO NATION AIRPORTS

2.1.1 FEDERAL IDENTIFICATION

The FAA's Airport/Facility Directory is a listing of data on record with the FAA on all open-to-the-public airports, seaplane bases, heliports, military facilities, and selected private use airports specifically requested by the Department of Defense (DOD). According to the latest Directory dated July 2014, numerous airports are located on Native American tribal lands in the states of Arizona, New Mexico, and Utah. Six airports are located on the Navajo Nation. These airports include the following:

Arizona

- Chinle Municipal Airport
- Kayenta Airport
- Tuba City Airport
- Window Rock Airport

New Mexico

- Shiprock Airstrip
- Crownpoint Airport

Utah

- No airports appear in the Directory

2.1.2 STATE IDENTIFICATION

Many aeronautics divisions within a state's Department of Transportation also maintain their own airport system plans. Overall, these state aviation system plans identify airports and heliports that perform an essential role in the economic and social development within the state. Furthermore, they provide guidelines to help planners determine how to maximize the return on investment of public funds and identify what capital improvements would best serve the state's aviation needs. The Navajo Nation airports identified in state aviation system plans include:

Arizona

- Tuba City Airport
- Kayenta Airport
- Chinle Municipal Airport
- Window Rock Airport
- Ganado Airport (currently closed)
- Rock Point Airport
- Shonto Airport

- Pinon Airport
- Lukachukai Airport
- Ricky Ridge Airport
- Pine Springs Airport

New Mexico
- Shiprock Airstrip
- Crownpoint Airport

Utah
- Oljatoh Airstrip

2.1.3 Navajo Nation Classification

According to the 2009 Navajo Nation Long Range Transportation Plan, the Navajo Nation airport system consists of approximately 32 airports/airstrips located within the states of Arizona, New Mexico, and Utah.

The airports/airstrips found on the Navajo Nation are classified as either primary or secondary. There are eight primary airports owned and maintained by the Navajo Nation. These primary airports are located within the Navajo Nation primary growth centers and are open for public use. The airports are primarily used for medical emergencies, and secondarily for tribal business, with occasional use by tourists and general aviation enthusiasts. The Navajo Nation primary airports are:

Arizona
- Chinle Municipal Airport
- Ganado Airport (currently closed)
- Kayenta Airport
- Tuba City Airport
- Window Rock Airport

New Mexico
- Crownpoint Airport
- Shiprock Airstrip

Utah
- Oljatoh Airstrip

Construction of Shiprock Airstrip, Tuba City Airport, Crownpoint Airport, and Chinle Municipal Airport was completed between 1998 and 2003. Also during this time period, the Kayenta Airport had improvements made to the runway, parking area, and electrical components. Kayenta Airport administration and operations are now administered by the Kayenta Township.

Ganado Airport is currently closed, but is planned to re-open sometime in 2015. When the airport was in operation, the most notable services included emergency medical transportation to and from the Sage Memorial Hospital. It is anticipated that once the airport is re-opened, the primary use of the airport will again be emergency medical transportation.

Window Rock Airport had some limited improvements made in 2009. It is the only primary airport with a general aviation terminal building. Window Rock is operated by the Navajo Nation Air Transportation Services under the Division of General Services, which provides charter services to the Navajo Nation President and other tribal officials. Other private air transportation services are also available at Window Rock Airport.

According to the 2009 Navajo Nation Long Range Transportation Plan, the Navajo Nation airport system also consists of twenty airports classified as secondary airports. They consist of unpaved/dirt runways and do not have any types of support facilities. Many of the airports are closed and are in poor condition. For the most part, these airports are used for medical emergencies and emergency landings only. Six of the Navajo Nation secondary airports are included in the Arizona State Aviation System Plan (ASASP) according to the Navajo Nation Long Range Transportation Plan. None of the remaining secondary airports are included in either the New Mexico or Utah state aviation system plans.

The Navajo Nation secondary airports are:

- Rock Point Airport
- Shonto Airport
- Pinon Airport
- Lukachukai Airport
- Rocky Ridge Airport
- Pine Springs Airport

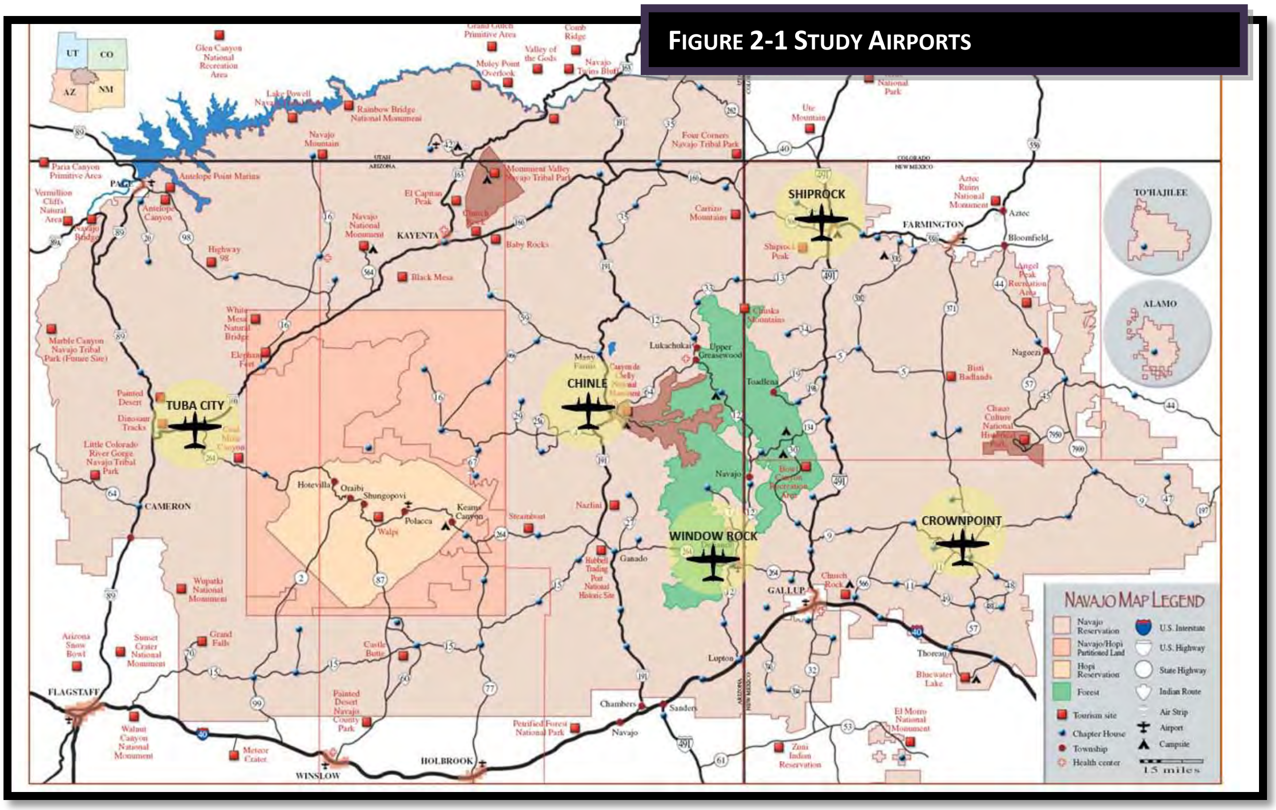
There are four privately owned and maintained airports on the Navajo Nation. These include the following:

- Goulding's Airport
- Thoreau Airport
- Klagetoh Airport
- Black Mesa Airport

2.2 STUDY AIRPORTS

The five Navajo Nation airports included in this study are Chinle Municipal, Tuba City, Window Rock (located in Arizona) and Crownpoint and Shiprock (located in New Mexico). These airports were selected for inclusion in the study because they are included in the National Plan of Integrated Airport Systems (NPIAS) and therefore are eligible to receive a planning grant. Furthermore, they are airports located within primary growth centers within the Navajo Nation. **Figure 2-1** depicts the location of the airports included in the study.

FIGURE 2-1 STUDY AIRPORTS



Source: 2009 Navajo Nation Long Range Transportation Plan, retrieved August 2014

2.3 AIRPORT SERVICE LEVEL/ROLE

Airport service levels/roles are often defined similarly from a national and state perspective. One explanation for this may be the FAA's use of state aviation system plans as guidelines when creating the 5-year capital improvement plan for NPIAS airports. This section will define the different roles the Federal Aviation Administration (FAA) and the Arizona and New Mexico Department of Transportation (DOT) Aeronautics/Aviation Divisions have established for the study airports as contained within the NPIAS and the state aviation system plans. Additionally, the types of aeronautical activities most closely associated with the airport roles will be defined.

From a local perspective, the role each airport serves in a community and its associated aeronautical activities on the Navajo Nation may be very different. One goal of this study is to verify if the types of aeronautical activities associated with the airports are accurate, and if not, identify aeronautical uses that have not been captured.

2.3.1 FEDERAL SERVICE LEVEL/ROLE

Since 1970, the FAA has classified a subset of the 5,400 public-use airports in the United States as being vital to serving the public needs for air transportation, either directly or indirectly, and therefore may be made eligible for federal funding to maintain their facilities. These airports are classified within the NPIAS, where the airport service level reflects the type of public use the airport provides. The service level also reflects the funding categories established by Congress to assist in airport development. The categories of airports listed in the NPIAS are:

- **Commercial Service** - public airports that accommodate scheduled air carrier service provided by the world's certificated air carriers. Commercial service airports are either:

    - Primary – a public-use airport that enplanes more than 10,000 passengers annually
    - Non-primary - a public-use airport that enplanes between 2,500 and 10,000 passengers annually.

- **Reliever** - an airport designated by the FAA as having the function of relieving congestion at a commercial service airport and providing more general aviation access. These airports comprise a special category of GA airports and are generally located within a relatively short distance of primary airports. Privately owned airports may also be identified as reliever airports.

- **General Aviation (GA)** – airports used exclusively by private and business aircraft not providing scheduled air carrier passenger service. There are many GA airports that are not included in the NPIAS, however, one criterion for inclusion is that the airport has at least 10 based aircraft and is located at least 20 miles away from the nearest NPIAS airport.

In May of 2012, the FAA published a report entitled *General Aviation Airports: A National Asset*. As part of the 18-month effort, the FAA documented the important airport roles and aeronautical functions these facilities provide to their communities and the national airport system. These functions include emergency preparedness and response, direct transportation of people and freight, commercial applications such as agricultural spraying, aerial surveying and oil exploration, and many others. Many of these functions cannot be supported efficiently or economically at primary airports. General aviation facilities were divided into four categories based on existing activity measures (e.g., the number and types of based aircraft and volume and types of flights). A follow-up study was published in March of 2014 entitled *ASSET 2: In-Depth Review of the 497 Unclassified Airports*. As a result of this study, the FAA was able to re-evaluate these unclassified airports and successfully re-classify 212 airports into one of the four GA categories.

For the purpose of this study, only the category which applies to the study airports needs explanation. All of the study airports are classified as basic. It is important to note that Shiprock and Window Rock airports are a part of the 212 that were re-classified as a result of the ASSET 2 report. According to the original report, airports which fall into the basic category support general aviation activities, often serving critical aeronautical functions within the local community such as emergency response and access to remote communities. These airports have moderate levels of activity with an average of 10 propeller-driven based aircraft and no jets.

2.3.2 State Service Level/Role

At the state level, the Arizona Department of Transportation, Multimodal Planning Division, Aeronautics Group (ADOT–MPD Aeronautics) has long recognized the importance of planning as a proactive approach to ensuring aviation continues its role in the statewide transportation system. They created a similar plan to the FAA's NPIAS in 1978 called the Arizona State Airports System Plan (ASASP). The purpose of the ASASP is to provide a framework for the integrated planning, operation, and development of Arizona's aviation assets. The most current version of the ASASP was published in 2008. Likewise, the New Mexico Department of Transportation Aviation Division also publishes a similar plan called the New Mexico Airport System Plan (NMASP) which also serves to assess the needs of the State's airport system, justify funding for needed airport improvements, and provide information for governmental and other entities concerning the value, use, and needs of New Mexico's system of airports. The most current version of the NMASP is the 2009 Update; an update to the 2009 version began in July 2014.

The ASASP and NMASP also classify airports into service roles. According to the ASASP, Chinle Municipal, Tuba City, and Window Rock are categorized as GA rural airports. The ASASP defines a GA rural airport as an airport that serves a supplemental role in local economies, primarily serving smaller business, recreational, and personal flying. According to the NMASP, Crownpoint and Shiprock Airstrip are categorized as low activity GA airports. The NMASP defines a low activity GA airport as an airport which plays a limited role in contributing to the local economy due to the limited activity. These airports are considered to provide emergency or remote access, primarily serving recreational and personal flying activities. A summary of the NPIAS and state aviation system plan GA categories are illustrated in **Table 2-1**.

TABLE 2-1 FEDERAL AND STATE GA CATEGORY CLASSIFICATION

Associated City	Airport Name	FAA ID	NPIAS Classification	SASP Classification
Chinle, AZ	Chinle Municipal	E91	GA - Basic	GA - Rural
Tuba City, AZ	Tuba City	T03	GA - Basic	GA - Rural
Window Rock, AZ	Window Rock	KRQE	GA - Basic	GA - Rural
Crownpoint, NM	Crownpoint	0E8	GA - Basic	Low Activity GA
Shiprock, NM	Shiprock Airstrip	5V5	GA - Basic	Low Activity GA

Sources: FAA National Plan of Integrated Airport Systems (2013-2017) Report; 2008 Arizona State Aviation System Plan; New Mexico Airport System Plan Update 2009; retrieved July 2014.

2.4 AERONAUTICAL ACTIVITIES

The role of a general aviation airport lends itself to specific aeronautical activities. The types of aeronautical activities that may be associated with the study airports include the following:

Air Medical Evacuation Services: The air medical evacuation (medevac) services provide quick and efficient transportation in emergency situations when time is of the essence, resulting in countless lives saved. The most common aircraft operated in this user category include turbine-engine rotorcrafts and multi-engine piston or turbo-props.

Business Transportation: Business aviation users benefit by being able to travel to or from business centers to conduct business activities in a single day, without requiring an overnight stay or extensive ground travel time. Local and other small businesses generally utilize single-engine and multi-engine piston aircraft. This user category also includes travel by state and federal government agency officials (including Navajo Nation government officials).

Recreational and Tourism: These users include transient pilots flying into the region to visit recreational and tourist attractions. These users mostly operate single-engine piston aircraft; however, a small percentage may operate multi-engine piston aircraft. Other types of aircraft in this category include home-built, experimental aircraft, gliders, and ultralights.

Flight Training: These users conduct local and itinerant flights in order to meet flight proficiency requirements for obtaining FAA pilot certifications. These flights include touch-and-goes, day and night local and cross-country flights, and practice instrument approaches. These users mostly operate single- or multi-engine piston or turbo-prop aircraft.

Military: Military operations are those conducted by U.S. or foreign military aircraft and personnel for the purposes of national security and defense. Almost all military operations taking place within U.S. airspace are training or proficiency related activities. A wide range of aircraft may be used for these operations, including multi-engine piston or turbo-prop, turbo-jet, jet, or rotary aircraft.

Aerial Firefighting: These users include State and Federal fire-fighting professionals working to control or extinguish wild fires located within the general vicinity or geographic region of the airport. These operations may be greater during the Arizona and New Mexico wildfire season of May through July. These users usually operate large rotary aircraft, multi-engine aerial tankers, and single-engine and rotary patrol aircraft.

2.5 Evaluation of Existing Aeronautical Activities

During the first Chapter House workshops held as part of this study, the community members in attendance were asked what types of aeronautical activities were most commonly associated with their airport. They were also asked to identify which activities they felt were the most important. The methodology used to ultimately define the roles and types of aeronautical activities for each airport in the study had a more qualitative rather than a quantitative approach.

Table 2-2 depicts a summary of the associated aeronautical activities for each study airport as perceived by the local community members in attendance is. Only three airports were perceived to have all of the activities mentioned occurring at the airport. Furthermore, one will notice that the most commonly perceived activities to occur at all airports according to the community members present are air medical evacuation (medevac), business transportation, and aerial firefighting. Of the total completed questionnaires that were returned from all workshops, 84 percent indicated that air medical evacuation services are the most important to the community; the second and third most important are business transportation and recreational and tourism activities (both tied at 8 percent).

TABLE 2-2 SUMMARY OF PERCEIVED AERONAUTICAL ACTIVITIES

Airport Name	Agency	Chapter	Associated City	Airport Aeronautical Activities: Medevac	Recreational and Tourism	Business (including government use)	Flight Training	Aerial Firefighting	Military
Arizona Airports									
Chinle Municipal Airport	Chinle	Chinle	Chinle	✓	✓	✓	✓	✓	✓
Tuba City Airport	Western	Tuba City	Tuba City	✓	✓	✓	✓	✓	✓
Window Rock Airport	Ft. Defiance	St. Michael	Window Rock	✓		✓		✓	
New Mexico Airports									
Crownpoint Airport	Eastern	Crownpoint	Crownpoint	✓	✓	✓		✓	
Shiprock Airstrip	Northern	Shiprock	Shiprock	✓	✓	✓	✓	✓	✓

Source: ACI, September 2014

2.6 SURROUNDING AIRPORTS

A comparison of several other neighboring airports in the vicinity of the study airports was conducted in order to provide an overall picture of the types of aeronautical facilities available to the surrounding communities. These neighboring airports may or may not fall within the Navajo Nation boundary, however were still included for informational purposes. This type of comparison is typically performed in order to define an airport's service area. An airport service area is defined by the communities and surrounding areas served by the airport facility. For example, factors such as the airport's surrounding topographical features (mountains, rivers, etc.), proximity to its users, quality of ground access, required driving time to the airport, and the proximity of the facility to other airports that offer the same or similar services, can all affect the size of a particular airport's service area. **Tables 2-3** through **2-7** describe the airports surrounding the study airports.

TABLE 2-3 AIRPORTS IN VICINITY OF CHINLE MUNICIPAL AIRPORT (E91)

Airport	Location	Airport Type	Ownership/Use	Distance from E91 (nm) and Direction	Runway Information	Instrument Approaches	Aviation Fuel Available
Kayenta Airport (0V7)	Kayenta, Arizona	GA	Public/Public	48 Northwest	5-23 (Asphalt) 7,101’ x 75’	None	No
Peabody Bedard Field Airport (38AZ)	Kayenta, Arizona	GA	Private/Private	46 Northwest	2-20 (Asphalt) 7,500’ x 75’	None	No
Polacca Airport (P10)	Polacca, Arizona	GA	Public/Public	45 Northwest	4-22 (Asphalt) 4,200’ x 50’	None	No
Rocky Ridge Airport (50AZ)	Rocky Ridge, Arizona	GA	Public/Private	49 West	3-21 (Dirt) 2,500’ x 45’	None	No
Window Rock Airport (RQE)[1]	Window Rock, Arizona	GA	Public/Public	37 Southeast	2-20 (Asphalt) 7,500’ x 75’	RNAV, GPS, VOR/DME	Yes (private)

Source: Airnav.com, retrieved July 2014. [1]Airport included as one of the five study airports within this report. Acronyms: Area Navigation (RNAV), General Aviation (GA), Global Positioning System (GPS), Nautical Mile (nm), Very High Frequency Omni-Directional Range (VOR), Distance Measuring Equipment (DME)

TABLE 2-4 AIRPORTS IN VICINITY OF TUBA CITY AIRPORT (T03)

Airport	Location	Airport Type	Ownership/Use	Distance from T03 (nm) and Direction	Runway Information	Instrument Approaches	Aviation Fuel Available
Grand Canyon National Park (GCN)	Grand Canyon, Arizona	Commercial Service - Primary	Public/Public	38 West	3-21 (Asphalt) 8,999’ x 150’	ILS, LOC DME, GPS, VOR	Yes
Kayenta Airport (0V7)	Kayenta, Arizona	GA	Public/Public	67 Northeast	5-23 (Asphalt) 7,101’ x 75’	None	No
Page Municipal Airport (PGA)	Page, Arizona	Commercial Service - Primary	Public/Public	50 North	15-33 (Asphalt) 5,950’ x 150’ 7-25 (Asphalt) 2,201’ x 75’	RNAV, VOR	Yes
Polacca Airport (P10)	Polacca, Arizona	GA	Public/Public	50 East	4-22 (Asphalt) 4,200’ x 50’	None	No
Peabody Bedard Field Airport (38AZ)	Kayenta, Arizona	GA	Private/Private	52 North-Northeast	2-20 (Asphalt) 7,500’ x 75’	None	No

Source: Airnav.com, retrieved July 2014. Acronyms: Area Navigation (RNAV), General Aviation (GA), Global Positioning System (GPS), Instrument Landing System (ILS), Nautical Mile (nm), Very High Frequency Omni-Directional Range (VOR), Localizer (LOC), Distance Measuring Equipment (DME)

TABLE 2-5 AIRPORTS IN VICINITY OF WINDOW ROCK AIRPORT (KRQE)

Airport	Location	Airport Type	Ownership/ Use	Distance from RQE (nm) and Direction	Runway Information	Instrument Approaches	Aviation Fuel Available
Chinle Municipal Airport (E91)[1]	Chinle, Arizona	GA	Public/Public	37 Northwest	18-36 (Asphalt) 6,902' x 60'	None	Yes (private)
Crownpoint Airport (0E8)[1]	Crownpoint, New Mexico	GA	Public/Public	42 East	18-36 (Asphalt) 5,820' x 60'	None	No
Gallup Municipal Airport (GUP)	Gallup, New Mexico	GA	Public/Public	16 Southeast	6-24 (Asphalt) 7,316' x 100'	RNAV, LOC, VOR	Yes
Holbrook Municipal Airport (P14)	Holbrook, Arizona	GA	Public/Public	68 Southwest	3-21 (Asphalt) 6,698' x 75' 11-29 (Dirt) 3,202' x 120'	None	Yes
Polacca Airport (P10)	Polacca, Arizona	GA	Public/Public	50 East	4-22 (Asphalt) 4,200' x 50'	None	No

Source: Airnav.com, retrieved July 2014. [1]Airport included as one of the five study airports within this report. Acronyms: Area Navigation (RNAV), General Aviation (GA), Nautical Mile (nm), Very High Frequency Omni-Directional Range (VOR), Localizer (LOC)

TABLE 2-6 AIRPORTS IN VICINITY OF CROWNPOINT AIRPORT (0E8)

Airport	Location	Airport Type	Ownership /Use	Distance from 0E8 (nm) and Direction	Runway Information	Instrument Approaches	Aviation Fuel Available
Aztec Municipal Airport (N19)	Aztec, New Mexico	GA	Public/ Public	68 North	8-26 (Asphalt) 4,314’ x 60’ 4-22 (Asphalt) 2,850’ x 40’	None	Yes
Black Rock Airport (ZUN)	Zuni Pueblo, New Mexico	GA	Public/ Public	48 Southwest	6-24 (Asphalt) 4,807’ x 50’	RNAV, GPS, VOR/DME	No
Gallup Municipal Airport (GUP)	Gallup, New Mexico	GA	Public/ Public	31 Southwest	6-24 (Asphalt) 7,316’ x 100’	RNAV, LOC, VOR	Yes
Grants-Milan Municipal Airport (GNT)	Grants, New Mexico	GA	Public/ Public	36 Southeast	13-31 (Asphalt) 7,172’ x 75’	RNAV, GPS	Yes
Window Rock Airport (RQE)[1]	Window Rock, Arizona	GA	Public/ Public	42 West	2-20 (Asphalt) 7,500’ x 75’	RNAV, GPS, VOR/DME	Yes (private)

Source: Airnav.com, retrieved July 2014. [1]Airport included as one of the five study airports within this report. Acronyms: Area Navigation (RNAV), General Aviation (GA), Global Positioning System (GPS), Nautical Mile (nm), Very High Frequency Omni-Directional Range (VOR), Distance Measuring Equipment (DME), Localizer (LOC)

TABLE 2-7 AIRPORTS IN VICINITY OF SHIPROCK AIRSTRIP (5V5)

Airport	Location	Airport Type	Ownership/ Use	Distance from 5V5 (nm) and Direction	Runway Information	Instrument Approaches	Aviation Fuel Available
Aztec Municipal Airport (N19)	Aztec, New Mexico	GA	Public/ Public	33 East	8-26 (Asphalt) 4,314' x 60' 4-22 (Asphalt) 2,850' x 40'	None	Yes
Chinle Municipal Airport (E91)[1]	Chinle, Arizona	GA	Public/ Public	55 Southwest	18-36 (Asphalt) 6,902' x 60'	None	Yes (private)
Cortez Municipal Airport (CEZ)	Cortez, Colorado	GA	Public/ Public	37 North	3-21 (Asphalt) 7,205' x 100'	RNAV, GPS, VOR	Yes
Kayenta Airport (0V7)	Kayenta, Arizona	GA	Public/ Public	74 West	5-23 (Asphalt) 7,101' x 75'	None	No
Window Rock Airport (RQE)[1]	Window Rock, Arizona	GA	Public/ Public	65 South-Southwest	2-20 (Asphalt) 7,500' x 75'	RNAV, GPS, VOR/DME	Yes (private)

Source: Airnav.com, retrieved July 2014. [1]Airport included as one of the five study airports within this report. Acronyms: Area Navigation (RNAV), General Aviation (GA), Global Positioning System (GPS), Nautical Mile (nm), Very High Frequency Omni-Directional Range (VOR), Distance Measuring Equipment (DME)

Chapter Three

CURRENT FUNDING POLICIES

CHAPTER 3 - CURRENT FUNDING POLICES

3.1 INTRODUCTION

The purpose of this chapter is to summarize the current funding polices pertaining to the Navajo Nation airports from the federal and state level. Each of the following polices impact the Nation's airport system and are critical to their long-term development and sustainability.

Current Polices:

- Arizona Revised Statutes A.R.S. Title §28, Chapter 25 - Aviation
- Arizona State Transportation Board Policies (Revised November 8, 2013)
- Arizona Department of Transportation, Five-Year Airport Capital Improvement Program Guidelines
- New Mexico State Grant Program
- Federal funding policies

3.2 ARIZONA REVISED STATUTES A.R.S. TITLE §28, CHAPTER 25 - AVIATION

The Arizona Revised Statutes (ARS) are laws established by the state of Arizona. The current ARS have more than 49 titles, including Title §28 which addresses transportation. Chapter 25 established the guidelines and requirements for the Aeronautics Division and the Director of Aviation to follow in order to encourage and advance the safe and orderly development of aviation in the state. The Director uses the statutes, along with the State Transportation Board Aviation Polices, to develop programs and procedures to fulfill the mandates and directs staff to implement and maintain the programs.

A.R.S. Title §28, Chapter 25 includes eight articles that address issues such as:

- General Provisions
- Aeronautics Division
- Aircraft Operation
- Aircraft Registration and Taxation
- Aircraft Dealers
- Airports in General
- Airport Zoning and Regulation
- Joint-Power Airport Authorities

An important piece of legislation impacting the Navajo Nation Airport System was signed by the Governor on June 14, 2013. Arizona Revised Statues Title §28, Chapter 25, Article 1 was amended via Senate Bill 1317 and was a landmark bill for the Navajo Nation airport system. In brief, SB 1317 authorizes ADOT to fund the planning, design, development, acquisition of interests in land, construction, and improvement of publicly owned and operated airport facilities in counties, incorporated cities, and towns on Native American reservations. The bill in its entirety can be reviewed in **Appendix E**.

3.3 Arizona State Transportation Board Policies

The Arizona State Transportation Board (STB) revised November 8, 2013, is responsible for developing rules to administer the Arizona Revised Statutes and create statewide transportation policies. There are six STB policies that are applicable to the state airports system. The purpose of the policies is to maximize funding resources and advance the safe and orderly development of the airport system. The STB policies are updated on a regular basis to address specific issues brought to the attention of ADOT and aviation in general that are within the statutory authority of the division.

Of the current 43 STB policies, policies related to aviation are as follows:

37. State Airport System Policy
38. State Airports System Plan (SASP) Policy
39. Airport Development Program Policy
40. Resource Allocation Policy
41. Project Selection and Prioritization Criteria Policy
42. Adequate Funding Policy
43. Regional and National Cooperative Planning and Best Practices Policy

3.4 ADOT Five-Year Airport Capital Improvement Program Guidelines

The purpose of the Five-Year Airport Capital Improvement Program (ACIP) is to maximize the effective use of state dollars for the development of airports while maximizing FAA Airport Improvement Program (AIP) funds for Arizona airports. The ADOT Multimodal Planning Division - Aeronautics Group develops a five-year ACIP program that is reviewed and approved annually by the State Transportation Board in conjunction with the STB Policies.

The ACIP allocates funds for eligible projects from the State Aviation Fund and distributes these funds across three major funding categories:

- Airport Development Grants Program
- Airport Loan Program
- Arizona Pavement Preservation Program (APPP)/Airport Pavement Management System (APMS)

3.5 New Mexico State Grant Program

The New Mexico Department of Transportation Aviation Division administers State grant programs for funding airport planning, construction, and maintenance projects. Matching grant funds for FAA AIP grants, state, and local only grants are also provided by the New Mexico Aviation Division. The Division establishes the overall policy and procedures for the development and funding of capital improvements. General fund appropriations, aviation fuel taxes, and registration fees on aircraft based in New Mexico are the primary sources of funding used by the Division. The revenue generated from these taxes and fees are deposited into a restricted account. The Aviation Division also receives a general fund appropriation from the New Mexico State Legislature.

3.6 FEDERAL FUNDING POLICIES

The FAA reauthorization legislation enacted on February 14, 2012, authorized appropriations to the FAA from fiscal year 2012 through fiscal year 2015. The legislation also seeks to improve aviation safety and capacity of the national airspace system, provide a framework for integrating new technology safely into our airspace, provide a stable funding system, and advance the implementation of the Next Generation Air Transportation System (NextGen).

The FAA Airport Improvement Program (AIP) provides grants to public agencies and, in some cases, to private owners and entities for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS).

AIP grants for planning, development, or noise compatibility projects that are associated with individual public-use airports (including heliports and seaplane bases). A public-use airport is an airport open to the public that also meets the following criteria:

- Publicly owned, or
- Privately owned but designated by FAA as a reliever, or
- Privately owned but having scheduled service and at least 2,500 annual enplanements.

Further, to be eligible for a grant, an airport must be included in the NPIAS. The NPIAS, which is prepared and published every 2 years, identifies public-use airports that are important to public transportation and contribute to the needs of civil aviation, national defense, and the Postal service.

Recipients of grants are referred to as "sponsors." The description of eligible grant activities is described in the authorizing legislation and relates to capital items serving to develop and improve the airport in areas of safety, capacity, and noise compatibility. In addition to these basic principles, a sponsor must be legally, financially, and otherwise able to carry out the assurances and obligations contained in the project application and grant agreement.

Eligible projects include those improvements related to enhancing airport safety, capacity, security, and environmental concerns. In general, sponsors can use AIP funds on most airfield capital improvements or repairs and in some specific situations, for terminals, hangars, and non-aviation development. Any professional services that are necessary for eligible projects, such as planning, surveying, and design, are eligible. Aviation demand at the airport must justify the projects, which must also meet Federal environmental and procurement requirements.

Projects related to airport operations and revenue-generating improvements are typically not eligible for funding. Operational costs, such as salaries, equipment, and supplies, are also not eligible for AIP grants.

For large and medium primary hub airports, the grant covers 75 percent of eligible costs (or 80 percent for noise program implementation). For small primary, reliever, and general aviation airports, the grant covers a range of 90-95 percent of eligible costs, based on statutory requirements.

3.7 SUMMARY

The Navajo Nation has multiple funding sources available for the development of the airports included in the study. Each funding source will be considered as part of the study to maximize the potential of each airport, and to minimize the financial impact on the Navajo Nation.

Chapter Four

INVENTORY OF AIRPORT SYSTEM ASSETS

CHAPTER 4 - INVENTORY OF AIRPORT SYSTEM ASSETS

4.1 INTRODUCTION

The purpose of this chapter is to identify and depict existing conditions at the Navajo Nation airports using tables, charts, and graphics. An accurate and thorough inventory of existing airport assets is necessary to ensure the results of the Navajo Nation Airport System Master Plan (NNASMP) are factual and most importantly implementable. The inventory portion of the study serves as the primary source of data for analysis. Additional data gathered from other sources is included where applicable. The data presented in the chapter is organized as follows:

- Data collection methods
- Grant history and financial data
- Airport planning documents
- Airport activity
- Airspace structure and components
- Instrument approach capabilities
- Runway wind coverage
- Existing airside facility inventory
- Existing landside facility inventory
- Navajo Nation lands and leases
- Airport sustainability

4.2 DATA COLLECTION METHODS

Data for this study was obtained from a variety of sources including on-site visits to each airport in the study. During the on-site visits, members of the consulting team reviewed the preliminary information against actual field observations and measurements.

In addition to the on-site visits, other sources of information including Federal Aviation Administration (FAA), Navajo DOT, and ADOT/NMDOT Aeronautics Division databases were used. Previous studies for individual airports provided additional information regarding the Navajo Nation airport system. The following specific sources of information were used, where necessary, to supplement data gathered during the inventory process:

- Airport Master Plans
- Airport Layout Plans
- Record drawings and reports
- FAA Terminal Area Forecasts (TAF)
- FAA Airport Master Record Form 5010-1
- Arizona State Airports System Plan 2008

- New Mexico Airport System Plan Update 2009
- Navajo Nation Long Range Transportation Plan 2009

4.3 GRANT HISTORY AND FINANCIAL DATA

4.3.1 GRANT HISTORY

The Federal grant history for the Navajo Nation is presented in **Table 4-1**. It contains the FAA Airport Improvement Program (AIP) grants received within the last five years.

TABLE 4-1 FAA AIP GRANT HISTORY FOR STUDY AIRPORTS IN ARIZONA AND NEW MEXICO

Federal Fiscal Year	Federal Grant Number	Project Description	Federal Grant Amount
2010	-	-	-
2011	3-04-D303-01-11	Master Plan	$600,000
	3-04-D303-XX-11	Window Rock Airport Runway Rehabilitation	$841,700
2012	-	-	-
2013	-	-	-
2014	-	-	-
Total amount			**$1,341,700**

Source: http://www.faa.gov/airports/aip/grant_histories/

4.3.2 AIRPORT FINANCIAL DATA

Initial financial data has been gathered for the Navajo Nation Airports System Master Plan, while additional data continues to be collected. The five-year Capital Improvement Program (CIP) for each of the study airports has been obtained and validated against the current conditions of each facility and future needs. Additionally, current funding sources and projected amounts have been identified, along with an understanding of how such funding sources will be allocated against the operations and facility needs of each of the study airports.

Information continues to be gathered for financial categories pertaining to the prior year's budget history, operating agreements, and leasing revenues history in order to establish a baseline for future financial forecasting. When complete, a comprehensive picture of the current financial structure of the

Navajo Nation Airports System will be available. This will serve as the basis for development of the future financial structure necessary to support and operate of each of the airports within that system.

4.4 Airport Planning Documents

A few of the airports included in the study have had master plans and airport layout plans prepared. In order for an airport to be eligible for federal and state funding, the FAA requires that airports must have an airport master plan or airport layout plan approved and on file with the FAA and the state DOT. Projects are not eligible for FAA or state DOT funds if they are not identified in an airport master plan and shown on an approved airport layout plan.

The completion dates of master plans and airport layout plans at the airports included in this study are summarized in **Table 4-2**. The FAA approval date of the ALP is also shown.

Table 4-2 Study Airports' Airport Master Plans and Airport Layout Plans

Airport Name	Associated City	FAA ID	Master Plan	ALP	FAA ALP Approval Date
Arizona Airports					
Chinle Municipal Airport	Chinle	E91	N/A	1992	1992
Tuba City Airport	Tuba City	T03	N/A	N/A	N/A
Window Rock Airport	Window Rock	RQE	1998	1998	2001
New Mexico Airports					
Crownpoint Airport	Crownpoint	0E8	N/A	N/A	N/A
Shiprock Airstrip	Shiprock	5V5	N/A	N/A	N/A

Sources: ADOT MPD – Aeronautics Group; New Mexico Airport System Plan Update 2009
Note: N/A = not applicable

4.5 Airport Activity

There are various federal, state, and local sources available for determining existing activity levels at an airport. These include, but are not limited to, FAA 5010-1 Form, FAA Terminal Area Forecast (TAF), an on-site inventory, and airport management records.

The FAA *Airport Master Record*, Form 5010-1, is the official record kept by the FAA to document airport physical conditions and other pertinent information. The information is typically collected from the airport sponsor and includes an annual estimate of aircraft activity as well as the number of based aircraft. The accuracy of the information contained in the 5010-1 Form varies directly with the airport manager's record keeping system and the date of its last revision.

The TAF is a historical record and contains forecast projections of based aircraft and annual operations. The TAF is maintained and utilized by the FAA for planning and budgeting purposes. The TAF data may not accurately reflect the based aircraft and operations numbers, as it is dependent on when it was last updated by the FAA. Furthermore, it is difficult to accurately record aircraft operations at airports that are not equipped with an air traffic control tower. Normally, operations are recorded by air traffic controllers and reported to the FAA. In this instance, none of the airports in the study have an air traffic control tower.

An on-site inventory of airport facilities is also a valuable method of collecting data. Each airport in the study received an on-site inventory of facilities performed by members of the consultant team. The airport inventories were conducted June through August 2014. In addition to the on-site inventories, data was also collected from Navajo DOT Airports Management personnel.

The existing aircraft operations and based aircraft for each airport are displayed in **Table 4-15** and can be found at the end of this chapter.

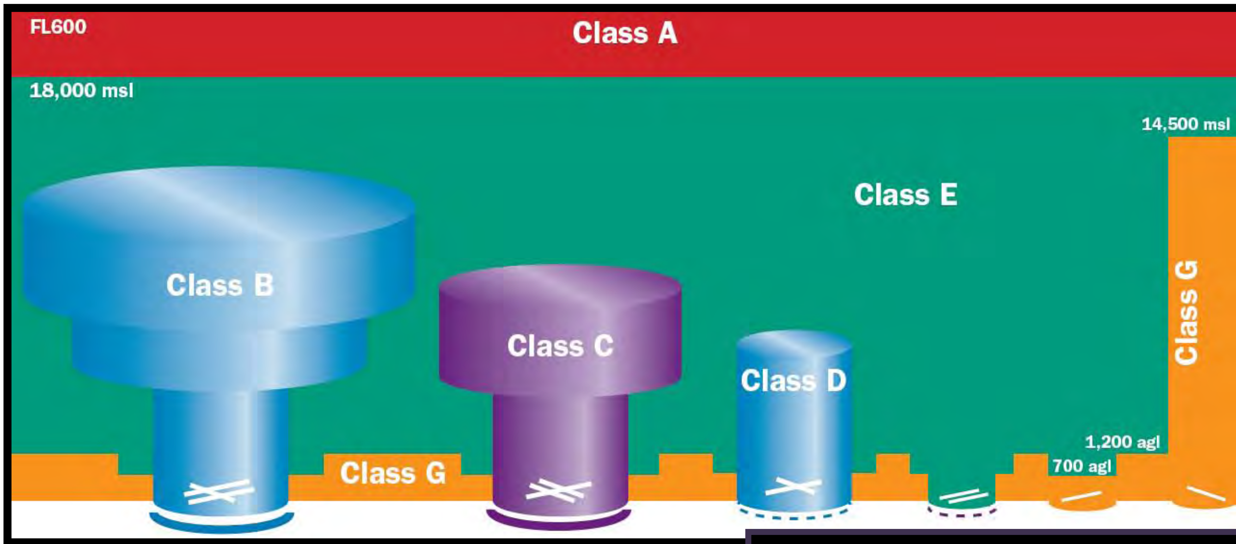
4.6 Airspace Structure and Components

4.6.1 Airspace Classifications

The National Airspace System consists of various classifications of airspace that are regulated by the FAA. Airspace is either controlled or uncontrolled. Pilots flying in controlled airspace are subject to Air Traffic Control (ATC) and must follow either Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) requirements. These requirements include combinations of operating rules, aircraft equipment and pilot certification, and vary depending on the Class of airspace. These rules are described in Federal Aviation Regulations (FAR) Part 71, *Designation of Class A, Class B, Class C, Class D and Class E Airspace Areas; Airways; Routes; and Reporting Points* and FAR Part 91, *General Operating and Flight Rules*. A graphical representation of the different airspace classes is shown in **Figure 4-1**. General definitions of the classes of airspace are provided below:

- **Class A Airspace** - Airspace from 18,000 feet MSL up to and including Flight Level (FL) 600.
- **Class B Airspace** - Airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements.
- **Class C Airspace** - Generally, airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower.
- **Class D Airspace** - Airspace from the surface up to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports with an operational control tower.
- **Class E Airspace** - Generally, controlled airspace that is not Class A, Class B, Class C, or Class D.
- **Class G Airspace** - Generally, uncontrolled airspace that is not designated Class A, Class B, Class C, Class D, or Class E.

- **Victor Airways** - These airways are low altitude flight paths between ground based VHF Omnidirectional Range receivers (VORs).



Source: Aircraft Owners and Pilots Association (AOPA), retrieved 2014

FIGURE 4-1 AIRSPACE CLASSIFICATIONS

Chinle Municipal and Window Rock Airports are situated in Class E airspace with floor 700 feet above the surface that laterally abuts 1,200 feet or higher Class E airspace. Tuba City, Crownpoint, and Shiprock Airports are situated in Glass G airspace from the surface up to 14,500 feet mean sea level (MSL). Pilots should check Notices to Airmen (NOTAMs) or the Airport/Facility Directory (A/FD) for additional information regarding airspace surrounding the airports.

A Victor Airway is a special kind of Class E airspace and is like a "highway" in the sky. Many powered aircraft follow these routes. The routes connect VOR stations that radiate a signal in all directions. These stations are usually located at or near airfields. North-South Victor Airways have odd numbers while East-West airways have even numbers. These federal or Victor Airways are used by both IFR and VFR aircraft. The airspace set aside for a Victor Airway is eight miles wide with a floor at 1,200 feet AGL and extend up to FL 180 (18,000 feet MSL). Victor Airways 208 and 210 (V-208 and V-210) can be used for navigational purposes from Tuba City Airport. Increased air traffic can be expected in and around Victor Airways and the originating and terminating VOR.

4.6.2 AIRSPACE JURISDICTION

Crownpoint and Window Rock Airports are located within the jurisdiction of the Albuquerque Air Route Traffic Control Center (ARTCC): Chinle Municipal, Tuba City, and Shiprock Airstrip are located within the jurisdiction of the Denver ARTCC. The altitude of radar coverage by the Albuquerque and Denver ARTCC may vary as a result of the FAA navigational/radar facilities in operation, weather conditions, and surrounding terrain. Pilots at Chinle Municipal, Tuba City, and Window Rock Airports may obtain additional weather data and other pertinent information from the Prescott Flight Service Station (FSS). Similarly, pilots at Crownpoint and Shiprock may use the services of the Albuquerque FSS.

4.6.3 Airspace Restrictions

Military Operation Areas (MOAs) and Military Training Routes (MTRs) are established for the purpose of separating certain military training activities, which routinely necessitate acrobatic or abrupt flight maneuvers, from Instrument Flight Rules (IFR) traffic. IFR traffic can be cleared through an active MOA if IFR separation can be provided by Air Traffic Control (ATC), otherwise ATC will reroute or restrict the IFR traffic. Restricted areas are defined as “airspace designated under FAR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency.” Restricted areas are typically associated with military operations and indicate the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery or guided missiles.

Tuba City Airport is located approximately 5 nautical miles (nm) north of the northern border of the Sunny MOA. The Sunny MOA begins at 12,000 feet MSL and extends up to Flight Level (FL) 180 (18,000 feet MSL). It is activated by issuing a NOTAM and is monitored by the Albuquerque Center. None of the other four study airports are located in the vicinity of a MOA.

Special Conservation Areas are also located in the vicinity of several of the study airports. This type of airspace surrounds many national parks, wildlife refuges, and other noise sensitive areas. Pilots are requested to avoid flight below 2,000 feet AGL in these areas. Chinle Municipal Airport is located approximately 3 nm from the western edge of the Canyon de Chelly National Monument area. Likewise, Crownpoint Airport is located approximately 20 nm southwest of the Chaco Culture National Historic Park area. Finally, and most notably, Tuba City Airport is located approximately 10 nm east of the eastern portion of the Grand Canyon National Park Special Flight Rules Area.

The 1987 National Parks Overflights Act (Public Law 100-91) requires restoration of natural quiet and visitor experience in Grand Canyon National Park. In March 1987, the FAA established a Special Flight Rules Area (SFRA) and other flight restrictions in the vicinity of Grand Canyon National Park to “reduce the impact of aircraft noise on the park.” In April of 2000, Congress passed the National Parks Air Tour Management Act (Public Law 106-181) to affirm the requirement to achieve substantial restoration of natural quiet in the Grand Canyon National Park and required FAA to designate reasonably achievable requirements for fixed-wing aircraft and helicopters to employ quiet-aircraft technology. The Act also called on FAA, in consultation with the National Park Service and the Grand Canyon Working Group, to create incentive routes for commercial air-tour operators and develop recommendations for proposed actions to meet the statutory mandate contained in the 1987 Overflights Act. As of this writing, a draft Environmental Impact Statement was prepared in February 2011 by the National Park Service to substantially restore natural quiet in the vicinity of the Grand Canyon National Park.

During the Chapter workshops the topic of considering special flight rules was mentioned for Canyon De Chelly National Monument, Window Rock Navajo Tribal Park & Veteran's Memorial, and the Chaco Culture National Historical Park. The Navajo DOT will need to decide if implementing special flight rules in the vicinity of these national parks is feasible. The special flight rules for the Grand Canyon National Park should be considered by the Navajo DOT as a framework for moving forward. All future approach procedure development for the airports included in the study should also consider the potential for having special flight rules implemented over the above mentioned national monument/parks.

4.6.4 Radio Navigational Aids

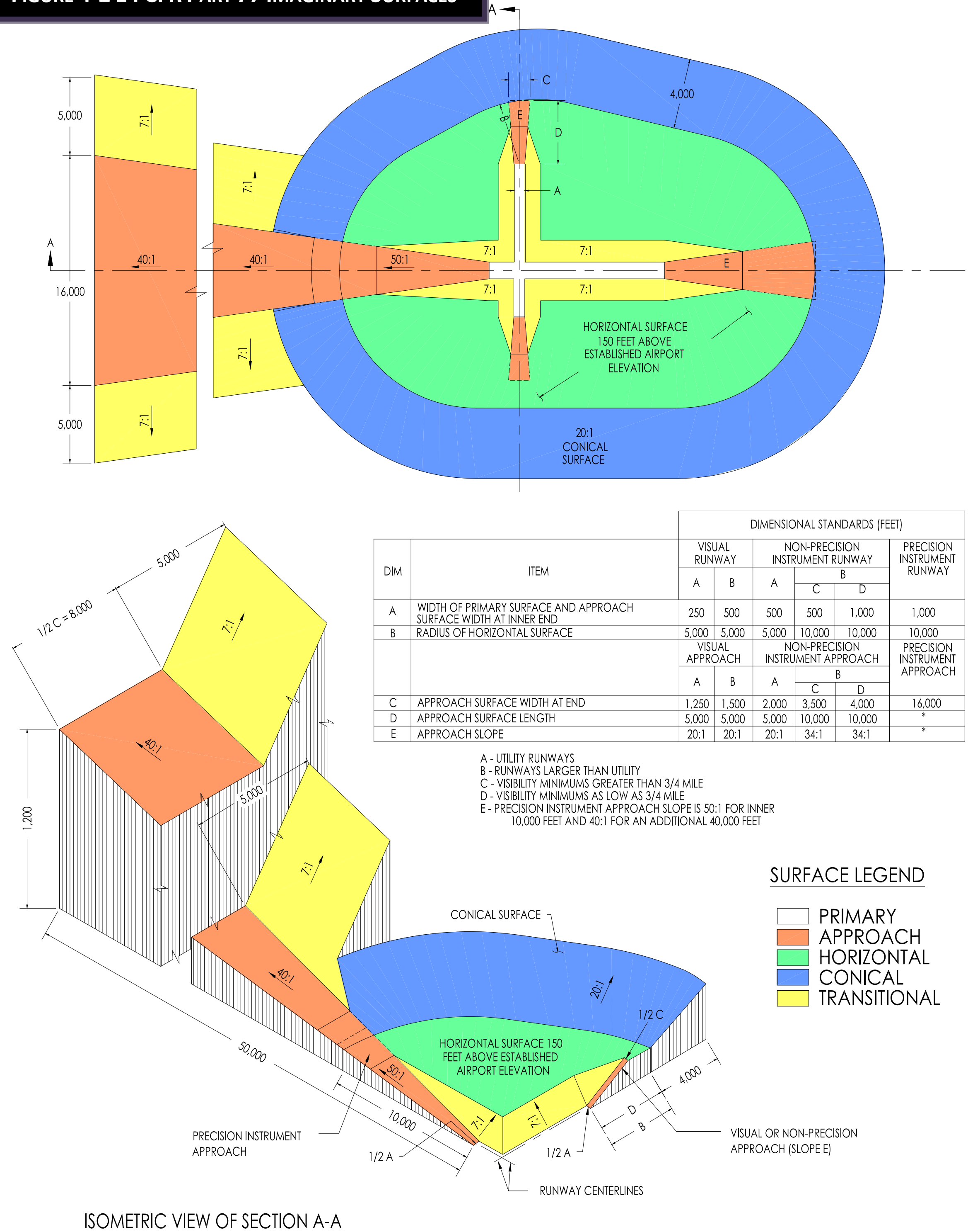
A Navigational Aid (NAVAID) is any ground based visual or electronic device used to provide course or altitude information to pilots. Radio NAVAIDs include Very High Omnidirectional Range (VORs), Very High Frequency Omnidirectional Range with Tactical Information (VOR-TACs), Nondirectional Beacons (NDBs), and Tactical Air Navigational Aids (TACANs), as examples.

Several of the study airports have radio navigational aids located nearby. For example, the Tuba City VORTAC is located approximately 6 nm west, and the Grand Canyon VOR/DME is located approximately 38 nm southwest of the Tuba City Airport. The Gallup VORTAC is located approximately 14 nm southeast of the Window Rock Airport and approximately 36 nm southwest of the Crownpoint Airport. Finally, the Rattlesnake VORTAC is located approximately 14 nm east of the Shiprock Airstrip.

4.6.5 Title 14, Code of Federal Regulations (14 CFR) Part 77 Imaginary Surfaces

The 14 CFR Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace* establishes several imaginary surfaces that are used as a guide to provide a safe and unobstructed operating environment for aviation. These surfaces, which are typical for civilian airports, are shown in **Figure 4-2**. The primary, approach, transitional, horizontal and conical surfaces identified in 14 CFR Part 77 are applied to each runway at both existing and new airports on the basis of the type of approach procedure available or planned for that runway and the specific 14 CFR Part 77 runway category criteria. For the purpose of this section, a utility runway is a runway that is constructed for and intended for use by propeller driven aircraft of a maximum gross weight of 12,500 pounds or less. A larger than utility runway is a runway constructed for and intended for the use of aircraft of a maximum gross weight of 12,500 pounds or greater. A visual runway is a runway intended for the operation of aircraft of any gross weight, but used only for visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan, or by any planning document submitted to the FAA by competent authority. A non-precision instrument runway is a runway with an approved or planned straight-in instrument approach procedure.

FIGURE 4-2 14 CFR PART 77 IMAGINARY SURFACES



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					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 APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					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 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
E - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

SURFACE LEGEND

- PRIMARY
- APPROACH
- HORIZONTAL
- CONICAL
- TRANSITIONAL

Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace*, 2014

4.6.5-1 Primary Surface

The primary surface is an imaginary surface of specific width, longitudinally centered on a runway. The primary surface extends 200 feet beyond each end of the paved surface of runways, but does not extend past the end of soft field runways. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width is 1,000 feet for precision runways, 500 feet for visual, larger-than-utility runways, and 250 feet for visual-utility runways.

4.6.5-2 Approach Surface

The approach surface is a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of the runway based upon the type of approach available or planned for that runway, with approach gradients of 20:1, 34:1 or 50:1. The inner edge of the surface is the same width as the primary surface. It expands uniformly to a width corresponding to the 14 CFR Part 77 runway classification criteria.

4.6.5-3 Transitional Surface

The transitional surface extends outward and upward at right angles to the runway centerlines from the sides of the primary and approach surfaces at a slope of 7:1 and end at the horizontal surface.

4.6.5-4 Horizontal Surface

The horizontal surface is considered necessary for the safe and efficient operation of aircraft in the vicinity of an airport. As specified in 14 CFR Part 77, the horizontal surface is a horizontal plane 150 feet above the established airport elevation. The airport elevation is defined as the highest point of an airport’s useable runways, measured in feet above mean sea level. The perimeter is constructed by arcs of specified radius from the center of each end of the primary surface of each runway. The radius of each arc is 5,000 feet for runways designated as utility or visual and 10,000 feet for all other runways.

4.6.5-5 Conical Surface

The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

4.6.5-6 Summary of Dimensional Criteria

The 14 CFR Part 77 imaginary surfaces depicted in **Tables 4-3**, **4-4, and 4-5** represent the existing dimensions for each of the airports included in the study. These surfaces will be used to determine if any existing or potential obstacles exists depending on the planned development at each airport. Any changes to the existing dimensions based on the selection of a different RDC for an airport will be noted on the Airport Data Table included on the Airport Layout Plan. Obstacles will be identified on the Airport Layout Plan and any proposed mitigation will also be identified, such as obstruction marking or the recommended removal of an obstacle.

TABLE 4-3 14 CFR PART 77 IMAGINARY SURFACES FOR TWO STUDY AIRPORTS

14 CFR Part 77 Imaginary Surfaces for: • Crownpoint Airport (Runway 18-36) • Shiprock Airstrip (Runway 2-20)	
Visual Utility Runway	
Primary Surface width	250’
Primary Surface beyond RWY end	200’
Horizontal Surface	150’ above airport elevation
Approach Surface dimensions	Both ends (250’ x 1,250’ x 5,000’)
Approach Surface slope	Both ends (20:1)
Transitional Surface slope	7:1
Conical Surface	20:1

Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace*, 2014

TABLE 4-4 14 CFR PART 77 IMAGINARY SURFACES FOR TWO STUDY AIRPORTS

14 CFR Part 77 Imaginary Surfaces for: • Chinle Municipal Airport (Runway 18-36) • Tuba City Airport (Runway 15-33)	
Visual Larger-than-Utility Runway	
Primary Surface width	500’
Primary Surface beyond RWY end	200’
Horizontal Surface	150’ above airport elevation
Approach Surface dimensions	Both ends (500’ x 1,500’ x 5,000’)
Approach Surface slope	Both ends (20:1)
Transitional Surface slope	7:1
Conical Surface	20:1

Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace*, 2014

TABLE 4-5 14 CFR PART 77 IMAGINARY SURFACES FOR WINDOW ROCK AIRPORT

CFR 14 Part 77 Imaginary Surfaces for: • Window Rock Airport (Runway 2-20)	
Non-precision Instrument Larger-than-Utility Runway	
Primary Surface width	500’
Primary Surface beyond RWY end	200’
Horizontal Surface	150’ above airport elevation
Approach Surface dimensions	R/W 2 (500’ x 3,500’ x 10,000’) R/W 20 (500’ x 1,500’ x 5,000’)
Approach Surface slope	R/W 2 (34:1) R/W 20 (20:1)
Transitional Surface slope	7:1
Conical Surface	20:1

Source: 14 CFR, Part 77 *Safe, Efficient Use, and Preservation of Navigable Airspace*, 2014

4.7 Instrument Approach Capabilities

Airport safety and capacity are greatly enhanced at airports where instrument approach procedures (IAP) are available during times of inclement weather. As the ceiling and visibility around an airport decreases, electronic guidance provided by specialized equipment to aircraft (also equipped with specialized equipment) allows pilots to safely operate and land in weather where visibility is restricted. Additionally, the availability of instrument approach capabilities at an airport increases capacity by allowing continued use of the airport by aircraft equipped to fly instrument procedures because they can still land at the airport while aircraft which can only fly during visual conditions cannot.

The instrument approach capabilities of an airport are typically broken into three categories: precision, non-precision, and visual. Precision instrument approach procedures provide very accurate electronic lateral and vertical guidance to aircraft. Non-precision instrument approach procedures also provide electronic guidance to aircraft, but the accuracy is less refined and is mainly limited to lateral guidance only. The type and accuracy of an instrument approach is highly dependent upon the airspace obstructions in the vicinity of the airport. Runways with no instrument approach capabilities are considered visual runways. Airports with published instrument approach procedures are known as Instrument Flight Rules (IFR) airports while airports with no published instrument approach procedures are considered Visual Flight Rules (VFR) airports.

The most common type of precision approach in use today is the Instrument Landing System (ILS). Non-precision approach capabilities have been greatly increased by the evolution of satellite technology, specifically Global Positioning System (GPS). The FAA has recently developed new approach procedures know as Localizer, or Lateral, Performance with Vertical Guidance (LPV). This new capability utilizes the Wide Area Augmentation System (WAAS). While not considered a precision approach, LPV provides vertical guidance to aircraft to “near precision” accuracy. Another type of instrument approach is area navigation (RNAV). This is a method of instrument flight rules (IFR) navigation that allows an aircraft to choose any course within a network of navigation beacons, rather than navigating directly to and from the beacons. RNAV can be defined as a method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability, or a combination of these. This can conserve flight distance, reduce congestion, and allow flights into airports without beacons.

Instrument approach procedures are developed by the FAA. GPS/RNAV and/or LPV approaches require no ground based equipment; thus, the FAA can now develop approach procedures at airports where it was previously not economically feasible. Combined with evolving technology, more and more aircraft are able to safely operate in more airport environments.

Of the five airports in the study, only Window Rock Airport (KRQE) has a published instrument approach. Runway 2 has a published GPS approach; approach minimums include an 800 foot decision height with 1 mile visibility. Runway 20 has a published GPS and VOR/DME (circling) approach; approach minimums include a 1,000 foot decision height with 1 ¼ visibility. Window Rock Airport is also the only airport in the study with automated weather capabilities located on the airfield; an automated surface observing system (ASOS) is located on the northeast side of the airfield and broadcasts on the radio frequency 118.325.

4.8 RUNWAY WIND COVERAGE

Wind direction and speed determine the desired alignment and configuration of the runway system. Aircraft land and takeoff into the wind and therefore can tolerate only limited crosswind components (the percentage of wind perpendicular to the runway centerline). The ability to land and takeoff in crosswind conditions varies according to pilot proficiency and aircraft type.

FAA Advisory Circular 150/5300-13A, *Airport Design*, recommends that a runway should yield 95 percent wind coverage under stipulated crosswind components. If one runway does not meet this 95 percent coverage, then construction of an additional runway may be advisable. The crosswind component of wind direction and velocity is the resultant vector, which acts at a right angle to the runway. It is equal to the wind velocity multiplied by the trigonometric sine of the angle between the wind direction and the runway direction. The allowable crosswind component for each Runway Design Code is shown in **Table 4-6**.

TABLE 4-6 CROSSWIND COMPONENT

Allowable Crosswind	Runway Design Code
10.5 knots	A-I & B-I
13 knots	A-II & B-II
16 knots	A-III, B-III & C-I through D-III
20 knots	A-IV through D-VI, E-I through E-VI

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

Historical wind data gathered for this study was obtained from the National Oceanic and Atmospheric Administration (NOAA). NOAA is able to collect and archive wind data from an automated weather reporting system, such as an ASOS/AWOS, over a long period of time. As previously mentioned, Window Rock Airport is the only airport in the study with an ASOS located on the airfield. All wind data pertaining to the runway at Window Rock Airport was obtained from the ASOS on the airfield. The other four airports (Chinle Municipal, Tuba City, Crownpoint, and Shiprock Airstrip) had to rely on wind data from other ASOS facilities located nearby. The other ASOS locations were chosen based upon their proximity to the study airport and how closely the runway orientation where the ASOS is located mirrored that of the study airport. The location airport of the ASOS used for the study airports and other general information regarding the wind data is depicted in **Table 4-7**.

TABLE 4-7 NAVAJO AIRPORTS WIND DATA (GENERAL INFORMATION)

	RWY True Bearing	ASOS Used	Distance to ASOS	VFR Observations	IFR Observations	Dates of Observation
Arizona Airports						
Chinle	7.1730	RQE	37 NM	92,456	6,664	2006-2014
Tuba City	346.2030	PGA	49 NM	95,633	2,589	2006-2014
Window Rock	214.0342	RQE	0 NM	92,456	6,664	2006-2014
New Mexico Airports						
Crownpoint	13.4005	RQE	42 NM	92,456	6,664	2006-2014
Shiprock	211.1434	FMN	22 NM	336,104	10,608	1973-2014

Note: ASOS data obtained from Window Rock Airport (RQE), Page Municipal Airport (PGA), and Four Corners Regional Airport (FMN).
Source: NOAA, July 2014

The historical wind data collected from each ASOS facility was used to determine the wind coverage percentage for the runways at each study airport. The allowable crosswind component and corresponding wind coverage percentages using all-weather data and IFR weather data for each airport are shown in **Table 4-8** and **Table 4-9**.

TABLE 4-8 NAVAJO AIRPORTS WIND DATA (ALL-WEATHER)

Arizona Airports	10.5 Knots	13.0 Knots	16.0 Knots
Chinle	91.29%	95.12%	98.38%
Tuba City	97.66%	98.94%	99.84%
Window Rock	95.66%	97.98%	99.53%
New Mexico Airports			
Crownpoint	92.43%	95.96%	98.80%
Shiprock	88.64%	93.10%	97.30%

Note: There is only one runway at each airport (single-runway configuration).
Source: NOAA, July 2014

TABLE 4-9 NAVAJO AIRPORTS WIND DATA (IFR WEATHER)

Arizona Airports	10.5 Knots	13.0 Knots	16.0 Knots
Chinle	87.83%	92.69%	97.24%
Tuba City	96.96%	98.16%	99.34%
Window Rock	94.19%	97.10%	99.06%
New Mexico Airports			
Crownpoint	89.31%	93.86%	97.89%
Shiprock	88.59%	93.12%	97.20%

Note: There is only one runway at each airport (single-runway configuration).
Source: NOAA, July 2014

When determining if a runway has adequate wind coverage, the first factor to consider is the source of the wind data. The second factor to consider is the appropriate Runway Design Code (RDC). The wind data for this study was obtained from nearby airports for all of the airports except for Window Rock Airport; thus, it is prudent not to rely too heavily on the results of the wind analysis for the remaining airports. In general, wind coverage is adequate for Window Rock for the types of aircraft likely to continue using the airport (A-I through B-II aircraft) because the coverage is greater than 95 percent for both 10.5 and 13.0 knots. The remaining airports wind analysis reveals that the wind coverage for 10.5 and 13.0 knots ranges from approximately 88 percent to 97 percent based on wind data from another source. Although not conclusive from the results of the wind analysis, it appears that all of the remaining airports may have adequate wind coverage. Therefore, the need to plan for potential crosswind runways at each of the airports will not be necessary.

4.9 Existing Airside Facility Inventory

The definition of airside is that portion of the airport, typically within the public safety and security fenced perimeter, in which aircraft, support vehicles, and equipment are located, and in which aviation-specific operational activities take place. The inventory of airside facilities provides the basis for the determination of any facility change requirements that might be identified. At the end of the chapter, **Table 4-14** summarizes the existing airside facilities for each of the airports in the study. **Exhibits A1 – A5** are also located at the end of this chapter; they illustrate the type and location of each existing airside facility and/or component on the airfield. Additional photographs and descriptions from the on-site airport inventories can be found in **Appendix F**.

Some of the unique physical constraints and/or apparent FAA design standard concerns at each airport are identified herein. It is important to note that no subsurface investigations or topographic surveys were performed as part of this study or inventory. Furthermore, any physical constraints identified are based on visual observations made only during onsite-visits to each airport.

4.9.1 Airfield Pavements

Airfield pavements consist of runways, taxiways/taxilanes, and aircraft aprons. The pavements are essentially the skeleton of the airport, supporting and connecting airside activities to landside facilities. The maintenance and preservation of an airport’s system of pavement is essential in order to provide safe and efficient operational capabilities. The on-site inventories at each of the study airports reveled that the airfield pavements at every airport is in need of some type of reconstruction and/or rehabilitation. A description of the existing pavement conditions for each airport is described below.

4.9.1-1 Runways

The airports included in the study consist of single runway configurations; there are no crosswind or parallel runways at any of the airports included in the study. The runway lengths vary from 4,840 to 7,000 feet, and are either 60 or 75 feet wide. Runway pavements are marked as either visual or non-precision. None of the runways were noted as having grooved pavement. In general, all of the runways appear to have adequate land surrounding them to allow for potential growth of the airfield. The only exception is Window Rock Airport; some residential and commercial properties are located at the north and west areas of the airport.

4.9.1-2 Taxiway System

The taxiway systems for the airports in the study consists of either a connector taxiway to an aircraft parking apron, a taxiway turn-around, or a partial parallel taxiway. The taxiway pavement at each of the airports appears to be in worse condition than the adjacent runway. From field observations, the airports with taxiway turn-arounds do not appear to meet current FAA design standards. The Airport Layout Plan for each airport will depict any needed modifications to the existing taxiway configurations, along with any proposed new taxiway pavement configurations, such as a parallel taxiway.

4.9.1-3 Aircraft Apron

Each airport in the study has an existing aircraft parking apron. The size, configuration, and overall pavement condition varies at each airport. In general, the aircraft aprons appear to meet the current demand based on visual observations, although additional aircraft apron maybe proposed on the Airport Layout Plans based on discussions with the Navajo Nation and existing or prospective users.

4.9.1-4 Existing Airfield Pavement Conditions at Chinle Municipal Airport

Based on a visual inspection of the pavements, the runway (18-36), taxiways, and apron areas have been crack and fog sealed in years past. However, many of the cracks have re-emerged and are filled with dirt and vegetation causing further deterioration. Additionally, a number of new runway shoulder areas have cracked and failed as well. Due to the numerous amounts of cracking and vegetation growth, the runway, taxiway, and apron are in fair condition.

There are no apparent constraints to future development of the runway. Adequate land exists at both ends of the runway and parallel to the runway to accommodate reasonable development such as parallel taxiways, aircraft parking aprons, etc. Any additional land identified in the planning process that is needed to accommodate future development will be identified on the Airport Layout Plan.

4.9.1-5 Existing Airfield pavement Conditions at Tuba City Airport

Based on a visual inspection of the pavements, the runway (15-33), taxiway, and apron pavement areas have all been crack and fog sealed in past years. However, many of the pavement cracks have re-emerged and are filled with dirt and vegetation propagating further pavement deterioration. As such, the runway is in poor condition, and the taxiway and apron are in fair condition.

Besides several large cracks and the growth of vegetation, the runway is considered in poor condition due to an area located approximately 1,500 feet from the north end of the runway that has cracked and heaved as a likely result of unstable soils and/or sub-grade underneath the asphalt. There is an active Notice to Airman (NOTAM) regarding rough and uneven runway pavement. Addressing this area of the runway will be further discussed in the Facility Requirements chapter.

There are no apparent constraints to future development of the runway. Adequate land exists at both ends of the runway and parallel to the runway to accommodate reasonable development such as parallel taxiways, aircraft parking aprons, etc. Any additional land identified in the planning process that is needed to accommodate future development will be identified on the Airport Layout Plan.

4.9.1-6 Existing Airfield Pavement Conditions at Window Rock Airport

Based on a visual inspection of the pavements, the runway (2-20), taxiway, and apron pavement areas have all been crack and fog sealed in past years. However, many of the pavement cracks have re-emerged and are filled with dirt and vegetation propagating further pavement deterioration. As such, the runway, taxiways, and apron are in poor condition.

There are no apparent constraints to future development of the runway except to the south where Logan Road would be impacted. Adequate land exists parallel to the runway to accommodate reasonable development such as parallel taxiways, aircraft parking aprons, etc. Any additional land identified in the planning process that is needed to accommodate future development will be identified on the Airport Layout Plan.

4.9.1-7 Existing Airfield Pavement Conditions at Crownpoint Airport

Based on a visual inspection of the pavements, the runway (18-36), taxiway, and apron areas have been crack and fog sealed in years past. However, many of the cracks have re-emerged and are filled with dirt and vegetation causing further deterioration. Additionally, a number of new runway shoulder areas have cracked and failed as well. Due to the numerous amounts of cracking and vegetation growth, the runway, taxiway, and apron are in fair condition.

There are no apparent constraints to future development of the runway. Adequate land exists at both ends of the runway and parallel to the runway to accommodate reasonable development such as parallel taxiways, aircraft parking aprons, etc. Any additional land identified in the planning process that is needed to accommodate future development will be identified on the Airport Layout Plan.

4.9.1-8 Existing Airfield Pavement Conditions at Shiprock Airstrip

Based on a visual inspection of the pavements, the runway (2-20), taxiway, and apron areas have been crack and fog sealed in years past. However, many of the cracks have re-emerged and are filled with dirt and vegetation causing further deterioration. Additionally, a number of new runway shoulder areas have cracked and failed as well. Due to the numerous amounts of cracking and vegetation growth, the runway, taxiway, and apron are in fair condition.

In addition to several large cracks and the growth of vegetation, evidence of significant erosion and drainage issues was observed adjacent to the north end of Runway 20 and the taxiway. When reconstruction or rehabilitation of the existing parallel taxiway and/or the existing runway takes place, correcting the drainage in this area will be necessary.

There are no apparent constraints to future development of the runway. Adequate land exists at both ends of the runway and parallel to the runway to accommodate reasonable development such as parallel taxiways, aircraft parking aprons, etc. Based on the planning process, if additional land is needed to accommodate the planned development, the Airport Layout Plan will show what land will be needed secured in the future.

4.9.2 RUNWAY PAVEMENT STRENGTH

According to FAA guidance on pavement strength, the aircraft types and the critical aircraft expected to use the airport during the planning period are used to determine the required pavement strength, or weight bearing capacity, of airfield surfaces. The required pavement design strength is an estimate based on average levels of activity and is expressed in terms of aircraft landing gear type and configurations. Pavement design strength is not the maximum allowable weight; limited operations by heavier aircraft other than the critical aircraft may be permissible. It is important to note that frequent operations by heavier aircraft will shorten the lifespan of the pavement. The existing runway pavement composition and strength ratings for each airport are illustrated in **Table 4-10**.

TABLE 4-10 RUNWAY PAVEMENT COMPOSITION AND STRENGTH

Airport Name	Associated City	Pavement Composition	Existing Pavement Strength (1,000 lbs.)
Arizona Airports			
Chinle Municipal Airport	Chinle	Asphalt	12.5 - SW
Tuba City Airport	Tuba City	Asphalt	12.5 - SW
Window Rock Airport	Window Rock	Asphalt	30.0 – SW 45.0 – DW 75.0 - DTW
New Mexico Airports			
Crownpoint Airport	Crownpoint	Asphalt	12.5[1] – SW 11.0[2] - SW
Shiprock Airstrip	Shiprock	Asphalt	12.5[1] – SW 11.0[2] - SW

Sources: ADOT MPD – Aeronautics Group, 2014; [1]New Mexico Airport System Plan Update 2009; [2]FAA Airport Master Record, retrieved August 2014 Note: SW = single-wheel landing gear, DW = dual-wheel landing gear, DWT = dual-tandem wheel landing gear

4.9.3 PAVEMENT CONDITION INDEX (PCI)

The PCI procedure is the standard used by the aviation industry to visually assess pavement condition. It was developed to provide engineers with a consistent, objective, and repeatable tool to represent the overall pavement condition. During a PCI survey, visible signs of deterioration within a selected sample area are identified, recorded, and analyzed. Pavement surveys are typically conducted using the procedure as documented in the following publications:

- The FAA's Advisory Circular 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements*.

- The American Society for Testing and Material's (ASTM's) standard D-5340, *Standard Test Method for Airport Pavement Condition Index Surveys*.

The results of a PCI evaluation provide an indication of the structural integrity and functional capabilities of the pavement. However, it should be recognized that during a PCI inspection only the top layer of the pavement is examined and that no direct measure is made of the structural capacity of the pavement system. Nevertheless, the PCI does provide an objective basis for determining maintenance and repair needs as well as for establishing rehabilitation priorities in the face of constrained resources. Furthermore, the results of repeated PCI monitoring over time can be used to determine the rate of deterioration and to estimate the time at which certain rehabilitation measures can be implemented. Both the Arizona Department of Transportation (ADOT) and the New Mexico Department of Transportation (NMDOT) have developed an airport pavement preservation program, each with its own set of guidelines and measurement tools.

4.9.3-1 ADOT'S PAVEMENT PRESERVATION PROGRAM

According to ADOT, the airport system in Arizona is a multimillion dollar investment of public and private funds that must be protected and preserved. The Arizona Pavement Preservation Program (APPP) has been established to assist in the preservation of the Arizona airport system infrastructure. Every year ADOT's Multimodal Planning Division (MPD) - Aeronautics Group, using the Airport Pavement Management System (APMS), identifies airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the state's Five-Year Airport Improvement Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the APPP, or the airport sponsor may sign an inter-government agreement (IGA) with the Aeronautics Group to participate in the APPP.

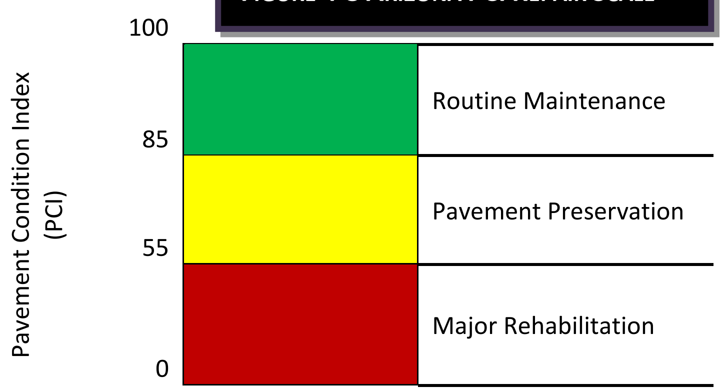
Pavement defects are characterized in terms of type of distress, severity level of distress, and amount of distress. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent). According to ADOT's PCI index, pavements above a PCI of 85 that are not exhibiting significant load-related distress will benefit from routine maintenance actions, such as periodic crack sealing or patching. Pavements with a PCI of 56 (65 for PCC pavements) to 85 may require pavement preservation, such as a surface treatment, thin overlay, or PCC joint resealing. Often, when the PCI is 55 or less, major rehabilitation, such as a thick overlay, or reconstruction are the only viable alternatives due to the substantial damage to the pavement structure. **Figure 4-3** depicts how the appropriate repair type varies with the PCI of a pavement section. **Table 4-11** depicts the most recent PCI inspection reported in the Arizona 2013 APMS report.

TABLE 4-11 ARIZONA STUDY AIRPORTS' 2013 PCI RATING

Airport	2013 PCI		
	Runway	Taxiway	Apron
Chinle Airport	38	18/54/55	35
Tuba City Airport	42/56	48	45
Window Rock Airport	11	5/18	12/20

Note. PCI numbers are preliminary based on the APMS 2013 field investigation; Multiple PCI numbers indicate multiple test sections of pavement.
Source: ADOT MPD – Aeronautics Group, Draft *2013 Arizona APMS Update Statewide Summary Report,* August 2014

FIGURE 4-3 ARIZONA PCI REPAIR SCALE



Source: ADOT MPD – Aeronautics Group, APMS program, 2014

4.9.3-2 NMDOT'S PAVEMENT PRESERVATION PROGRAM

The New Mexico Department of Transportation Aviation Division also proactively plans for its pavement preservation and has an Airport Pavement Management System (APMS) in order to monitor the condition of the pavements within the New Mexico aviation system. In May 2014, the NMDOT published the results of their study that included both Crownpoint Airport and Shiprock Airstrip. The airports were assessed in August 2013 using similar criteria described above for the ADOT program. NMDOT's pavement condition index (PCI) scale is illustrated in **Figure 4-4**, which also depicts how the appropriate repair type varies with the PCI of a pavement section. **Table 4-12** depicts the most recent PCI inspection reported in the New Mexico 2013 airport pavement management reports.

TABLE 4-12 NEW MEXICO STUDY AIRPORTS' 2013 PCI RATING

Airport	2013 PCI		
	Runway	Taxiway	Apron
Crownpoint Airport	51	30	42
Shiprock Airstrip	38/50	14	18

Note: Multiple PCI numbers indicate multiple test sections of pavement.
Source: NMDOT Aviation Division, *Crownpoint Airport Pavement Management Report* and *Shiprock Airstrip Pavement Management Report*, May 2014

FIGURE 4-4 NEW MEXICO PCI REPAIR SCALE

Source: NMDOT Aviation Division, APMS program, 2014

4.9.4 AIRFIELD LIGHTING, SIGNAGE, AND VISUAL AIDS

Airfield lighting, signage, and visual aids are used at airports to assist pilots while navigating near and on the airfield; these aids are especially important during periods of inclement weather and for nighttime operations. Visual aids such as rotating beacons, wind cones, and segmented circles are used by pilots during daytime and nighttime operations to determine airport location, wind direction, and traffic pattern information on the airfield prior to landing. Lighting on the runway and taxiways, along with airfield signage, helps guide pilots while maneuvering on the airfield. Pavement markings also help identify the type of runway and delineate pavement edges, centerlines, and other important safety functions, e.g. runway hold short lines.

4.9.4-1 AIRFIELD LIGHTING

Runway edge lighting was observed at Chinle Municipal, Tuba City, Window Rock, and Crownpoint Airports. No runway edge lighting is present at Shiprock Airstrip. The runway edge lighting is in good overall condition at Chinle Municipal, Tuba City Airport, and Crownpoint Airport. The medium intensity runway edge lighting system at Window Rock Airport is in poor condition primarily due to the infestation of prairie dogs in the area. Numerous lights were tilted and misaligned do to prairie dogs burrowing around them. Also, the runway edge lights at Crownpoint appear to have the wrong wattage bulbs installed. It was observed that 25-watt incandescent bulbs have been installed, making the edge lighting a low intensity system rather than the published medium intensity system.

Taxiway edge lighting was observed at Window Rock and Tuba City Airports. The taxiway edge lighting at Window Rock Airport is in poor condition for the same reason as the runway edge lights (prairie dog infestation). Tuba City's is in overall good condition. Taxiway edge retro-reflectors were observed at Chinle Airport; they are in fair condition.

Runway threshold lights were observed at all airports except for Shiprock. Overall they appeared to be in good to fair condition. The Runway End Identifier Lights (REIL) system at the Window Rock Airport (Runway 2) is damaged, and therefore is in poor condition. It was observed that the lens is cracked and the unit appears to be improperly aligned. According to the manufacturer's name plate located on the unit, it was installed in 2006. A REIL system was not in place at any of the other airports.

Visual glide scope indicators (VGSI) were present at all airports except for Shiprock. These lighting aids are used by pilots as they approach the airport in either the daytime or nighttime. The lighting systems provide vertical guidance by way of light beams, either white or red, to alert pilots of their relative position on the approach slope to the runway end. The most common types of VGSI found on airfields are Precision Approach Path Indicators (PAPI) and Visual Approach Slope Indicator (VASI); a less common type is the Pulse Light Approach Slope Indicators (PLASI).

A two-box PAPI system was observed at both ends of Runway 18-36 at Chinle Municipal Airport; a two-box PAPI is also in place at the end of Runway 2 at Window Rock Airport. The PAPIs at Chinle appear to be relatively new and in good condition. On the other hand, the PAPI at Window Rock is very dated and is reaching the end of its useful lifecycle; thus, it is in poor condition.

A two-box VASI system was observed at both ends of Runway 15-33 at Tuba City Airport. Both appear to be in good condition. A PLASI was observed at the end of Runway 18 at Crownpoint Airport. It appeared to be slightly outdated, but in working condition. Recommendations for the replacement of these VGSI systems will be further discussed in Chapter 5.

According to the FAA Form 5010-1 and airnav.com, all runway edge lighting and PAPI/VASI/PLASI (with the exception of Shiprock Airstrip) can be controlled by pilots for operation at night by using the airport's published Common Traffic Advisory Frequency (CTAF). It should be noted that verification of the pilot-controlled lighting was not performed during the on-site airport inventory due to the lack of access to a radio capable of performing this task.

4.9.4-2 Signage

As previously mentioned, airfield signs help inform and direct pilots while maneuvering on the runways, taxiways, and other airfield pavements. All of the airports in the study are severely lacking in all types of airfield signage. Window Rock and Tuba City Airports were the only airports observed during the on-site inventory to have any airfield signage; runway hold signs were noted at both airports. Recommendations for the installation of various airfield signs will be discussed further in Chapter 5.

4.9.4-3 VISUAL AIDS

The airport wind cones at Chinle Municipal, Tuba City, Crownpoint, and Shiprock Airstrip are in good condition; however, the two wind cones at the Window Rock Airport are in poor condition and should be replaced. Due to the lack of power at Shiprock Airstrip, the wind cone is not lit and it does not have a red obstruction light mounted on the top of the wind cone assembly. Additionally, according to the FAA Form 5010-1 and airnav.com, Crownpoint's wind cone light is out of service indefinitely.

The segmented circles at all the airports are in relatively good condition. Some were slightly obstructed by brush, which should be removed. Although each segmented circle is in good condition physically, it is not known if each meets FAA design standards as set forth in Advisory Circular (AC) 150-5340-5D, Segmented Circle Airport Marker System. Recommendations for the upgrading of each airport's segmented circle will be discussed further in Chapter 5.

Rotating beacons were observed at Chinle Municipal, Tuba City, Window Rock, and Crownpoint Airports; Shiprock Airstrip does not currently have a rotating beacon. All beacons are in good to fair condition; however, more energy efficient models could replace the existing ones at some point in the future if warranted by the Navajo DOT. The manner in which the beacon at Crownpoint Airport is mounted (on a wooden utility pole) does not comply with FAA standards and should be replaced to allow for a safer method of maintaining the rotating beacon. In addition, the self-support tower for the beacon at Chinle Municipal Airport needs to be repainted in order also to comply with FAA standards.

Pavement markings such as runway end numbers and centerlines, taxiway centerlines, and other essential pavement markings at all the airports are in fair to poor condition, with only a few exceptions in some areas. Overall the paint is faded, cracked, and/or missing on the majority of the painted surface. Recommendations for the rehabilitation of pavement markings at all airports will be further discussed in Chapter 5.

4.9.5 WEATHER REPORTING SYSTEMS

Automated airport weather stations are automated sensor suites which are designed to serve aviation and meteorological observing needs for safe and efficient aviation operations, weather forecasting and climatology. There are several types of automated airport weather reporting stations. These include the Automated Weather Observing System (AWOS), the Automated Surface Observing System (ASOS), and the Automated Weather Sensor System (AWSS). These units are operated and controlled cooperatively in the United States by the National Weather Service (NWS), the FAA and the Department of Defense (DOD). These systems generally report at hourly intervals, but also report special observations if weather conditions change rapidly and cross aviation operation thresholds. They generally report all the parameters of the AWOS-III (barometric pressure, altimeter setting, wind speed and direction, temperature and dew point in degrees Celsius, density altitude, visibility, and cloud ceiling), while also having the additional capabilities of reporting temperature and dew point in degrees Fahrenheit, present weather, icing, lightning, sea level pressure and precipitation accumulation. Data dissemination is usually via an automated VHF airband radio frequency (108-137 MHz) at each airport, broadcasting the automated weather observation. This is often via the Automatic Terminal Information Service (ATIS). Most automated weather stations also have discrete phone numbers to retrieve real-time observations over the phone or through a modem.

During the inventory of Window Rock Airport, it was observed that the airport has an Automated Surface Observing System (ASOS); it is in excellent condition. Automated weather information can be obtained from the VHF radio frequency of 118.325, or by calling 928-871-3421. None of the remaining four airports included in the study have either an AWOS or ASOS located on the airfield.

4.10 Existing Landside Facility Inventory

The definition of landside is that portion of the airport designed to serve passengers or other airport users typically located outside of the public safety and security fenced perimeter; landside facilities include terminal buildings, parking areas, entrance roadways, and other buildings that may not necessarily conduct aviation related activities. The inventory of landside facilities provides the basis for the determination of any facility change requirements that might be identified. At the end of the chapter, **Table 4-14** summarizes the existing landside facilities for each of the airports in the study. **Exhibits A1 – A5**, also located at the end of this chapter, illustrate the type and location of each existing landside facility (if applicable) and/or component on the airfield. Additional photographs and descriptions from the on-site airport inventories can be found in **Appendix F**.

4.10.1 Terminal Building

The only airport in the study that has a terminal building is Window Rock Airport. Any proposed recommendations for future development of a terminal building at the remaining four airports will be discussed in Chapter 5.

4.10.2 Hangars

The only airport in the study that has aircraft storage hangar facilities is Window Rock Airport. In general, the existing hangars are in excellent condition and appear to be adequate. Some minor damage to the exterior metal siding was noted on the existing storage hangar adjacent to the terminal building and vehicle parking area. Any proposed recommendations for future hangar development will be discussed in Chapter 5.

4.10.3 Airport Services / Fixed Base Operator

A Fixed Base Operator (FBO) is usually a private or commercial enterprise that leases land from the airport sponsor on which to provide services to based and transient aircraft. The extent of the services provided varies from airport to airport. These services frequently include aircraft fueling, minor maintenance and repair, aircraft rental and/or charter services, flight instruction, pilot lounge and flight planning facilities, and aircraft tiedown and/or hangar storage. There are currently no FBOs with the types of services mentioned above present at any of the airports. The only services similar to those found at an FBO are found at the Window Rock Airport terminal building; a lounge area, small flight planning area, restrooms, and telephone are available for public use. Any proposed recommendations for the future development of a FBO at any of the airports will be discussed in Chapter 5.

4.10.4 Aviation Fuel Facilities

The only airports that have aviation fuel facilities are Window Rock and Chinle Municipal Airports. The fuel facilities at both of the airports are not available to the general public. The fuel at the Window Rock

Airport is for the exclusive use of the Navajo DOT. The fuel facility at the Chinle Municipal Airport is for the exclusive use of the emergency medical transport aircraft based at the airport. Both fuel facilities appear to be in good condition. The location on the airfield of both facilities may not be the best in the long-term. The Window Rock Airport fuel facility is located in the middle of the aircraft parking apron requiring the fuel truck to traverse the active apron to refill the tanks. The Chinle Municipal Airport fuel facility is located on the south edge of the existing aircraft parking apron and unless relocated, the fuel facility will prevent further expansion of the aircraft parking apron to the south. The Airport Layout Plans for both airports will make recommendations for relocating the fuel facilities if necessary to allow for future development of the airports.

4.10.5 Other Miscellaneous Buildings

The existing electrical building at the Chinle Municipal Airport is in fair condition, but will require renovation in the future. The existing concrete block walls appear structurally sound, but the existing wood-truss, metal roofing, and soffits are reaching the end of their useful life and will need replacement in the future. Portions of the existing soffit are missing, revealing the existing wood fascia that is in poor condition. The exterior block walls of the electrical building also need painting. It was noted during the site visit that the existing back-up generator and floor mounted automatic transfer switch are reaching the end of their useful life. Maintenance personnel indicated that the relays in the transfer switch have been problematic for many years. Replacement of the generator and transfer switch with a smaller wall mounted transfer switch will be required in the future.

The existing electrical building at the Tuba City Airport is in fair condition, but will require renovation in the future. The existing concrete block walls and flat, pre-cast concrete roof appear structurally sound. The adjacent generator addition concrete block walls are also in fair condition. However, the corrugated metal roof is in poor condition and needs to be replaced. Both structure’s paint has faded.

4.10.6 Access Roads and Signage

All of the airports included in the study have access roads leading from the public roads to the airfields. The access roads are all generally adequate and in fair condition. The Navajo DOT has recently installed airport informational signs at the entrance to each airport. Speed limit signs were not observed on any of the airport access roads (except for the entrance to Window Rock Airport). Cattle guards were observed at each of the airport entrances. The two existing cattle guards at the entrance to Crownpoint Airport are in poor condition. There is a significant grade difference from the edge of the highway and the entrance road to the airport. Replacement of the cattle guards and modification of the grades will be depicted on the Airport Layout Plan for Crownpoint Airport. It was also observed at Tuba City Airport that water had flooded the entrance road near the intersection of the highway due to recent monsoon storms.

4.10.7 Automobile Parking

Vehicle parking is available at all of the airports included in the study. Recommendations for additional parking will be depicted on each Airport Layout Plan. With the exception of Chinle Municipal Airport, the pavement condition for all the vehicle parking areas is poor. The parking areas either consist of asphalt or gravel. The vehicle parking area at Chinle Municipal Airport is asphalt and is in excellent condition.

4.10.8 UTILITIES

All of the airports included in the study have some utilities on-site or nearby. The following represents what utilities are available at or in the close proximity of each airport:

- Chinle Municipal Airport
    - Three-phase electrical power
- Window Rock Airport
    - Three-phase electrical power
    - Municipal water
    - Septic
    - Internet/phone
- Tuba City Airport
    - Single-phase electrical power
- Crownpoint Airport
    - Single-phase electrical power
- Shiprock Airstrip
    - Single-phase electrical power

Based on the proposed development plans for each airport, additional utilities will be required at many of the airports. The ability of the Navajo DOT to provide the necessary utilities to the airports will have an impact on the potential for the airports and the surrounding lands to be developed. The Airport Layout Plans will identify what additional utilities will be needed to support the proposed development at each airport.

4.10.9 FENCING AND SECURITY

Separating vehicles and fixed wing aircraft is very important at all airports. Window Rock Airport is the only airport that has fencing and gates to separate vehicles from aircraft (separation of airside from landside). New fencing should consist of 6-foot high chain link fence with barbed wire in this area. This type of fencing will reduce inadvertent entry on the airports and will allow for the installation of more secure access gates. The Airport Layout Plans will depict the recommended areas where fencing and gates are necessary to separate vehicles and aircraft.

Airport perimeter fencing is present at all airports and consists of five-strand barbed wire livestock fence. Overall, the fencing at each airport is in fair condition. Additional recommendations regarding perimeter fencing at each airport will be discussed further in Chapter 5.

4.10.10 AIRPORT SUPPORT AND MAINTENANCE

Currently the Navajo DOT provides all necessary maintenance to each of the airports included in this study. Consideration should be given to the potential of transferring some or all of the airport support and maintenance to the local communities. Maintaining the airports is an on-going effort and will become even more important as the airports are further developed.

Airfield maintenance equipment, such as a tractor with mower attachment and a sweeper, are used at all the study airports. At the time of the on-site inventory, the tractor was observed at Chinle Municipal and Tuba City Airports, and the sweeper was observed at Chinle Municipal Airport.

4.11 Navajo Nation Lands and Leases

The Navajo Nation is comprised of various types of land interests with over 17 million acres of land spanning across Arizona, New Mexico, and Utah. Each type of land interest is important to the planning process because the airports included in the study reside on various types of land. The Airport Layout Plan will reflect the types of land interest for each airport and the surrounding lands based on information provided by the Navajo DOT. Depending on the proposed development at each airport, modifications to the existing land interests may be required. The composition of land interests within the Navajo Nation are depicted in **Table 4-13**.

Table 4-13 Navajo Nation Land Composition

	Arizona	New Mexico	Utah	Total
Navajo Nation Trust Land	10,158,784.82	2,795,416.26	1,223,933.96	14,178,137.04
Navajo Nation Fee Land	585,169.98	347,553.21	424.90	933,148.09
Individual Indian Allotment Land	81,936.81	671,043.50	9,741.80	762,749.11
State Lands Lease	256,905.79	126,760.10	0.00	383,665.89
BLM Leases	0.00	150,002.23	0.00	150,002.23
U.S. Forest Service Permits	174,000.00	0.00	0.00	174,000.00
Government E.O. PLO & School Tract	-	91,838.89	5.99	91,844.98
New Lands	345,032.00	0.00	0.00	345,032.00
Total	11,601,856.40	4,182,616.29	1,234,106.65	17,018,579.34

Source: Navajo Land Department, as of 02/03/05

4.12 Compatible Land Use

Land use compatibility conflicts are a common problem around many airports, including smaller general aviation facilities. In urban areas, as well as some rural settings, airport owners find that essential expansion to meet the demands of airport traffic is difficult to achieve due to the nearby development of incompatible land uses. Aircraft noise is generally a deterrent to residential development and other noise sensitive uses.

Conflicts may also exist in the protection of runway approach/departure and transition zones to ensure the safety of both the flying public and the adjacent property owners. Adequate land for this use should be either owned in fee or controlled in easements, as recommended on the Airport Layout Plan for each airport included in the study.

A possible constraint to development on or around the airports in the study may be the existence of grazing permits. Although land is abundant around the airports, it has constraints that can impede economic development. The majority of Navajo Nation land is held in trust by the Bureau of Indian Affairs (BIA). When the Nation needs to use it for a specific purpose, it has to be withdrawn from the BIA, and this process can take many years to complete. Grazing permits were developed by the BIA in the early 1930's in an effort to prevent overgrazing and to control erosion. The permits were issued to use the grass and other surface plants for grazing. Over the years, the grazing permits were used and treated as land use permits, which was not the original intent. The situation has given the grazing permit holders a sense of ownership, and their permission is needed to pursue any economic development project on or near areas they claim as their land. According to the Navajo Nation's 2009-2010 Comprehensive Economic Development Strategy, many economic development projects have failed to become a reality because the grazing permit holders did not consent to any development in their grazing areas. To the extent possible, grazing permits will be identified on surrounding properties adjacent to the study airports.

4.13 Environmental Considerations

A comprehensive environmental inventory was not completed as part of this study. However, due to the significant presence of cultural resources that are often found on the Navajo Nation, a review of the available archeological reports provided by the Navajo DOT for each airport in the study was conducted. The following is a summary of the reports and the associated resources that pertain to each airport. Also included in this section is a brief description on airport sustainability policies. Many airport sponsors are incorporating sustainability into their airport's master plans; the Navajo Nation is encouraged to also consider incorporating sustainability efforts into their future plans at their airports.

4.13.1 Cultural Resource Impacts

Although an environmental inventory is not part of the study, a cursory review of available archaeological reports revealed that archaeological sites exist at some of the airports included in this study. The following is a summary of the sites where cultural resources are known to be present:

4.13.1-1 Chinle Municipal Airport

Prior to the construction of the Chinle Municipal Airport, a cultural resource inventory was conducted in 1992. According to the findings of the inventory, two archaeological sites (one isolated occurrence and one in-use) were identified. Provided the construction of the airport avoided one of the archaeological sites, no effect on the resource would take place. The second site was located within the construction area and was likely impacted. No further inventories have taken place since the construction of the airport.

4.13.1-2 Tuba City Airport

Based on a cultural resource inventory conducted in 1994 encompassing approximately 24 acres, only one isolated occurrence was identified within the vicinity of the airport. The inventory did not survey the entire airport property; therefore, other cultural resources may exist.

4.13.1-3 Window Rock Airport

According to a cultural resources inventory completed on June 24, 1993, two cultural resources were located in close proximity of the airport infrastructure, and one isolated occurrence of cultural material was identified.

One of the cultural properties appears to be eligible for the National Register of Historic Places (AZ-P-24-62) and appears to possess integrity, meets the general 50-year guideline, and appears to meet criterion "d" for registration consideration according to the cultural resources inventory abstract.

4.13.1-4 Crownpoint Airport

A total of nine archaeological sites and five isolated occurrences are present on the airport according to an archaeological survey conducted in June 1984. The majority of the sites (8 of 9) represent apparently seasonal and temporary site locations associated with the Muddy River Chacoan outlier community. The remaining site is a probable historic component of Navajo cultural affiliation.

According to an archaeological report addendum dated August 5, 1987, the isolated occurrences 1 and 2 were severely disturbed as part of the aircraft parking apron and entrance road construction projects and the status of the other isolated occurrences is unknown but considered insignificant according to the report.

4.13.1-5 Shiprock Airstrip

No sites, isolated occurrences, or traditional cultural properties are located on the airport according to a cultural resources inventory dated April 22, 1993, (NNAD 93-047).

4.13.1-6 Conclusion

The above summary does not replace the need for further environmental clearance documentation, such as an environmental assessment (EA) or an environmental impact statement (EIS), which may be required for implementation of the proposed projects resulting from this study. To obtain environmental clearance for any proposed project, documentation is required to be prepared in accordance with United States Department of Transportation (USDOT) policy, FAA Order 5050.4B, FAA Order 1050.1E, and CEQ Regulations.

FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* describes the types of impacts and thresholds that determine if an impact is considered to be significant. The proposed development projects will require a determination to be made regarding which of the following environmental clearance documents would be required prior to project implementation. These environmental clearance documents include the following:

Categorical Exclusions – Projects or actions that are found, based on past experience with similar projects, or actions, that do not normally require an EA or EIS because they do not individually or cumulatively have a significant effect on the environment.

Environmental Assessment (EA) – Preparation of a concise document used to describe a proposed project's anticipated environmental impacts and mitigation measures.

Environmental Impact Statement (EIS) – Preparation of a clear, concise, and appropriately detailed document that provides the agency, decision makers, and the public with a full and fair discussion of significant environmental impacts of the proposed project and reasonable alternatives.

Ultimately, the FAA will determine whether a proposed development project constitutes a major federal action subject to NEPA, or whether it is a Categorical Exclusion from NEPA because it is not expected to have a significant adverse effect on the environment.

4.13.2 Airport Sustainability

The FAA began focusing on sustainability at airports in 2010, and has said that their objective is to make sustainability a core objective in airport planning. The FAA has provided airports across the United States with funding to develop comprehensive sustainability planning documents. These documents, called sustainability master plans and airport sustainability plans, include initiatives for reducing environmental impacts, achieving economic benefits, and increasing integration with local communities. To date, the FAA has funded 45 airports across the United States.

The FAA Reform and Modernization Act of 2012, Section 133 of H.R. 658, requires airport master plans to address the feasibility of solid waste recycling at an airport, minimizing the generation of waste, operation and maintenance requirements, the review of waste management contracts, and the potential for cost savings or revenue generation. The FAA is in the process of crafting guidance for airport sponsors to use in developing a recycling program at their airport as part of an airport master plan. Solid waste is being collected from the terminal building and disposed of by a waste collection company, however, it is not known if any recycling is taking place by any of the airport tenants. Recommendations for ways to implement a recycling program and other sustainability practices will be discussed in Chapter 5.

TABLE 4-14 SUMMARY OF EXISTING AIRSIDE AND LANDSIDE FACILITIES

				Airside Facilities													Landside Facilities				
Airport Name	Agency	Chapter	Associated City	Runway Orientation	Length (feet)	Width (feet)	RDC	Runway Lighting	Taxiway Lighting	Pavement Markings	Known Obstructions	Other Navigational Aids	PAPI/ PLASI/VASI	REIL	Taxiway Type	Cultural Resources Present	Aircraft Apron (sy)	Fuel	Hangars	GA Terminal	Entrance Road
Arizona Airports																					
Chinle Municipal Airport	Chinle	Chinle	Chinle	18-36	6,902	60	B-I	MIRL	Retro-reflectors	Non-precision	No	Pilot control rwy lighting, beacon, lighted wind cone, segmented circle	Y/Y (PAPI)	N/N	Turn-around (both ends) and Connector	Y	7,500 sy	Yes (private)	No	No	Yes
Tuba City Airport	Western	Tuba City	Tuba City	15-33	6,230	75	B-II	MIRL	MITL	Non-precision	Yes – RWY 15 & 33	Pilot control rwy lighting, beacon, lighted wind cone, segmented circle	Y/Y (VASI)	N/N	Connector	N	7,500 sy	No	No	No	Yes
Window Rock Airport	Ft. Defiance	St. Michaels	Window Rock	2-20	7,000	75	B-II	MIRL	MITL	Non-precision	Yes – RWY 2	Pilot control rwy lighting, beacon, lighted wind cone, segmented circle, ASOS	Y/N (PAPI)	Y/N	Connector	Y	16,000 sy	Yes (private)	3	Yes	Yes
New Mexico Airports																					
Crownpoint Airport	Eastern	Crownpoint	Crownpoint	18-36	5,820	60	B-I	MIRL	None	Basic	Yes – RWY 18 & 36	Pilot control rwy lighting, beacon, wind cone, segmented circle	Y/N (PLASI)	N/N	Connector	Y	5,000 sy	No	No	No	Yes
Shiprock Airstrip	Northern	Shiprock	Shiprock	2-20	4,840	75	B-II	None	None	Basic	Yes – RWY 2	Wind cone, segmented circle	N/N	N/N	Partial Parallel	N	5,600 sy	No	No	No	Yes

Note. Aircraft apron size is approximate and shown in square yards; it is not based on survey information.

Sources: ACI field observations July/August 2014; 2008 Arizona State Airports System Plan; New Mexico Airport System Plan Update 2009; 2009 Navajo Nation Long Range Transportation Plan; FAA Airport Master Record, retrieved August 2014

TABLE 4-15 EXISTING AIRCRAFT OPERATIONS AND BASED AIRCRAFT

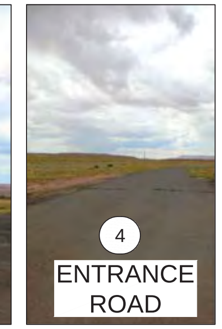
				Aircraft Operations					Based Aircraft							
Airport Name	Agency	Chapter	Associated City	Air Taxi	GA Local	GA Itinerant	Military	Total	Single Engine	Multi-Engine	Jets	Helicopters	Gliders	Ultralights/ Other	Military	Total Based Aircraft
Arizona Airports																
Chinle Municipal Airport	Chinle	Chinle	Chinle	5,800	400	1,600	0	7,800	0	1	0	0	0	0	0	1
Tuba City Airport	Western	Tuba City	Tuba City	0	0	250	0	250	0	0	0	0	0	0	0	0
Window Rock Airport	Ft. Defiance	St. Michaels	Window Rock	0	1,500	3,500	0	5,000	1	3	0	0	0	2	0	6
New Mexico Airports																
Crownpoint Airport	Eastern	Crownpoint	Crownpoint	300	0	200	0	500	0	0	0	0	0	0	0	0
Shiprock Airstrip	Northern	Shiprock	Shiprock	0	0	500	0	500	0	0	0	0	0	0	0	0

Sources: ACI field observations July/August 2014; 2008 Arizona State Airports System Plan; New Mexico Airport System Plan Update 2009; 2009 Navajo Nation Long Range Transportation Plan; FAA Airport Master Record, retrieved August 2014


1 RUNWAY 18 END

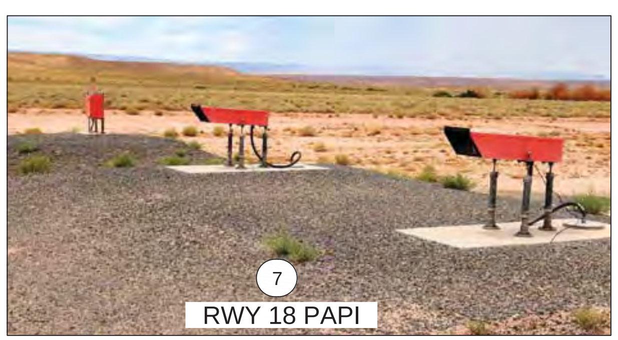

2 RUNWAY 36 END


3 AIRCRAFT PARKING APRON


4 ENTRANCE ROAD


5 ELECTRICAL BUILDING


6 VEHICLE PARKING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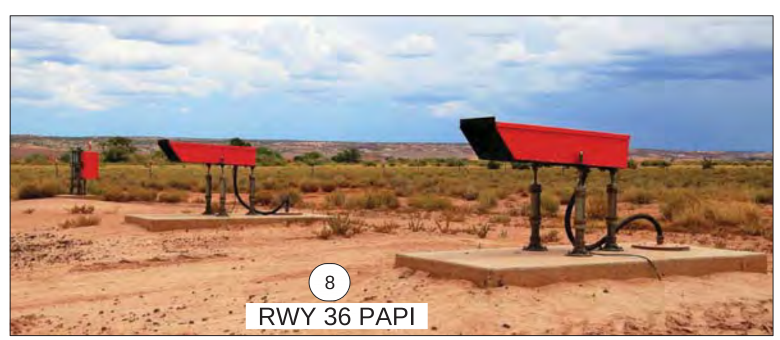

8 RWY 36 PAPI


9 SEGMENTED CIRCLE


10 MAINTENANCE EQUIPMENT


11 RWY EDGE LIGHT


12 BEACON


13 RWY 36 THRESHOLD LIGHTS

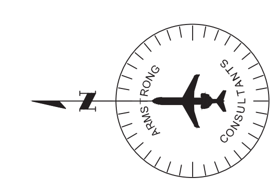

14 TWY REFLECTOR


15 AIRPORT SIGN


16 FUEL FACILITY


17 BACK-UP GENERATOR


18 WINDCONE



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SCALE IN FEET

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CHINLE AIRPORT
CHINLE, ARIZONA

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	08/2014	ORIGINAL ISSUE	6214502 -E91	LDS	CM	JZP

AIRPORT COMPONENTS

EXHIBIT A1

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\CHINLE MUNICIPAL AIRPORT\146214502_E91.DWG

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WINDOWROCK AIRPORT
WINDOWROCK, ARIZONA

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502 -RQE	LDS	CM	JZP

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AIRPORT COMPONENTS

EXHIBIT A2

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\WINDOW ROCK\146214502_RQE.DWG

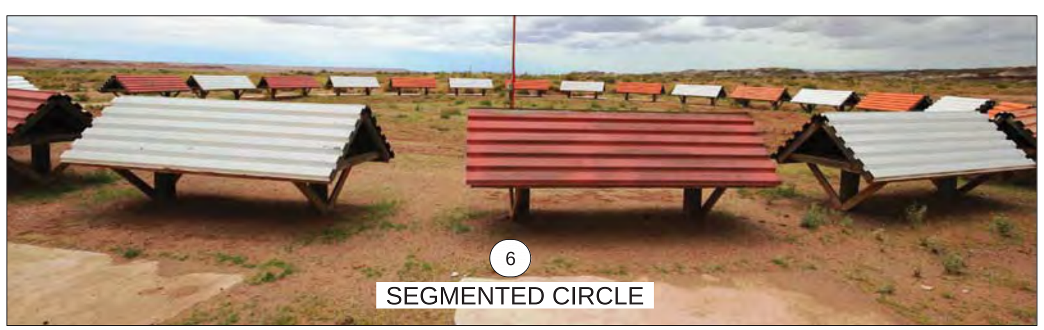
1 RUNWAY 15 END

2 RUNWAY 33 END

3 VEHICLE PARKING

4 AIRCRAFT PARKING APRON

5 ENTRANCE ROAD

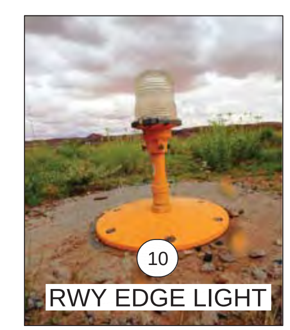


6 SEGMENTED CIRCLE

7 TWY EDGE LIGHT

8 BEACON

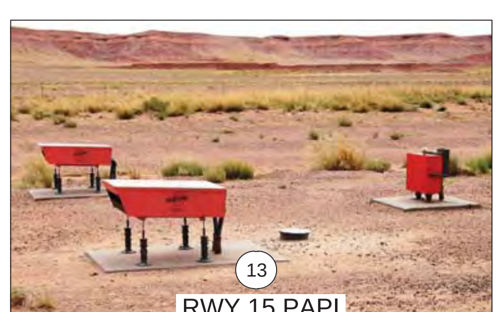
9 WINDCONE



10 RWY EDGE LIGHT

11 AIRFIELD SIGN

12 AIRPORT SIGN



13 RWY 15 PAPI

14 RWY 33 PAPI

15 ELECTRICAL BUILDING

0 300 600
SCALE IN FEET

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TUBA CITY AIRPORT
TUBA CITY, ARIZONA

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2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502-T03	LDS	CM	JZP

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AIRPORT COMPONENTS

EXHIBIT A3

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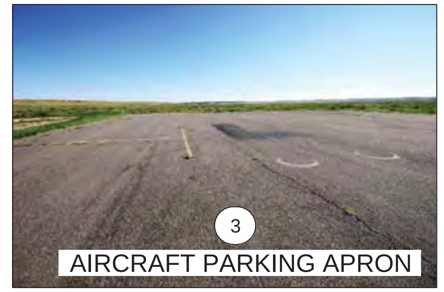
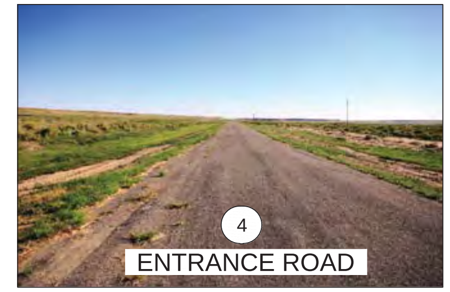
RUNWAY 36 END



AIRCRAFT PARKING APRON

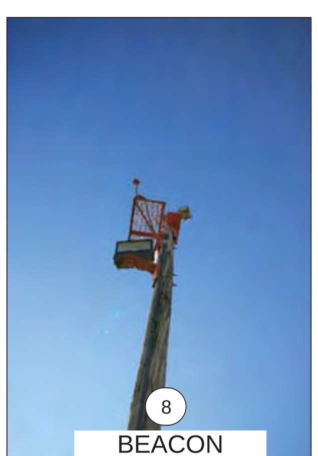


ENTRANCE ROAD

AIRPORT ENTRANCE

VEHICLE PARKING

AIRPORT SIGN



BEACON

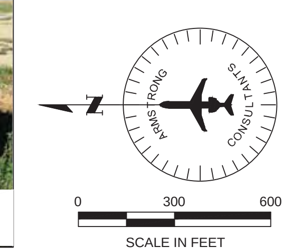
LIGHTED WINDCONE

SEGMENTED CIRCLE

PLASI II

RUNWAY EDGE LIGHT

PILOT CONTROL



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CROWNPOINT AIRPORT
CROWNPOINT, NEW MEXICO

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3							
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0	146214	09/2014	ORIGINAL ISSUE	6214502-0E8	LDS	CM	JZP

AIRPORT COMPONENTS

EXHIBIT A4

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PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\SHIPROCK NM ALP\146214502_5V5.DWG

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SHIPROCK AIRPORT
SHIPROCK, NEW MEXICO

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AIRPORT COMPONENTS

EXHIBIT A5

Chapter Five

FACILITY REQUIREMENTS AND NEEDS ASSESSMENT

CHAPTER 5 - FACILITY REQUIREMENTS AND NEEDS ASSESSMENT

This chapter identifies the requirements for airfield and landside facilities to accommodate existing and anticipated demand levels at each of the airports included in the study. In order to meet the demand levels, an assessment of the ability of existing airport facilities to meet current and future demand is needed. The facility requirements will be based on information derived from information from FAA advisory circulars and design standards, the Navajo DOT's vision of the future of the airports, the condition and functionality of existing facilities, and other pertinent information.

Facility requirements have been developed for the various airport functional areas listed below:

- General aviation requirements
- Support facilities
- Ground access, circulation, and parking requirements
- Infrastructure and utilities
- Land use compatibility and control

The time frame for addressing development needs usually involves short-term (up to five years), medium-term (six to ten years), and long-term (eleven to twenty years) planning periods. Long-term planning primarily focuses on the ultimate role of the airport and is related to development. Medium-term planning focuses on a more detailed assessment of needs, while the short-term analysis focuses on immediate action items. Most important to consider is that a good plan is one that is based on actual demand at an airport rather than time-based predictions. Actual activity at the airport will vary over time and may be higher or lower than what is anticipated. Using the three planning milestones (short-term, medium-term, and long-term) the airport sponsor can make an informed decision regarding the timing of development based on the actual demand. This approach will result in a financially responsible and demand-based development of the airports included in the study.

5.1 DESIGN STANDARDS

Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. The standards cover the wide range of size and performance characteristics of aircraft that are anticipated to use an airport. Various elements of airport infrastructure and their functions are also covered by these standards. Choosing the correct aircraft characteristics for which the airport will be designed needs to be done carefully so that future requirements for larger and more demanding aircraft are taken into consideration, while remaining mindful that designing for large aircraft that will never serve the airport is not economical. The existing design standards for each airport are illustrated in **Exhibits B1 – B5**, and can be found at the end of this chapter.

5.1.1 Design Aircraft

According to FAA AC 150/5300-13A, *Airport Design*, planning a new airport or improvement to an existing airport requires the selection of one or more “design aircraft.” In most cases, the design aircraft (for the purpose of airport geometric design) is a composite aircraft representing a collection of aircraft classified by the following parameters:

- Aircraft Approach Category (AAC)
- Airplane Design Group (ADG)
- Taxiway Design Group (TDG)

For the purpose of selecting a design aircraft, the FAA recommends that the most demanding aircraft, or family of aircraft, which makes at least 500 operations per year at the airport be chosen as the design aircraft(s). Additionally, when an airport has more than one active runway, a design aircraft is selected for each runway.

Based on existing aircraft activity records kept by the Navajo DOT, the aircraft which makes at least 500 operations at the majority of the study airports is the Beechcraft Super King Air 200. Thus, this aircraft has been selected as the design aircraft for all study airports and will be discussed and referenced throughout the remainder of this chapter, specifically as the design aircraft relates to the study airports’ runway design code (RDC) and airport reference code (ARC).

5.1.2 Runway Design Code (RDC)

To arrive at the RDC, the AAC, ADG and approach visibility minimums are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to the aircraft wingspan or tail height (physical characteristics). The final component relates to the visibility minimums expressed by runway visual range (RVR) values in feet of 1,200, 1,600, 2,400, 4,000 and 5,000. The FAA AC 150/5300-13A, *Airport Design*, RDC requirements are illustrated in **Table 5-1**

TABLE 5-1 RUNWAY DESIGN CODE

Aircraft Approach Category	Approach Speed	
Category A	less than 91 knots	
Category B	91 to 120 knots	
Category C	121 knots to 140 knots	
Category D	141 knots to 165 knots	
Category E	165 knots or more	
Airplane Design Group	**Wingspan**	**Tail Height**
Group I	< 49 feet	<20 feet
Group II	49 to 78 feet	20 to 29 feet
Group III	79 to 117 feet	30 to 44 feet
Group IV	118 to 170 feet	45 to 59 feet
Group V	171 to 213 feet	60 to 65 feet
Group VI	214 to 261 feet	66 to 79 feet
Runway Visual Range (ft.)	**Flight Visibility Category (statue mile)**	
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 Advisory Circular 150/5300-13A, *Airport Design*

As previously mentioned, from discussions with the Navajo DOT, airports users, and by reviewing historical data, it was discovered that the most predominate aircraft type using the airports on a regular basis are various models of a Beechcraft King Air (e.g. B200 and C90, etc). Most of the activity is related to emergency medical transportation and government travel by Navajo Nation officials.

Recommendation: Due to the existing aircraft activity at the airports, it is reasonable to predict that the current aircraft fleet mix will remain relatively the same for the future and the design aircraft mentioned above (Beechcraft Super King Air 200) will remain the most demanding aircraft using the airports. On the contrary, aircraft which fall into the A-I, A-II, and B-I design standards are also known to frequent one or more of the study airports. However, they do not make up the majority of aircraft operations, and thus, the RDC for all airports in the study should follow B-II design standards.

Examples of various aircraft meeting the design standards for a RDC of A-I and B-I are illustrated on **Table 5-2A**, and examples of aircraft with a RDC of A-II and B-II are depicted in **Table 5-2B**. For the purpose of this Chapter, examples of the remaining Airplane Design Group (ADG) categories of C, D, and E aircraft and their corresponding approach categories (I, II, III, etc.) are not depicted due to their infrequent use of the Airport; the sample aircraft provided below are those that are likely to use the Airport on a regular basis.

TABLE 5-2A RDC OF A-I OR B-I (SAMPLE AIRCRAFT)

Aircraft	Approach Speed (kts)	Wingspan (ft)	Tail Height (ft)	Max Take Off Weight (lbs)
Beech Baron 58P	101	37.8	9.1	6,200
Beech Bonanza V35B	70	33.5	6.6	3,400
Beech King Air B100	111	45.9	15.3	11,799
Cessna 150	55	33.3	8.0	1,670
Cessna 172	60	36.0	9.8	2,200
Cessna 177	64	35.5	8.5	2,500
Cessna 182	64	36.0	9.2	2,950
Cessna 340	92	38.1	12.2	5,990
Cessna 414	94	44.1	11.5	6,750
Cessna Citation I	108	47.1	14.3	11,850
Gates Learjet 28/29	120	42.2	12.3	15,000
Mitsubishi MU-2	119	39.1	13.8	10,800
Piper Archer II	86	35.0	7.4	2,500
Piper Cheyenne	110	47.6	17.0	12,050
Rockwell Sabre 40	120	44.4	16.0	18,650
Swearingen Merlin	105	46.3	16.7	12,500
Raytheon Beechjet	105	43.5	13.9	16,100
Eclipse 500 Jet	90	37.9	13.5	5,920

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

TABLE 5-2B RDC OF A-II OR B-II (SAMPLE AIRCRAFT)

Aircraft	Approach Speed (kts)	Wingspan (ft)	Tail Height (ft)	Max Take Off Weight (lbs)
Air Tractor 802F	105	58.0	11.2	16,000
Beech King Air C90-1	100	50.3	14.2	9,650
Beech Super King Air B200	103	54.5	14.1	12,500
Cessna 441	100	49.3	13.1	9,925
Cessna Citation II	108	51.6	15.0	13,300
Cessna Citation III	114	50.6	16.8	17,000
Dassault Falcon 50	113	61.9	22.9	37,480
Dassault Falcon 200	114	53.5	17.4	30,650
Dassault Falcon 900	100	63.4	24.8	45,500
DHC-6 Twin Otter	75	65.0	19.5	12,500
Embraer Phenom 300	117	52.2	16.9	17,968
Grumman Gulfstream I	113	78.5	23.0	35,100
Pilatus PC-12	85	52.3	14.0	9,920

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

Based on discussions with the Navajo DOT, the Nation is considering replacing one of their King Air aircraft with an Embraer Phenom 300. Although the timing and ultimate decision to acquire the Embraer Phenom 300 has not been determined, it’s important to note that the Embraer Phenom 300 is also a B-II aircraft and would not change the RDC for the airports if acquired.

5.1.3 Taxiway Design Group (TDG)

To arrive at the best TDG, the undercarriage dimensions of the aircraft are used. The TDG design standards are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. Taxiway/taxilane width and fillet standards, and in some instances, runway to taxiway and taxiway/taxilane separation requirements, are determined by the TDG. The FAA advises that it is appropriate for a series of taxiways on an airport to be built to a different TDG standards based on anticipated use.

For airports with two or more active runways, it is advisable to design all airport elements to meet the requirements of the most demanding RDC and Taxiway Design Group (TDG). However, it may be more practical and economical to design some airport elements such as a secondary runway to standards associated with a lesser demanding RDC and TDG. For example, it would not be prudent for an air carrier airport that has a separate general aviation runway, or a crosswind runway for general aviation traffic, to design that element for air carrier traffic.

Recommendation: With the exception of the connector taxiway at Chinle Municipal Airport, the overall pavement condition of all the existing taxiways, taxiway turn-arounds, and connector taxiways appear to be in poor condition. Recognizing that the taxiway pavements will all likely need reconstruction in the future, it is recommended that they be reconstructed to meet TDG-2 design standards in order to accommodate the most demanding aircraft currently using the airports or anticipated to use the airports.

5.1.4 Airport Reference Code (ARC)

An Airport Reference Code (ARC) is not a design standard, rather is an airport designation that signifies an airport’s highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning purposes only, and does not limit the aircraft that may be able to operate safely on the airport.

Recommendation: Based upon the proposed design standards described above, it is recommended that the ARC for all of the study airports be recognized as B-II. Examples of the types of design aircraft and their corresponding ARC are depicted in **Figure 5-1**.

FIGURE 5-1 TYPICAL DESIGN AIRCRAFT AND CORRESPONDING ARC

Source: ACI, 2013

5.1.5 SAFETY AREAS

Runway and taxiway safety areas (RSAs and TSAs) are defined surfaces surrounding the runway and taxiway prepared specifically to reduce the risk of damage to aircraft in the event of an undershot, overshot, or excursion from the runway or taxiway. The safety areas must be:

- Cleared and graded and have no potentially hazardous surface variations;
- Drained so as to prevent water accumulation;
- Capable, under dry conditions, of supporting snow removal equipment, ARFF equipment and the occasional passage of aircraft without causing structural damage to the aircraft;
- Free of objects, except for objects that need to be located in the runway or taxiway safety area because of their function.

Recommendation: It was observed at all the airports that the existing safety areas were not adequately graded to meet current design standards. Specific runway safety areas that have erosion include Chinle Airport and Shiprock Airstrip. Potential terrain obstructions were also noted at Crownpoint Airport due to the insufficient grading of the runway safety area to comply with current design standards. In general, it was observed that the safety areas at all of the airports require some level of re-grading to comply with current design standards. Therefore, it is recommended as part of future pavement rehabilitation/reconstruction projects, safety areas are re-graded.

5.1.6 Obstacle Free Zone (OFZ) and Object Free Area (OFA)

The OFZ is a three dimensional volume of airspace which supports the transition of ground to airborne aircraft operations. The clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual Navigational Aids (NAVAIDs) that need to be located in the OFZ because of their function. The OFZ is similar to the FAR Part 77 Primary Surface insofar that it represents the volume of space longitudinally centered on the runway. It extends 200 feet beyond the end of each runway. The Runway Object Free Area (ROFA) is a two-dimensional ground area surrounding the runway. The ROFA standard precludes parked airplanes, agricultural operations and objects, except for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes.

5.1.7 Runway Protection Zone (RPZ)

The Runway Protection Zone (RPZ) is trapezoidal in shape and centered about the extended runway centerline. The RPZ dimension for a particular runway end is a function of the type of aircraft and approach visibility minimum associated with that runway end. The existing, as well as any future RPZ dimensions, can be seen on the Airport Layout Plans for each airport.

5.2 Airside Facility Requirements

All airports are comprised of both airside and landside facilities as presented in Chapter 1. Airside facilities consist of those facilities that are related to aircraft arrival, departure, and ground movement, along with all associated navigational aids, airfield lighting, pavement markings, and signage.

5.2.1 Runway Length Comparison

A relative comparison between airport elevations, temperatures, and runway lengths for the study airports is depicted in **Table 5-3**. The runway length required at each study airport was based on the recommended runway length criteria found in FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design,* and FAA AC 150/500-13, *Airport Design*. The FAA family grouping of aircraft used for the study airports was that of *small aircraft*, as defined by AC 150/5325-4, because the identified design aircraft, the Beechcraft Super King Air 200, falls within this classification having a MTOW of 12,500 pounds. The runway length required in order to accommodate both 95 and 75 percent of small aircraft at each airport is also illustrated in **Table 5-3**.

TABLE 5-3 RUNWAY LENGTH COMPARISON FOR STUDY AIRPORTS

Airport Name	Associated City	Airport Elevation (MSL)	Temperature (degrees F) (July)	Existing Runway Length (feet)	Small Aircraft, 95% of Fleet (feet)	Small Aircraft 75% of Fleet (feet)	Adequate Runway Length Available (95% & 75%)
Arizona Airports							
Chinle Municipal Airport	Chinle	5,550	91	6,902	6,980	4,920	No/Yes
Tuba City Airport	Tuba City	4,513	93	6,230	5,750	4,370	Yes/Yes
Window Rock Airport	Window Rock	6,742	84	7,000	8,100	5,720	No/Yes
New Mexico Airports							
Crownpoint Airport	Crownpoint	6,696	86	5,820	8,110	5,730	No/Yes
Shiprock Airstrip	Shiprock	5,270	95	4,840	6,710	4,850	No/No

Note. Temperature data from the U.S. Climate Data
Source: ACI, 2014

Although **Table 5-3** indicates that adequate runway length is available at each airport (Shiprock Airstrip is only 10 feet short of accommodating the 75 percent) for 75 percent of small aircraft using the airports, it important to explain what is taken into consideration when determining runway length.

When establishing the necessary runway length for an airport, there are a number of variables to consider. The information required to determine the runway length includes airfield elevation, mean maximum temperature of the hottest month, and the effective gradient for the runway. Also, the performance characteristics and operating weight of an aircraft impacts the amount of runway length needed.

Recommendation: A prudent planning practice is to provide adequate runway length for 75 percent of the existing and forecasted fleet of aircraft. For economic reasons, airports do not typically development runway lengths to satisfy the need of 95 percent of the fleet. In other words, this means that 25 percent of the fleet would be somewhat constrained during the hottest months of the year. To remedy this, the aircraft would need to reduce its weight (fuel and/or cargo) to operate. The remainder of the year they would not be constrained. If the Navajo Nation wants to provide for more than 75 percent of the existing or anticipated fleet, then the following airports will need to consider additional runway length as part of the planning process:

- Chinle Municipal Airport
- Window Rock Airport
- Crownpoint Airport
- Shiprock Airstrip

Recommendation: When determining runway length requirements for an airport, it is also necessary to consider the design aircraft's respective takeoff distance requirements. The MTOW and elevation above sea level can adversely affect the amount of runway required to land. Therefore, if the Navajo Nation decides to increase the runway length at any of the airports mentioned above, it is recommended that the takeoff distance requirements for the existing design aircraft or any future design aircraft (i.e. the Embraer Phenom 300) be made part of the design process.

5.2.2 Runway Width

The required runway width is a function of airplane approach category, airplane design group, and the approach minimums for the design aircraft expected to use the runway on a regular basis. The existing runway pavement widths of 75 feet at Tuba City, Window Rock, and Shiprock Airstrip meet the existing and future FAA design standards and should be maintained over the planning period.

Recommendation: Although Chinle Municipal and Crownpoint Airports both meet the existing FAA design standards established for runways widths for a RDC of B-I (see **Table 4-14**), the earlier recommendation to establish all airports at a RDC of B-II would require the runway at each of these airports to be widened to 75 feet. The recommended runway width requirements can be seen on each airport's Airport Layout Plan.

5.2.3 Runway Pavement Strength

According to FAA guidance on pavement strength, the aircraft types and the critical aircraft expected to use the airport during the planning period are used to determine the required pavement strength, or weight bearing capacity, of airfield surfaces. The required pavement design strength is an estimate based on average levels of activity and is expressed in terms of aircraft landing gear type and configurations. Pavement design strength is not the maximum allowable weight; limited operations by heavier aircraft other than the critical aircraft may be permissible. It is important to note that frequent operations by heavier aircraft will shorten the lifespan of the pavement.

Recommendation: The existing pavement strength for each airport's runway was displayed in **Table 4-10**. Based upon the existing and planned RDCs for each runway and the aircraft most likely to use the airport on a regular basis (illustrated in **Tables 5-2A and 5-2B**), the pavement strength ratings for all runways appear adequate. As previously mentioned in Chapter 4, each runway's condition is described as fair to poor, and it is likely that all runways will need some type of rehabilitation and/or reconstruction in the short-term planning period. If and when each runway is reconstructed and/or rehabilitated, the pavement strength should be constructed to a rating of at least 12,500 pounds single-wheel gear (or the existing rating at Window Rock Airport of 30,000 pound single-wheel gear) or greater.

5.2.4 Taxiway and Taxilane Requirements

By definition, a taxiway is a defined path established for the taxiing of aircraft from one part of an airport to another. A taxilane is a taxiway designated for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area, providing access from taxiways to aircraft parking positions, hangars, and terminal areas.

FAA AC 150/5300-13A, *Airport Design*, provide planners with guidance on recommended taxiway and taxilane layouts to avoid runway incursions and to enhance the overall safety at the airport. According to the FAA, a runway incursion is "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

According to *Airport Design*, "good airport design practices keep taxiway intersections simple by reducing the number of taxiways intersecting at a single location and allows for proper placement of airfield markings, signage, and lighting." Existing taxiway geometry should be improved whenever feasible with emphasis on "hot spots," and to the extent practical, the removal of existing pavement to correct confusing layouts is advisable.

Recommendations: As previously mentioned in Section 5.1.3, Taxiway Design Group (TDG), it is recommended that all future taxiways at each of the airports should meet TDG-2 design standards based on the design aircraft such as the Beechcraft Super King Air 200 and potentially the Embraer Phenom 300, and the RDCs for each runway. Various taxiway and taxilane layout configurations to improve access to and from the aprons, hangars, and the terminal building will be depicted on the Airport Layout Plan for each airport.

5.2.5 Aircraft Apron

An aircraft apron is typically located in the non-movement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and/or cargo. Activities such as fueling, maintenance, and short to long-term parking take place on an apron. The layout and size of an apron depends on aircraft and ground vehicle circulation needs and specific aircraft clearance requirements. There are several types of aircraft aprons:

Terminal/itinerant aircraft apron – These aprons are adjacent to the terminal where passengers board and deplane from the aircraft. The apron also accommodates multiple activities such as fueling, maintenance, limited aircraft service, etc. Itinerant aprons handle itinerant aircraft activities which are usually only on the airport for a few days. At general aviation airports, this type of apron can also provide some tie-down locations for both itinerant and based aircraft.

Tie-down apron – An apron area for both short-term and long-term aircraft parking (based and itinerant aircraft).

Other services apron – Apron areas that will accommodate aircraft servicing, fueling, and the loading/unloading of cargo.

Hangar aprons – This is an area on which aircraft move into and out of a storage hangar.

FAA AC 150/5300-13A, *Airport Design*, provides design criteria to assist in apron layout and capacity. For the purpose of calculating the aircraft apron size, the following planning criterions were used:

- 800 square yards of apron per aircraft for single-engine and multi-engine aircraft
- 1,500 square yards per aircraft for turboprops and business jets
- 5,000 square yards per aircraft for larger fire fighting aircraft
- 20% of single-engine based aircraft will require apron parking

- 10% of multi-engine based aircraft will require apron parking
- Itinerant aircraft apron requirements are based on the design hour operations

Recommendation: Based on the above criterion, a review was made of the existing aircraft parking apron available at each airport. It was determined that the sizes of the existing aircraft aprons appear adequate for the near future at the following airports:

- Window Rock Airport
- Tuba City Airport
- Crownpoint Airport
- Shiprock Airstrip

However, additional aircraft apron is recommended at Chinle Airport because of the current emergency medical personnel and aircraft which occupy the majority of the existing apron. As additional itinerant or based aircraft use the airport, additional aircraft apron will likely be needed. Consideration should be given to provide adequate apron space for emergency medical and firefighting helicopters at each airport. In the short-term, one parking spot for helicopters should be sufficient at each airport.

The Airport Layout Plan for each airport will show where additional apron can be constructed. The actual size and timing of additional aircraft parking apron will be based on demand, but showing the additional apron on the ALP allows the airport to adapt to the growing and changing needs of the airport and surrounding community.

5.2.6 Instrument Aids to Navigation

As discussed in Chapter 4, Inventory of Airport System Assets, having instrument approach capabilities at each airport is very important; an instrument approach at each airport would provide enhanced safety and utility during hours of darkness and adverse weather conditions. Each of the airports will benefit from having an approach and will be especially important for air ambulance, physician transport, and business flights.

Recommendation: Development of a GPS approach procedure with Area Navigation (RNAV) with one mile visibility minimums for the primary runway end are recommended for each airport. Visibility minimums of lower than ¾-mile are not recommended for any of the airports at this time. The cost of installing and maintaining the Medium-Intensity Approach Lighting System (MALSR) required for lower visibility minimums is prohibitive as the benefit from the lower visibility minimums is not anticipated to outweigh the costs.

5.2.7 Airfield Lighting, Signage, Markings, and Visual Aids to Navigation

An overview of the general conditions and constraints at each airport was included in Chapter 4. Based on the findings from the on-site visits conducted at each airport, the availability and reliability of the airfield lighting, signage, markings, and visual aids to navigation vary.

Recommendations: In general, each airport should have runway and taxiway edge lighting and signage, a precision approach path indicator (PAPI) and runway end identifier lights (REIL) at each runway end, a rotating beacon, a lighted wind cone, and a segmented circle. In addition, each airport should have non-precision pavement markings.

To facilitate the installation of the recommended airfield lighting and visual aids, new or potentially modified electrical service entrances will be required at many of the airports, along with the construction of electrical buildings to house the required constant current regulators.

Table 5-4 at the end of this chapter depicts the priority and specific recommendations for airfield lighting, signage, markings, and visual aids to navigation for each of the airports included in the study.

5.2.8 Weather Aids

Presently, only Window Rock Airport has an on-airport weather aid. The Automated Surface Observing System (ASOS) is in excellent condition and provides the necessary weather information to pilots.

Recommendation: Based on conversations with medical, government, and private pilots who actively use all of the airports, and from feedback at the Chapter House workshops, the need for reliable weather information is very important. Therefore, it is recommended that all of the remaining airports have an Automated Weather Observing System (AWOS) or an ASOS installed as soon as possible.

5.3 Landside Facility Requirements

Landside facilities are another important aspect of any airport as they handle aircraft and passengers while on the ground at the airport. Landside facilities serve as the processing interface between two modes of transportation - air and ground. Likewise, landside facilities also offer travelers the first impression of the airport and the local community.

5.3.1 Hangar Facilities

Based on existing aircraft operations, an immediate need for new or additional hangars at the study airports are not necessarily needed. However, as aircraft operations increase in the future, a desire for hangar facilities may develop. As such, hangars have been proposed at some of the study airports, and will be depicted on each airports Airport Layout Plan. **Table 5-4** at the end of this chapter illustrates which airports are recommended to construct hangar facilities in the future.

If hangar development is desired at the airports in the future, prefabricated conventional and T-hangar units are available from a variety of manufacturers throughout the United States. Storage space for based aircraft was determined using guidelines suggested in manufacturer's literature. Typical aircraft sizes were also reviewed in light of the evolution of business aircraft sizes. These standards include the following:

Conventional hangar:

- 1,200 square feet for single-engine aircraft
- 1,400 square feet for multi-engine aircraft
- 1,800 square feet for turboprop or turbojet aircraft

T-hangar:

- 1,400 square feet for single- and multi-engine aircraft

Recommendation: Window Rock Airport is the only airport included in the study that has existing aircraft storage hangars. Additional hangars will likely be needed to accommodate future growth at the remaining airports. The above criterion will provide guidance when planning for the addition of hangars at each airport. Additional or new hangars will be shown on the Airport Layout Plans for each airport. As always, the size and timing of the hangars will be based on actual demand.

5.3.2 Aviation Fuel Facilities

As discussed in Chapter 4, only Window Rock Airport and Chinle Municipal Airport have aviation fuel available on the airfield. However, the fuel is considered for private use and is not readily available to the general public (Navajo Nation at Window Rock and Eagle Air Med at Chinle Municipal own and operate the fuel storage tanks at the airports).

Recommendations: The capability to sell fuel at airports is one way to generate airport revenue. One feature that should be included with any new fuel facility is a self-service system with a credit card reader. Self-service systems are very common at general aviation airports and they are becoming more of an expectation by pilots using small GA airports. In the short-term, self-service fueling with a credit card payment option for use by the general public is recommended at Window Rock and Chinle Airports. Additionally, the Nation should consider adding the same self-fueling capabilities mentioned above for the remaining three study airport at some point in the future. The Airport Layout Plans for each airport depict where future fuel facilities should be installed.

Additional fuel storage capacity should be planned when the airport is unable to maintain an adequate supply and reserve. For general aviation airports such as the airports included in the study, typically a 14 day supply is common. The presence of a Fixed Based Operator (FBO) on the airport would help in determining when additional fuel storage may be needed. As the need for additional fuel storage becomes necessary, additional tanks should be added in 10,000 or 12,000 gallon increments. These increments will be the most economical to install.

5.3.3 Security

There are several programs designed to increase general aviation airport security. For example, the Aircraft Owners and Pilots Association (AOPA) Airport Watch program created an around the clock telephone hotline answered by federal authorities for pilots and other airport users to report suspicious activity at GA airports. Also, the Transportation Security Administration's (TSA) *Security Guidelines for General Aviation Airports* provides a set of federally-endorsed recommendations to enhance security for municipalities, owners, operators, sponsors and other entities charged with oversight of general aviation airports. The TSA's guidance provides nationwide consistency with regard to security at general aviation facilities, as well as a rational method for determining when and where these enhancements may be appropriate based upon the operational profile of differing airports. The guidelines offer an extensive list of options, ideas, suggestions and proven best practices for the airport operator, sponsor, tenant and/or user to choose from when considering security enhancements. The TSA's guidelines are updated and modified as new security enhancements are developed and as input from the general aviation community is received.

Recommendation: It is recommended that the Navajo DOT review the latest version of the TSA's *Security Guidelines for General Aviation Airports* in order to assess the suggested security enhancements for the five airports included in this study.

5.3.4 Fencing

According to FAA AC 150/5300-13A, *Airport Design*, the primary purpose of airport fencing is to restrict inadvertent entry to the airport by unauthorized people and wildlife. There are several types of airport fencing that are eligible for FAA funding as part of the AIP program depending on the airport's classification (commercial service, GA, etc.) and fencing needs. The different types include wire fencing (with wooden or steel posts), chain-link fencing with steel posts, and wildlife deterrent fencing. Wildlife deterrent fencing usually consists of installing chain-link fence fabric along an existing chain-link fence and constructing concrete pads at existing fence gates.

Recommendations: Based on the conditions of the perimeter fencing as described in Chapter 4, Navajo DOT may want to consider an upgrade to either six-foot or eight-foot high chain-link fencing with three-strand barbed wire in the future. If wildlife in the area becomes an issue, wildlife deterrent fencing may also be an option. The specific location, extent, type, and height of wildlife deterrent fencing shall be designed for the purpose intended based on and in general conformance with accepted guidelines and recommendations of the Arizona Game and Fish Department or other recognized public wildlife specialists for preventing intrusion of the specific targeted animals known to inhabit the area.

Also mentioned in Chapter 4, four of the five study airports currently do not have any type of fencing which prohibits access to the AOA (Air Operations Area). The airports are not required to have security fencing in place to separate the AOA from the landside portions of the airfield because it does not conform to FAR Part 139 and Title 49 CFR, Part 1542. However, in order to enhance safety on the airfield and prevent unauthorized access to aircraft and other airside facilities, it is recommended that chain-link fencing and electrified, mechanical access gates be installed in the vicinity of the landside and other nearby public areas.

5.3.5 Snow Removal Equipment (SRE) and Storage Building

Based on the feedback at the Chapter workshops and from conversations with airport users, the need for snow removal equipment is needed at each of the airports. Currently, the Navajo DOT has to dispatch plows to the airports to remove snow. Not having equipment located at the airport reduces the reliability of the airports; this may largely impact emergency medical flights that would not be able to use the airport during inclement weather.

Recommendation: In order to remedy this problem, it is recommended that each airport in the study obtain its own adequate snow removal equipment and erect a storage building on the airfield. The equipment will be dedicated for use on the airports only.

5.3.6 Aircraft Rescue and Fire Fighting (ARFF) Equipment & Storage Building

According to FAA guidance, operators of Part 139 certificated airports must provide Aircraft Recue and Fire Fighting (ARFF) services. Because the airports included in the study are not Part 139 certificated airports, ARFF equipment is not required. Local municipal or volunteer fire departments typically provide fire protection to general aviation airports in their district. On the Navajo Nation, the Department of Fire & Rescue Services provides fire protection to the airports.

Recommendations: Procedures should be in place to ensure emergency response in case of an accident or emergency at the airports. Although statistically very safe, the most likely emergency situations at general aviation airports are an aircraft accident, fuel or aircraft fire, or a hazardous material (fuel) spill. The level of protection recommended in FAA AC 150/5210-6D, *Aircraft Fire and Rescue Facilities and Extinguisher Agents*, for small general aviation airports is 190 gallons of aqueous film forming foam (AFFF) supplemented with 300 pounds of dry chemical. Proximity suits should be utilized for fire fighter protection. Aviation rated fire extinguishers should be immediately available in the vicinity of the aircraft apron and fueling facilities. It is recommended that the Department of Fire and Rescue maintain compliance with the recommendations contained in FAA AC 150/5210.6D, *Aircraft Fire and Rescue Facilities and Extinguishing Agent*, if they are currently noncompliant.

5.3.7 Airport Access and Vehicle Parking

As mentioned in Chapter 4, all of the airports included in the study have access roads leading from the public roads to the airfields. The access roads are all generally adequate and in fair condition. Speed limit signs were not observed on any of the airport access roads (except for the entrance to Window Rock Airport). Vehicle parking is also available at all of the airports included in the study. The parking areas either consist of asphalt or gravel, and with the exception of Chinle Municipal Airport, the pavement condition or gravel for all vehicle parking areas is poor.

Recommendations: Speed limit signs should be installed on the entrance roads in accordance with Navajo DOT specifications in addition to the upkeep and maintenance of the entrance roads themselves. The two existing cattle guards at the entrance to Crownpoint Airport need replacement. Furthermore, there is a significant grade difference from the edge of the highway and the entrance road to the airport. Replacement of the cattle guards and modification of the grades will be depicted on the Airport Layout Plan for Crownpoint Airport. Recommendations for additional parking will also be depicted on each Airport Layout Plan. At airports where pavement exists, it should be rehabilitated or reconstructed in the near future.

From discussions with Navajo DOT, the development of a new vehicle parking lot for Window Rock Airport has already been approved. Approximately 2,000 square yards of new asphalt pavement with a total of 48 vehicle parking spaces is anticipated to begin construction in the fall of 2014; completion of the project is projected for sometime in the spring of 2015.

5.3.8 Infrastructure Needs

Chapter 4 indicated that additional utilities will be required at many of the airports. It is assumed that upgrades to the existing electric, water, and telecommunication utilities will be needed to some degree for each existing facility.

Recommendation: Upgrades and improvements to the existing utilities are recommended, as needed, in order to accommodate recommended development. The need for additional utilities, or modifications to existing utilities, will be identified on the Airport Layout Plans for each airport.

5.3.9 Miscellaneous Airport Development

During the Chapter workshops, and from discussions with the Navajo DOT staff, it was discovered that some of the study airports have miscellaneous airport development plans already in the works. Perhaps the most notable and likely to occur are those plans for Window Rock Airport. Planned facilities on or adjacent to the airport include the following:

- A planned recreational vehicle park located northwest of the existing runway and southeast of the Navajo Nation Fairgrounds.

- Construction of an Air Operations facility on 10 acres of withdrawn land located on the airport property for use by the Bureau of Indian Affairs (BIA) Navajo Region, Branch of Wildlife Fire and Aviation.

No time table has been set for the construction of the recreational vehicle park. Consideration as to where the park will be potentially located will be important to the planning process. A new park will need to remain outside of certain FAA design standard surfaces and applicable 14 CFR Part 77 imaginary surfaces.

Construction of the Air Operations facility has been in the planning process since 2008. The planned location, size, and needs of the facility will be taken into consideration as future airside infrastructure is proposed i.e., taxiway, aprons, etc.

5.3.10 Airport Zoning

Airport zoning ordinances should include height restrictions and land use compatibility regulations. Development around airports can pose certain hazards to air navigation if appropriate steps are not taken to ensure that existing, as well as future, buildings and other types of structures do not penetrate 14 CFR Part 77 imaginary surfaces. The FAA therefore recommends that airport sponsors implement height restrictions in the vicinity of the airport to protect these surfaces.

Based on the physical inspection of each airport, there currently appears to be no incompatible land uses in the vicinity of the airports. A review of the Chapter Houses' Comprehensive Land Use Plans corresponding to their associated airports was conducted as part of the inventory process; a summary of the type(s) of zoning found at each airport is described below:

Chinle Municipal Airport:

- According to the Chinle Chapter Comprehensive Land Use Plan, the airport is located in an industrial zone.

Tuba City Airport:

- According to the Tuba City Chapter Comprehensive Land Use Plan, the airport does not appear to be located in an existing or future land area within a specific category. The Plan also indicates that proposed development is planned to the east of the existing airport. Development in this area will need to be compatible with the airport.

Window Rock Airport:

- According to the St. Michaels Chapter Community Land Use Plan, the airport does not appear to be located in an existing or future land area within a specific category.

Crownpoint Airport:

- The Crownpoint Chapter Comprehensive Community-Based Land Use Plan indicates that the airport is located in area designated as Community Facilities.

Shiprock Airstrip:

- A review of the Shiprock Chapter Master Land Use Plan reveals that the airport is located outside of a designated zoned area.

Recommendations: The Airport Layout Plan for the airports included in the study will show areas where height restrictions will be necessary. Likewise, the Airport Layout Plans will also show where non-compatible land uses may exist related to existing and future development.

5.3.11 SUSTAINABLE PRACTICES

As discussed in Chapter 4, development of the Navajo Nation airports will present multiple opportunities to implement more sustainable infrastructure and practices. For example, for both the medium intensity taxiway lights (MITL) and medium intensity runway lights (MIRL), preference is given to light-emitting diode (LED) fixtures as they will significantly reduce energy costs and have superior light quality over incandescent or quartz bulbs. LED fixtures for taxiways and runways (MIRL only) are FAA approved, although it is important to note that LED fixtures do have higher initial costs. Lighting is just one component of the overall goal to improve airport sustainability; Navajo DOT also has options in this area with regards to any new buildings constructed on the airfield.

Recommendations: During the design phase of a lighting project, the Navajo DOT along with the FAA and the design engineer can evaluate what type of light fixture (incandescent, quartz, or LED) best meets the needs of the Navajo DOT. New buildings could either be constructed via conventional construction, pre-fabrication, or modular methods. Each building type has advantages and disadvantages and varying costs to consider. Any new building should be designed with at least a 20-year lifespan with minimal renovation and upgrades needed. Attention should be given in the design phase to ensure the building's functionality throughout the entire planning period is met. New buildings will also allow the opportunity to incorporate numerous sustainable features such as a high-energy efficient heating and cooling system, solar hot water, rainwater harvesting, LED lighting, drought tolerant landscaping, and the use of low volatile organic compounds (VOC) and recycled materials in the construction of the building.

It is not recommended that the Navajo DOT seek a LEED rating on new buildings less than 25,000 square feet. LEED, or Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project. However, steps should be taken to ensure that all new buildings are designed to LEED guidelines as much as practical. Seeking a LEED rating on a new building is more practical for larger buildings (25,000 square feet or more) due to the cost of administering the LEED rating process.

5.4 SUMMARY OF PROPOSED FACILITY REQUIREMENTS

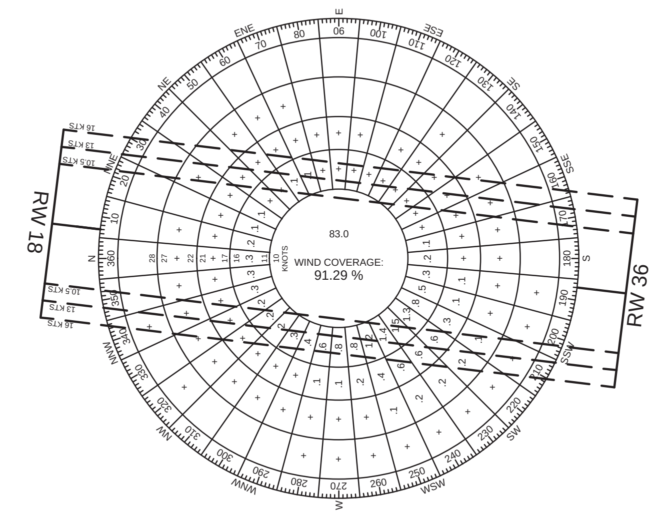
The facility requirements for the Navajo Nation Airport System Master Plan are summarized on **Table 5-4**. The recommendations are based on the types and volume of aircraft currently using, and expected to use, the airport in the short and long-term time frames. The recommended facilities will enable the airport to continue to serve its current and future users in a safe and efficient manner.

In the next chapter, Development Plan, the various airside and landside improvements will be presented and evaluated. An Airport Layout Plan (ALP) will be created to visually depict and communicate the Nation's vision for each airport in the study.

TABLE 5-4 PROPOSED AIRPORT IMPROVEMENTS AND DEVELOPMENT

Priority Ranking ✸ High ■ Medium ▶ Low --- N/A	Basic Facility Needs							All Weather Capabilities			Aeronautical Services				
	Airfield Pavements (Runways, Taxiways, Apron)	Airfield Lighting	Airfield Signage	Airfield Pavement Markings	Visual Navigational Aids (Glide Scope Indicator, Wind cone, Rotating Beacon, Segmented Circle, REIL)	Fencing and Access Control	Entrance Road	Automated Weather Source	Instrument Approach Procedures	Snow Removal Equipment and Storage Building	Fixed Base Operator (FBO)	Fuel Capabilities	Hangars	GA Terminal Building	Ground Transportation Service
Arizona Airports															
Chinle Municipal Airport	Reconstruct/ Rehabilitate ✸	Upgrade MIRL/MITL ✸	Install ✸	Maintain non-precision (rwy); Repaint all ✸	▶ GSI: Maintain existing PAPI Runways 18 & 36 ✸ Rotating Beacon: Replace ▶ Wind cone: Maintain existing ✸ Segmented Circle: Replace ✸ REIL: Install Runways 18 & 36	Upgrade perimeter fencing/install automatic access control gate to AOA ✸	No immediate concerns; in good condition ▶	Install AWOS III ✸	Proposed GPS/RNAV Runway: TBD ✸	Obtain equipment; construct building ✸	Proposed ■	Self-Serve ✸	Proposed ▶	Not proposed	Proposed (long-term) ▶
Tuba City Airport	Reconstruct/ Rehabilitate ✸	Upgrade MIRL/MITL ✸	Upgrade /Install ■	Maintain non-precision (rwy); Repaint all ✸	✸ GSI: Replace VASI/Install PAPI Runways 15 & 33 ▶ Rotating Beacon: Maintain existing ✸ Wind cone: Replace ✸ Segmented Circle: Replace ✸ REIL: Install Runways 15 & 33	Upgrade perimeter fencing/install automatic access control gate to AOA ■	No immediate concerns; in good condition ▶	Install AWOS III ✸	Proposed GPS/RNAV Runway: TBD ✸	Obtain equipment; construct building ■	Not Proposed	Self-Serve ■	Proposed ▶	Not proposed	Proposed (long-term) ▶
Window Rock Airport	Reconstruct/ Rehabilitate ✸	Upgrade MIRL/MITL ✸	Upgrade /Install ✸	Maintain non-precision (rwy); Repaint all ✸	✸ GSI: Replace/Install PAPI Runways 2 & 20 ▶ Rotating Beacon: Maintain existing ✸ Wind cone: Replace ✸ Segmented Circle: Replace ✸ REIL: Replace Runway 2/Install Runway 20	Upgrade perimeter fencing/upgrade automatic access control gate to AOA ✸	Rehabilitate ■	Maintain existing ASOS	Maintain existing	Obtain equipment; construct building ■	Proposed ■	Self-Serve ✸	Proposed ▶	Maintain existing ▶	Proposed (long-term) ■
New Mexico Airports															
Crownpoint Airport	Reconstruct/ Rehabilitate ✸	Upgrade MIRL/MITL ✸	Install ■	Upgrade to non-precision (rwy); Repaint all ✸	✸ GSI: Replace PLASI/Install PAPI Runways 18 & 36 ✸ Rotating Beacon: Replace ▶ Wind cone: Maintain existing ▶ Segmented Circle: Maintain existing ✸ REIL: Install Runways 18 & 36	Upgrade perimeter fencing/install automatic access control gate to AOA ■	Rehabilitate ■	Install AWOS III ✸	Proposed GPS/RNAV Runway: TBD ✸	Obtain equipment; construct building ✸	Not proposed	Self-Serve ■	Proposed ▶	Not proposed	Not proposed
Shiprock Airstrip	Reconstruct/ Rehabilitate ✸	Install MIRL/MITL ✸	Install ■	Upgrade to non-precision (rwy); Repaint all ✸	✸ GSI: Install PAPI Runways 2 & 20 ✸ Rotating Beacon: Install ✸ Wind cone: Replace ✸ Segmented Circle: Replace ✸ REIL: Install Runways 2 & 20 ✸ Pilot-controlled lighting: Install	Upgrade perimeter fencing/install automatic access control gate to AOA ■	Rehabilitate ■	Install AWOS III ✸	Proposed GPS/RNAV Runway: TBD ✸	Obtain equipment; construct building ■	Not proposed	Self-Serve ■	Proposed ▶	Not proposed	Not proposed

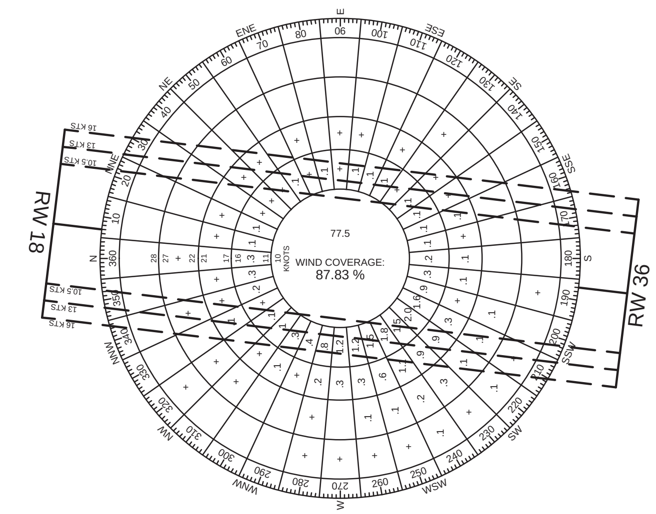
Definitions: Air Operations Area (AOA), Automated Surface Observing System (ASOS), Automated Weather Observing System (AWOS), Glide Scope Indicator (GSI), Medium Intensity Runway Lighting (MIRL), Medium Intensity Taxiway Lighting (MITL), Not Applicable (N/A), Precision Approach Path Indicator (PAPI), Pulse Light Approach Slope Indicator (PLASI), Runway (Rwy), Runway End Identifier Lights (REIL), To be determined (TBD), Visual Approach Slope Indicator (VASI)
Source: ACI, 2014



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
18/36	91.29%	95.12%	98.38%

ALL WEATHER WIND ROSE

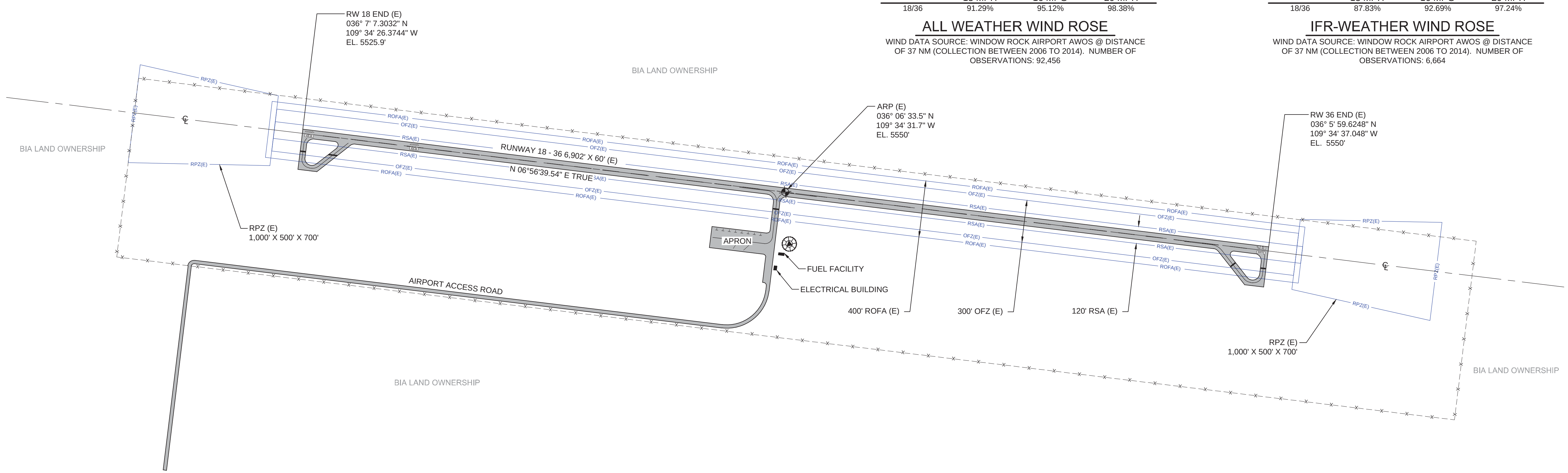
WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 37 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 92,456



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
18/36	87.83%	92.69%	97.24%

IFR-WEATHER WIND ROSE

WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 37 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 6,664

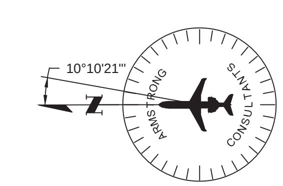


LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION	EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPH./CONC.)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)	N/A		REIL
		AIRPORT PROPERTY LINE (APL)			VASI/PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)			AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)			WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)	N/A		AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)			LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)		N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)			DRAINAGE / WATER EDGE
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)	4125 4125	N/A	CONTOURS
APRC(E)	APRC(F)(U)	APPROACH SURFACE			ROADS
OCS(E)	OCS(F)(U)	OBSTACLE CLEARANCE SURFACE			MARKINGS
OIS(E)	OIS(F)(U)	OBSTACLE IDENTIFICATION SURFACE	X	XX	FENCING
	N/A	PACS/SACS MONUMENT		N/A	TREES
		TO BE REMOVED			CULVERT
	N/A	ARCHEOLOGICAL SITE			AIRPORT REFERENCE POINT (ARP)
	N/A	UTILITY POLE / LIGHT POLE			
		PARCEL LINES	NOTE: SOME LINES AND SYMBOLS MAY NOT BE PRESENT ON DRAWING		

NOTES

1. ALL LATITUDE/LONGITUDE COORDINATES SHOWN ARE 1983 NORTH AMERICAN DATUM (NAD 83).
2. ALL EXISTING AND FUTURE RUNWAYS/TAXIWAYS ARE BITUMINOUS PAVEMENT.
3. AIRPORT COMPLIES WITH (AC-150/5300-13) STANDARDS.
4. MAP FEATURES ARE APPROXIMATE ONLY AND ARE NOT NECESSARILY ACCURATE TO SURVEYING OR ENGINEERING STANDARDS. PROPERTY BOUNDRY LINES SHOWN ARE ARE NOT A RESULT OF OF AN ACTUAL SURVEY AND ARE PROVIDED FOR INFORMATION ONLY. RUNWAY END COORDINATES ARE APPROXIMATE ONLY.
5. ONE ISOLATED OCCURANCE OF A CULTURAL RESOURCE IS LOCATED WITHIN THE AIRPORT BOUNDARY ACCORDING TO CULTURAL RESOURCES DATED APRIL 1, 1992, NNAD-91-152



MAGNETIC NORTH SOURCE: NOAA GEOPHYSICAL DATA CENTER 08.19.14 RATE OF CHANGE 6° 9' W/YEAR

0 300 600
SCALE IN FEET

ARMSTRONG
PLANNING ENGINEERING CONSTRUCTION

COLORADO: 970.242.0101 ARIZONA: 602.803.7079 NEW MEXICO: 505.508.2192
www.armstrongconsultants.com

CHINLE AIRPORT
CHINLE, ARIZONA

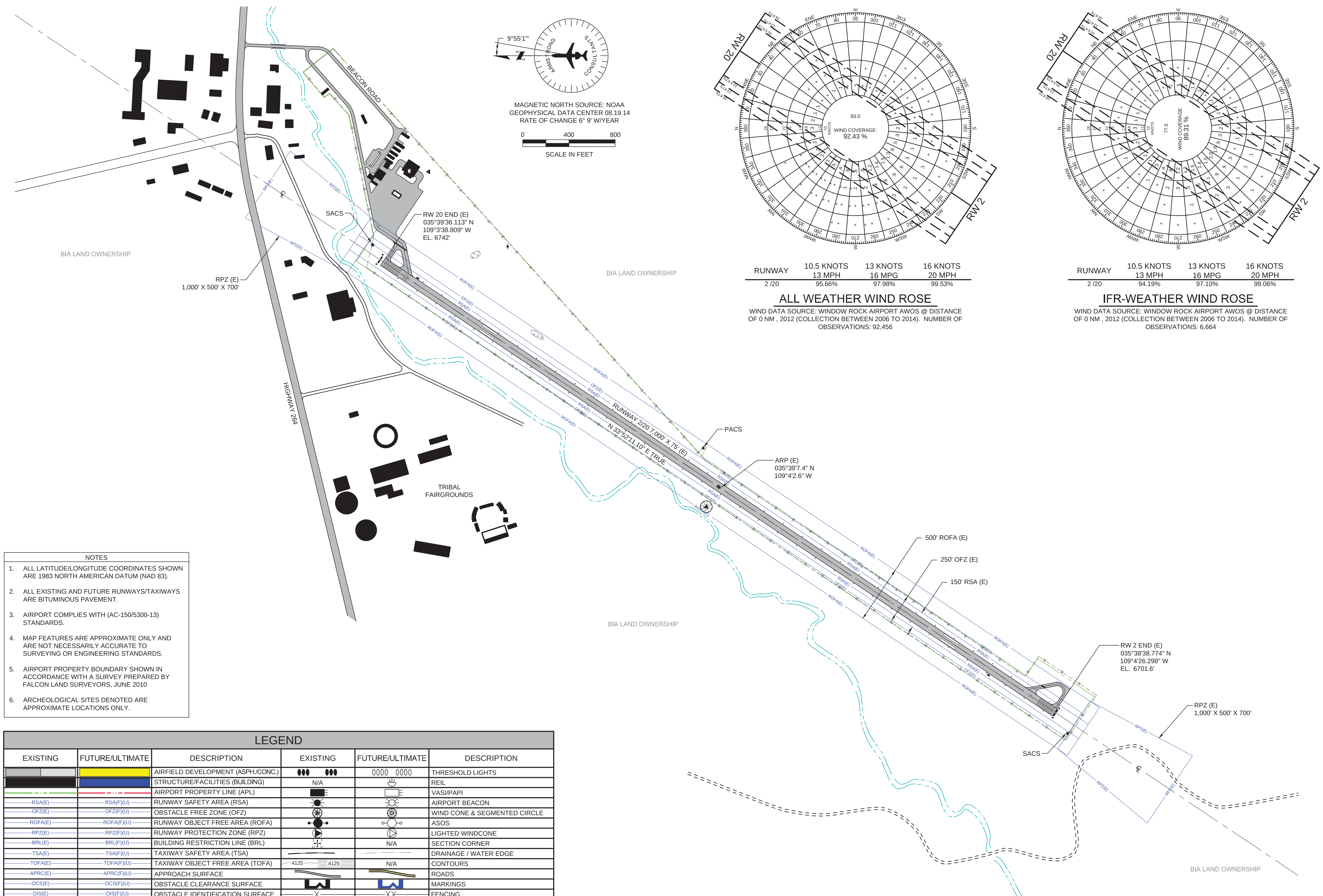
No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	08/2014	ORIGINAL ISSUE	6214502-E91	LDS	CM	JZP

THE PREPARATION OF THIS DOCUMENT MAY HAVE BEEN SUPPORTED, IN PART, THROUGH THE AIRPORT IMPROVEMENT PROGRAM FINANCIAL ASSISTANCE FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER TITLE 49 U.S.C., SECTION 47104. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE OR WOULD HAVE JUSTIFICATION IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

EXISTING DESIGN STANDARDS

EXHIBIT B1

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\CHINLE MUNICIPAL AIRPORT\146214502_E91.DWG



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
2 /20	95.66%	97.98%	99.53%

ALL WEATHER WIND ROSE

WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 0 NM , 2012 (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 92,456

RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
2 /20	94.19%	97.10%	99.06%

IFR-WEATHER WIND ROSE

WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 0 NM , 2012 (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 6,664

NOTES

1. ALL LATITUDE/LONGITUDE COORDINATES SHOWN ARE 1983 NORTH AMERICAN DATUM (NAD 83).
2. ALL EXISTING AND FUTURE RUNWAYS/TAXIWAYS ARE BITUMINOUS PAVEMENT.
3. AIRPORT COMPLIES WITH (AC-150/5300-13) STANDARDS.
4. MAP FEATURES ARE APPROXIMATE ONLY AND ARE NOT NECESSARILY ACCURATE TO SURVEYING OR ENGINEERING STANDARDS.
5. AIRPORT PROPERTY BOUNDARY SHOWN IN ACCORDANCE WITH A SURVEY PREPARED BY FALCON LAND SURVEYORS, JUNE 2010
6. ARCHEOLOGICAL SITES DENOTED ARE APPROXIMATE LOCATIONS ONLY.

LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION	EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPH./CONC.)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)	N/A		REIL
		AIRPORT PROPERTY LINE (APL)			VASI/PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)			AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)			WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)			ASOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)			LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)		N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)			DRAINAGE / WATER EDGE
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)	4125 4125	N/A	CONTOURS
APRC(E)	APRC(F)(U)	APPROACH SURFACE		N/A	ROADS
OCS(E)	OCS(F)(U)	OBSTACLE CLEARANCE SURFACE			MARKINGS
OIS(E)	OIS(F)(U)	OBSTACLE IDENTIFICATION SURFACE			FENCING
	N/A	PACS/SACS MONUMENT		N/A	TREES
		TO BE REMOVED			CULVERT
	N/A	ARCHEOLOGICAL SITE			AIRPORT REFERENCE POINT (ARP)
	N/A	UTILITY POLE / LIGHT POLE			
		PARCEL LINES	NOTE: SOME LINES AND SYMBOLS MAY NOT BE PRESENT ON DRAWING		

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\WINDOW ROCK\146214502_RQE.DWG

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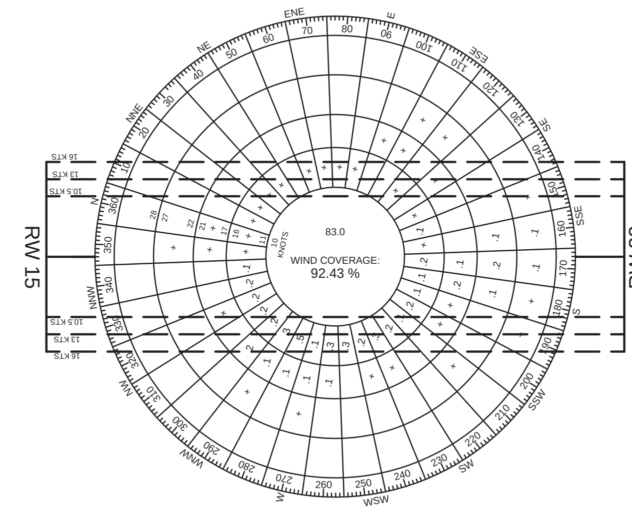
WINDOWROCK AIRPORT
WINDOWROCK, ARIZONA

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502 -RQE	LDS	CM	JZP

AIRPORT COMPONENTS

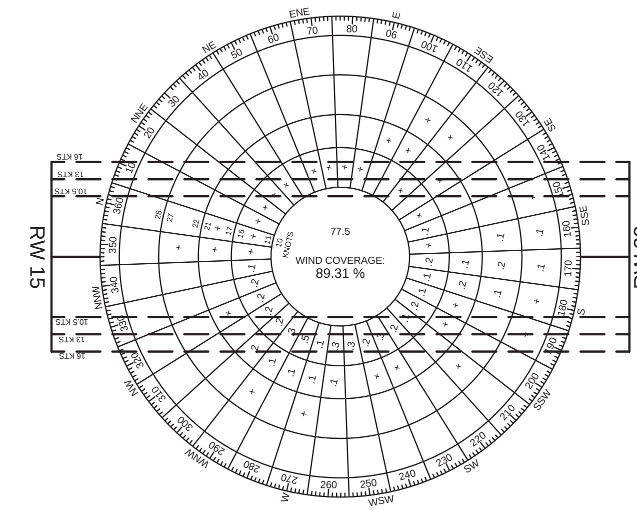
EXHIBIT B2



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
15 /33	97.66%	98.94%	99.84%

ALL WEATHER WIND ROSE

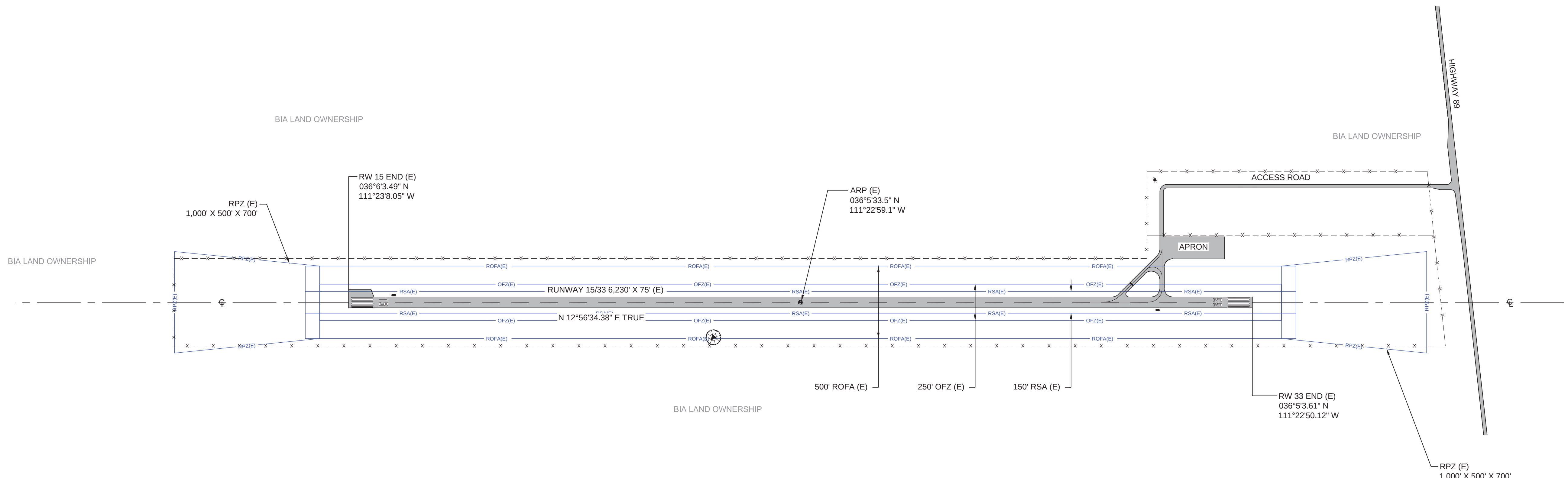
WIND DATA SOURCE: PAGE MUNICIPAL AWOS @ DISTANCE OF 49 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 95,633



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
15 /33	96.96%	98.16%	99.34%

IFR-WEATHER WIND ROSE

WIND DATA SOURCE: PAGE MUNICIPAL AWOS @ DISTANCE OF 49 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 2,589

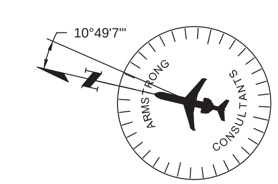


LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION	EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPH./CONC.)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)	N/A		REIL
		AIRPORT PROPERTY LINE (APL)			VASI/PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)			AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)			WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)			ASOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)			LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)		N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)			DRAINAGE / WATER EDGE
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)	4125 4125	N/A	CONTOURS
APRC(E)	APRC(F)(U)	APPROACH SURFACE			ROADS
OCS(E)	OCS(F)(U)	OBSTACLE CLEARANCE SURFACE			MARKINGS
OIS(E)	OIS(F)(U)	OBSTACLE IDENTIFICATION SURFACE			FENCING
	N/A	PACS/SACS MONUMENT		N/A	TREES
		TO BE REMOVED			CULVERT
	N/A	ARCHEOLOGICAL SITE			AIRPORT REFERENCE POINT (ARP)
	N/A	UTILITY POLE / LIGHT POLE			
		PARCEL LINES	NOTE: SOME LINES AND SYMBOLS MAY NOT BE PRESENT ON DRAWING		

NOTES

1. ALL LATITUDE/LONGITUDE COORDINATES SHOWN ARE 1983 NORTH AMERICAN DATUM (NAD 83).
2. ALL EXISTING AND FUTURE RUNWAYS/TAXIWAYS ARE BITUMINOUS PAVEMENT.
3. AIRPORT COMPLIES WITH (AC-150/5300-13) STANDARDS.
4. MAP FEATURES ARE APPROXIMATE ONLY AND ARE NOT NECESSARILY ACCURATE TO SURVEYING OR ENGINEERING STANDARDS. PROPERTY BOUNDRY LINES SHOWN ARE NOT A RESULT OF OF AN ACTUAL SURVEY AND ARE PROVIDED FOR INFORMATION ONLY. RUNWAY END COORDINATES ARE APPROXIMATE ONLY.



MAGNETIC NORTH SOURCE: NOAA GEOPHYSICAL DATA CENTER 08.19.14 RATE OF CHANGE 6° 9' W/YEAR

0 400 800

SCALE IN FEET

ARMSTRONG
PLANNING ENGINEERING CONSTRUCTION
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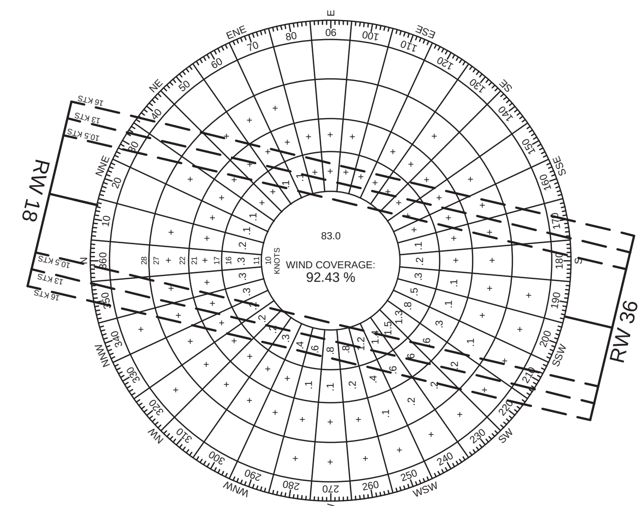
TUBA CITY AIRPORT
TUBA CITY, ARIZONA

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502-T03	LDS	CM	JZP

EXISTING DESIGN STANDARDS

EXHIBIT B3

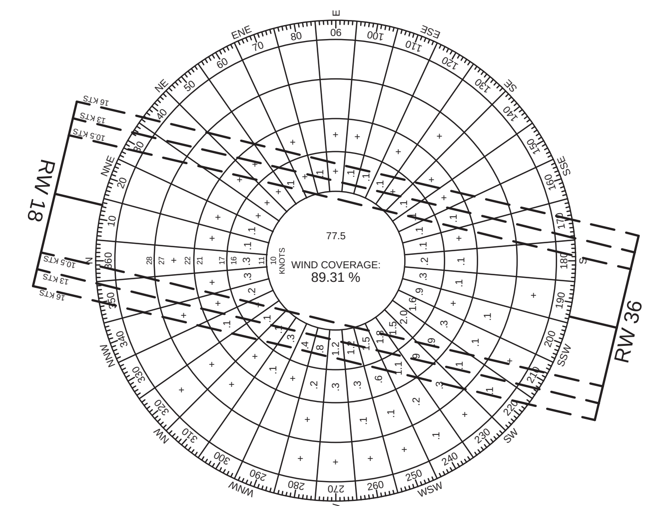
PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\TUBA CITY AIRPORT\146214502_T03.DWG



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
18/36	92.43%	95.96%	98.80%

ALL WEATHER WIND ROSE

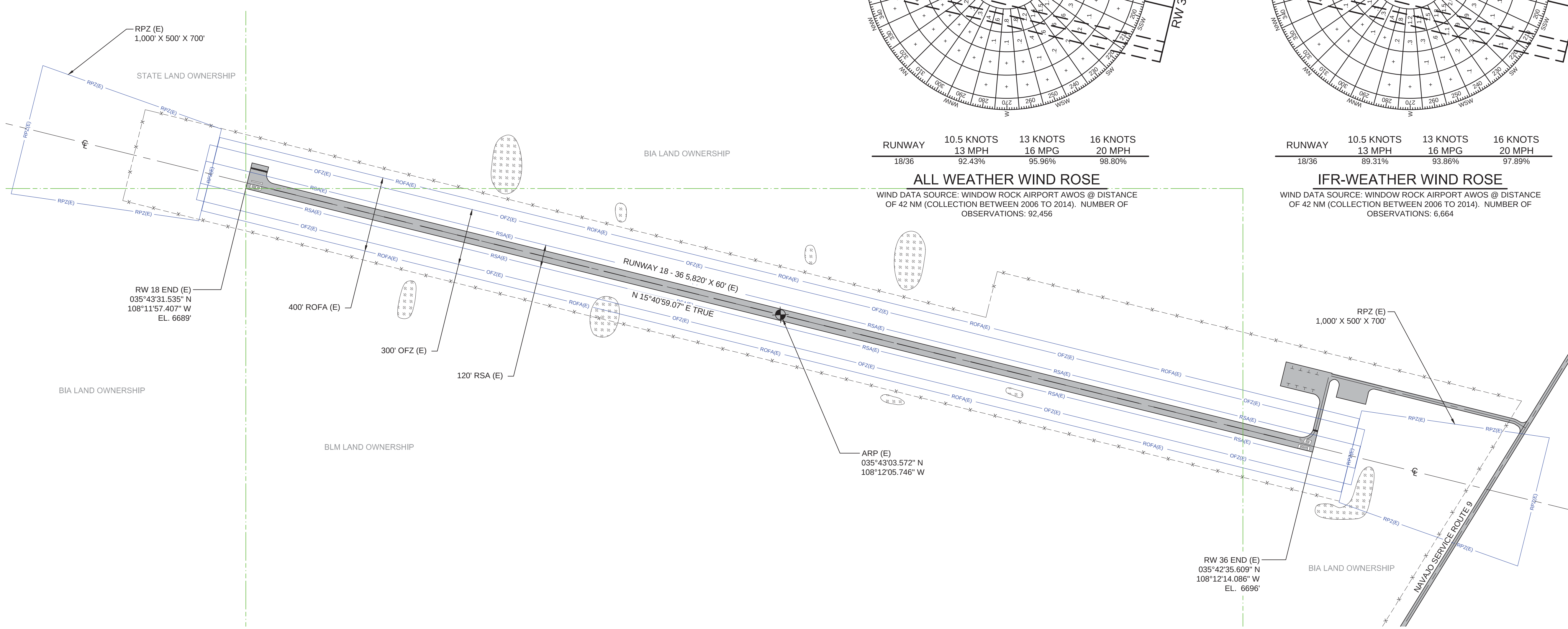
WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 42 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 92,456



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
18/36	89.31%	93.86%	97.89%

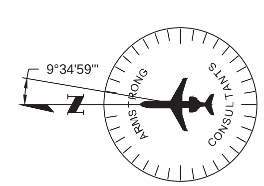
IFR-WEATHER WIND ROSE

WIND DATA SOURCE: WINDOW ROCK AIRPORT AWOS @ DISTANCE OF 42 NM (COLLECTION BETWEEN 2006 TO 2014). NUMBER OF OBSERVATIONS: 6,664



NOTES

1. ALL LATITUDE/LONGITUDE COORDINATES SHOWN ARE 1983 NORTH AMERICAN DATUM (NAD 83).
2. ALL EXISTING AND FUTURE RUNWAYS/TAXIWAYS ARE BITUMINOUS PAVEMENT.
3. AIRPORT COMPLIES WITH (AC-150/5300-13) STANDARDS.
4. MAP FEATURES ARE APPROXIMATE ONLY AND ARE NOT NECESSARILY ACCURATE TO SURVEYING OR ENGINEERING STANDARDS. PROPERTY BOUNDRY LINES SHOWN ARE ARE NOT A RESULT OF OF AN ACTUAL SURVEY AND ARE PROVIDED FOR INFORMATION ONLY. RUNWAY END COORDINATES ARE APPROXIMATE ONLY.
5. ARCHEOLOGICAL SITES DENOTED ARE APPROXIMATE LOCATIONS ONLY.



MAGNETIC NORTH SOURCE: NOAA GEOPHYSICAL DATA CENTER 08.13.14 RATE OF CHANGE 7° 0' W/YEAR

0 300 600
SCALE IN FEET

LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION	EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPH./CONC.)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)	N/A		REIL
		AIRPORT PROPERTY LINE (APL)			VASI/PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)			AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)			WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)	N/A		AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)			LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)	1 2 12 11	N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)			DRAINAGE / WATER EDGE
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)	4125 4125	N/A	CONTOURS
APRC(E)	APRC(F)(U)	APPROACH SURFACE			ROADS
OCS(E)	OCS(F)(U)	OBSTACLE CLEARANCE SURFACE			MARKINGS
OIS(E)	OIS(F)(U)	OBSTACLE IDENTIFICATION SURFACE			FENCING
	N/A	PACS/SACS MONUMENT		N/A	TREES
		TO BE REMOVED			CULVERT
	N/A	ARCHEOLOGICAL SITE			AIRPORT REFERENCE POINT (ARP)
	N/A	UTILITY POLE / LIGHT POLE			
		PARCEL LINES	NOTE: SOME LINES AND SYMBOLS MAY NOT BE PRESENT ON DRAWING		

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\CROWNPOINT NM ALP\146214502_0E8.DWG

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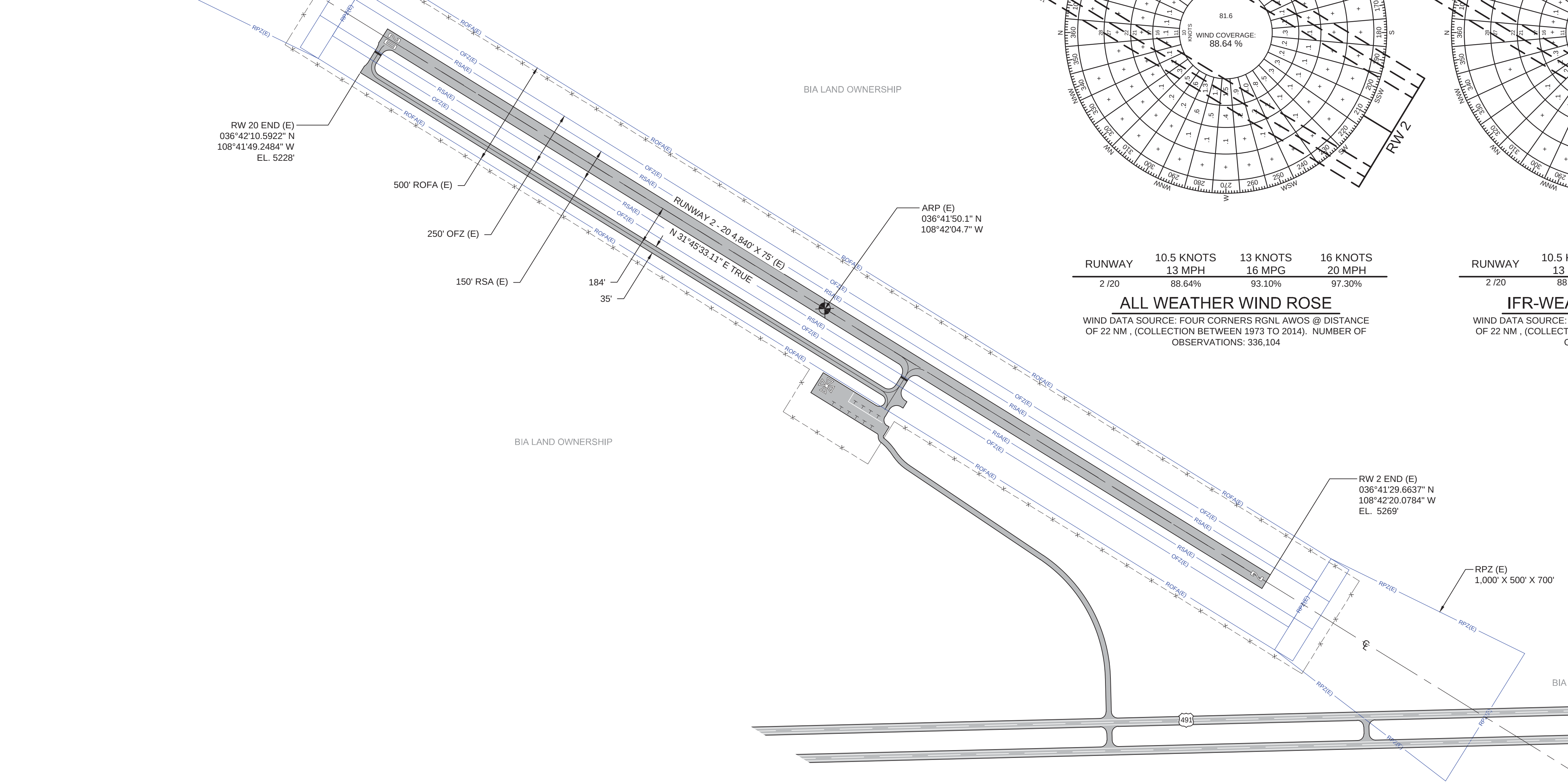
www.armstrongconsultants.com

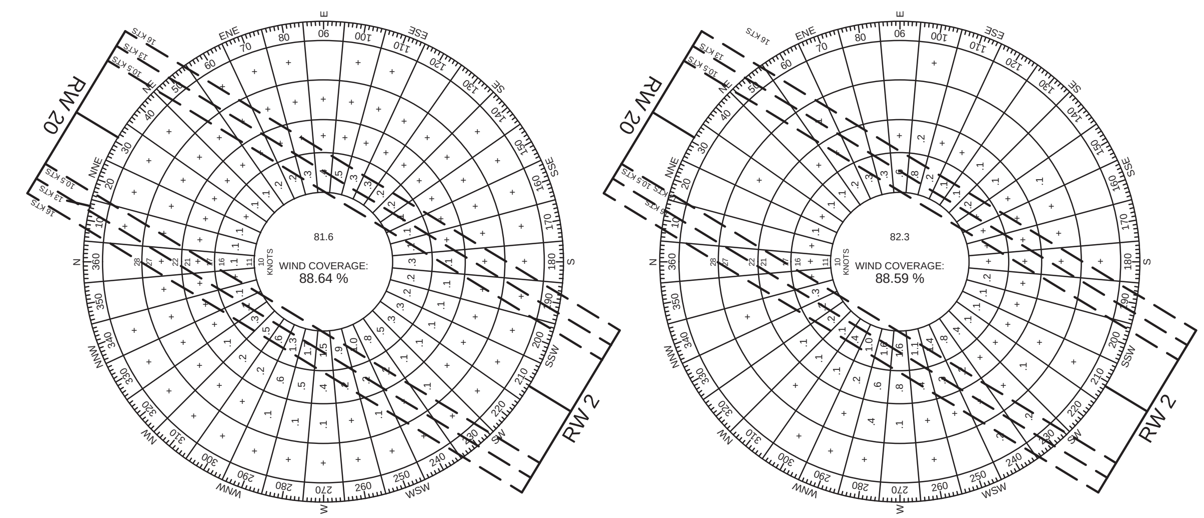
CROWNPOINT AIRPORT
CROWNPOINT, NEW MEXICO

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502-0E8	LDS	CM	JZP

EXISTING DESIGN STANDARDS

EXHIBIT B4





RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
2 /20	88.64%	93.10%	97.30%

ALL WEATHER WIND ROSE

WIND DATA SOURCE: FOUR CORNERS RGNL AWOS @ DISTANCE OF 22 NM , (COLLECTION BETWEEN 1973 TO 2014). NUMBER OF OBSERVATIONS: 336,104

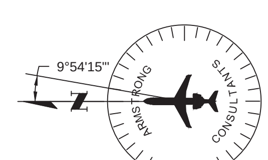
RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPG	16 KNOTS 20 MPH
2 /20	88.59%	93.12%	97.20%

IFR-WEATHER WIND ROSE

WIND DATA SOURCE: FOUR CORNERS RGNL AWOS @ DISTANCE OF 22 NM , (COLLECTION BETWEEN 1973 TO 2014). NUMBER OF OBSERVATIONS: 10,608

NOTES

1. ALL LATITUDE/LONGITUDE COORDINATES SHOWN ARE 1983 NORTH AMERICAN DATUM (NAD 83).
2. ALL EXISTING AND FUTURE RUNWAYS/TAXIWAYS ARE BITUMINOUS PAVEMENT.
3. AIRPORT COMPLIES WITH (AC-150/5300-13) STANDARDS.
4. MAP FEATURES ARE APPROXIMATE ONLY AND ARE NOT NECESSARILY ACCURATE TO SURVEYING OR ENGINEERING STANDARDS. PROPERTY BOUNDRY LINES SHOWN ARE ARE NOT A RESULT OF OF AN ACTUAL SURVEY AND ARE PROVIDED FOR INFORMATION ONLY. RUNWAY END COORDINATES ARE APPROXIMATE ONLY.
5. NO SITES, ISOLATED OCCURENCES, OR TRADITIONAL CULTERED PROPERTIES ARE LOCATED WITHIN THE AIRPORT PROPERTY ACCORDING TO CULTURAL RESOURCES DATED APRIL 23, 1993, NNAD 93-047.



MAGNETIC NORTH SOURCE: NOAA GEOPHYSICAL DATA CENTER 08.19.14 RATE OF CHANGE 7° 1' W/YEAR

0 300 600
SCALE IN FEET

LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION	EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPH./CONC.)		0000 0000	THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)	N/A		REIL
		AIRPORT PROPERTY LINE (APL)			VASI/PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)			AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)			WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)	N/A		AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)			LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)	1 2 12 11	N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)			DRAINAGE / WATER EDGE
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)	4125 4125	N/A	CONTOURS
APRC(E)	APRC(F)(U)	APPROACH SURFACE			ROADS
OCS(E)	OCS(F)(U)	OBSTACLE CLEARANCE SURFACE			MARKINGS
OIS(E)	OIS(F)(U)	OBSTACLE IDENTIFICATION SURFACE	X	XX	FENCING
	N/A	PACS/SACS MONUMENT		N/A	TREES
		TO BE REMOVED			CULVERT
	N/A	ARCHEOLOGICAL SITE			AIRPORT REFERENCE POINT (ARP)
	N/A	UTILITY POLE / LIGHT POLE			
		PARCEL LINES	NOTE: SOME LINES AND SYMBOLS MAY NOT BE PRESENT ON DRAWING		

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SHIPROCK, NEW MEXICO

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
3							
2							
1							
0	146214	09/2014	ORIGINAL ISSUE	6214502 -5V5	LDS	CM	JZP

EXISTING DESIGN STANDARDS

EXHIBIT B5

PLOT DATE: September 5, 2014 FILE NAME: L:\PROJECTS\ARIZONA\DWG\NAVAJO NATION\SHIPROCK NM ALP\146214502_5V5.DWG

Appendix A

GLOSSARY OF TERMS AND ACRONYMS

GLOSSARY OF TERMS

Above Ground Level (AGL) - A height above ground as opposed to MSL (height above Mean Sea Level)

Advisory Circular (AC) - Publications issued by the FAA to provide a systematic means of providing non-regulator guidance and information in a variety of subject areas

Airplane Design Group (ADG) – A classification of aircraft based on wingspan and tail height

Airport Improvement Program (AIP) - The Airport and Airway Improvement Act of 1982, as amended. Under this program, the FAA provides funding assistance for the development of airports and airport facilities

Aircraft Mix - The number of aircraft movements categorized by capacity group or operational group and specified as a percentage of the total aircraft movements

Aircraft Operation - An aircraft takeoff or landing

Airport - An area of land or water used or intended to be used for landing and takeoff of aircraft, includes buildings and facilities, if any

Airport Elevation - The highest point of an airport's useable runways, measured in feet above mean sea level.

Airport Hazard - Any structural or natural object located on or near a public airport, or any use of land near such airport, that obstructs the airspace required for flight of aircraft on approach, landing, takeoff, departure, or taxiing at the airport

Airport Land Use Regulations - Are designed to preserve existing and/or establish new compatible land uses around airports, to allow land use not associated with high population concentration, to minimize exposure of residential uses to critical aircraft noise areas, to avoid danger from aircraft crashes, to discourage traffic congestion and encourage compatibility with non-motorized traffic from development around airports, to discourage expansion of demand for governmental services beyond reasonable capacity to provide services and regulate the area around the airport to minimize danger to public health, safety, or property from the operation of the airport, to prevent obstruction to air navigation and to aid in realizing the policies of a County Comprehensive Plan and Airport Master Plan

Airport Layout Plan (ALP) - A graphic presentation, to scale, of existing and proposed airport facilities, their location on the airport and the pertinent applicable standards. To be eligible for AIP funding assistance, an airport must have an FAA-approved ALP

Airport Master Record, Form 5010 - The official FAA document, which lists basic airport data for reference and inspection purposes

Airport Reference Code (ARC) - The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport

Airport Reference Point (ARP) - The latitude and longitude of the approximate center of the airport

Airspace - Space above the ground in which aircraft travel; divided into corridors, routes and restricted zones

Air Traffic - Aircraft operating in the air or on an airport surface, excluding loading ramps and parking areas

Approach Surface - A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end

Automated Weather Observing System (AWOS) – Equipment that automatically gathers weather data from various locations on the airport and transmits the information directly to pilots by means of computer generated voice messages over a discrete frequency

Based Aircraft - An aircraft permanently stationed at an airport

Building Restriction Line - A line which identifies suitable building area locations on airports

Ceiling - The height above the earth's surface of the lowest layer of clouds or other phenomena which obscure vision

Conical Surface - A surface extending outward and upward form the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet

Controlled Airspace – Airspace in which some or all aircraft may be subject to air traffic control to promote safe and expeditious flow of air traffic

Day Night Level (DNL) - 24-hour average sound level, including a 10 decibel penalty for sound occurring between 10:00 PM and 7:00 AM

Decibel - Measuring unit for sound based on the pressure level

Design Aircraft - In airport design, the aircraft which controls one or more design items such as runway length, pavement strength, lateral separation, etc., for a particular airport. The same aircraft need not be critical for all design items

Displaced Threshold - A threshold that is located at a point on the runway beyond the beginning of the runway

Federal Aviation Administration (FAA) - The federal agency responsible for the safety and efficiency of the national airspace and air transportation system

FAR Part 77 - A definition of the protected airspace required for the safe navigation of aircraft

Fixed Base Operator (FBO) - An individual or company located at an airport and providing commercial general aviation services

Fuel Flowage Fees - Fees charged by the airport owner based upon the gallons of fuel either delivered to the airport or pump at the airport

General Aviation (GA) - All aviation activity in the United States, which is neither military nor conducted by major, national or regional airlines

Glider - A heavier-than-air aircraft that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine (FAR Part 1)

Global Positioning System (GPS) - The global positioning system is a space based navigation system, which has the capability to provide highly accurate three-dimensional position, velocity and time to an infinite number of equipped users anywhere on or near the Earth. The typical GPS integrated system will provide: position, velocity, time, altitude, groundspeed and ground track error, heading and variation. The GPS measures distance, which it uses to fix position, by timing a radio signal that starts at the satellite and ends at the GPS receiver. The signal carries with it, data that discloses satellite position and time of transmission and synchronizes the aircraft GPS system with satellite clocks

Hazard to Air Navigation - An object which, as a result of an aeronautical study, the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities or existing or potential airport capacity

Horizontal Surface - A horizontal plane 150 feet above the established airport elevation, the perimeter which is constructed by swinging arcs of specified radii form the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs.

Imaginary Surfaces - Surfaces established in relation to the end of each runway or designated takeoff and landing areas, as defined in paragraphs 77.25, 77.28 and 77.29 of FAR Part 77, *Objects Affecting Navigable Airspace*. Such surfaces include the approach, horizontal, conical, transitional, primary and other surfaces

Itinerant Operations - All operations at an airport, which are not local operations

Jet Noise - The noise generated externally to a jet engine in the turbulent jet exhaust

Knots - Nautical miles per hour, equal 1.15 statute miles per hour

Large Airplane - An airplane of more than 12,500 pounds maximum certified takeoff weight

Local Operations – Operation by aircraft flying in the traffic pattern or within sight of the control tower, aircraft known to be arriving or departing from flight in local practice areas, or aircraft executing practice instrument approaches at the airport

Location Identifier - A three-letter or other code, suggesting where practicable, the location name that it represents

Maneuvering Area - That part of an airport to be used for the takeoff and landing of aircraft and for the movement of aircraft associated with takeoff and landing, excluding aprons

Master Plan - A planning document prepared for an airport, which outlines directions and developments in detail for 5 years and less specifically for 20 years. The primary component of which is the Airport Layout Plan (ALP)

Mean/Maximum Temperature - The average of all the maximum temperatures usually for a given period of time

Mean Sea Level (MSL) - Height above sea level

Medium Intensity Runway Lights (MIRL) - For use on VFR runways or runway showing a non-precision instrument flight rule (IFR) procedure for either circling or straight-in approach

Minimum Altitude - That designated altitude below which an IFR pilot is not allowed to fly unless arriving or departing an airport or for specific allowable flight operations

National Airspace System - A plan prepared annually by the FAA which identifies, for the public, the composition of a national system of airports together with the airport development necessary to anticipate and meet the present and future needs of civil aeronautics, to meet requirements in support of the national defense and to meet the special needs of the Postal Service. The plan includes both new and qualitative improvements to existing airports to increase their capacity, safety, technological capability, etc.

NAVAID - A ground based visual or electronic device used to provide course or altitude information to pilots

Noise - Defined subjectively as unwanted sound. The measurement of noise involve understanding three characteristics of sound: intensity, frequency and duration

Noise Contours - Lines drawn about a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise

Noise Exposure Level - The integrated value, over a given period of time of a number of different events of equal or different noise levels and durations

Non-Precision Instrument - A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance for which a straight-in non-precision instrument approach procedure has been approved

Notice to Airmen (NOTAM) - A notice containing information (not known sufficiently in advance to publicize by other means concerning the establishment, condition or change in any component (facility, service, or procedure) of or hazard in the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations

Object - Includes, but is not limited to, above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain and parked aircraft

Object Free Area (OFA) - A two-dimensional ground area-surrounding runways, taxiways and taxilanes which is clear of objects except for object whose location is fixed by function

Obstacle Free Zone (OFZ) - The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDs

Obstruction to Air Navigation - An object of greater height than any of the heights or surfaces presented in Subpart C of Title 14 CFR Part 77, *Standards for Determining Obstructions to Air Navigation or Navigational Aids or Facilities*

Parking Apron - An apron intended to accommodate parked aircraft

Pattern - The configuration or form of a flight path flown by an aircraft or prescribed to be flown, as in making an approach to a landing

Precision Approach Path Indicators (PAPI) - The visual approach slope indicator system furnishes the pilot visual slope information to provide safe descent guidance. It provides vertical visual guidance to aircraft during approach and landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that they are "on path" if they see red/white, "above path" if they see white/white and "below path" if they see red/red

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, but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway

Rotating Beacon - A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport

Runway - A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes

Runway Design Code (RDC) - A code signifying the design standard to which the runway is to be built

Runway End Identifier Lights (REIL) - REILs are flashing strobe lights which aid the pilot in identifying the runway end at night or in bad weather conditions

Runway Gradient - The average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used provided that no intervening point on the runway profile lies more than five feet above or below a straight line joining the two ends of the runway. In excess of five feet the runway profile will be segmented and aircraft data will be applied for each segment separately

Runway Lighting System - A system of lights running the length of a system that may be either high intensity (HIRL), medium intensity (MIRL), or low intensity (LIRL)

Runway Orientation - The magnetic bearing of the centerline of the runway

Runway Protection Zone (RPZ) - An area off the runway end used to enhance the protection of people and property on the ground

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 form the runway

Segmented Circle - A basic marking device used to aid pilots in locating airports and which provides a central location for such indicators and signal devices as may be required

Small Aircraft - An airplane of 12,500 pounds or less maximum certified takeoff weight

Taxiway - A defined path established for the taxiing of aircraft from one part of an airport to another

Taxiway Design Group (TDG) - A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear distance (CMG)

Terminal Area - The area used or intended to be used for such facilities as terminal and cargo buildings, gates, hangars, shops and other service buildings, automobile parking, airport motels, 8restaurants, garages and automobile services and a specific geographical area within which control of air traffic is exercised

Threshold - The beginning of that portion of the runway available for landing. "Threshold" always refers to landing, not the start of takeoff

Touch and Go Operations - Practice flight performed by a landing touch-down and continuous takeoff without stopping

Traffic Pattern - The traffic flow that is prescribed for aircraft landing at, taxiing on or taking off form an airport. The usual components are the departure, crosswind, downwind, and base legs; and the final approach

Transitional Surface - Surfaces that extend outward and upward at right angles to runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces

Universal Communications (UNICOM) - A private aeronautical advisory communications facility for purpose other than air traffic control. Only one such station is authorized in any landing area. Service available are advisory in nature primarily concerning the airport services and airport utilization. Locations and frequencies of UNICOMs are listed on aeronautical charts and publications

Visual Flight Rules (VFR) - Rules that govern flight procedures under visual conditions

Visual Runway - A runway intended for visual approaches only with no straight- in instrument approach procedure either existing or planned for that runway

COMMONLY USED ACRONYMS

AC	Advisory Circular	MALSF	Medium Intensity Approach Lighting System with Sequenced Flashers
AD	Airport Design		
ADG	Airplane Design Group	MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
AGL	Above Ground Level		
AIP	Airport Improvement Program	ME	Multi-Engine
ALP	Airport Layout Plan	MIRL	Medium Intensity Runway Lights
ALS	Approach Lighting System	MITL	Medium Intensity Taxiway Lights
ARC	Airport Reference Code	MLS	Microwave Landing System
ARP	Airport Reference Point	MOA	Military Operating Area
ARTCC	Air Route Traffic Control Center	MSL	Mean Sea Level
ASDA	Accelerate Stop Distance	NAVAID	Navigational Aid
ASR	Airport Surveillance Radar	NDB	Non-Directional Beacon
ASV	Annual Service Volume	NM	Nautical Mile
ATC	Air Traffic Control	NPIAS	National Plan of Integrated Airport Systems
ATCT	Airport Traffic Control Tower	ODALS	Omni-Directional Approach Lighting System
AWOS	Automated Weather Observation system	OFA	Object Free Area
BRL	Building Restriction Line	OFZ	Obstacle Free Zone
CAT	Category	PAPI	Precision Approach Path Indicator
CFR	Code of Federal Regulations	PAR	Precision Approach Radar
CWY	Clearway	RAIL	Runway alignment Indicator Lights
CY	Calendar Year	REIL	Runway End Identifier Lights
DME	Distance Measuring Equipment	ROFA	Runway Object Free Area
EL	Elevation	RPZ	Runway Protection Zone
EMT	Emergency Medical Technician	RSA	Runway Safety Area
FAA	Federal Aviation Administration	RVR	Runway Visual Range
FAR	Federal Aviation Regulation	RW	Runway
FBO	Fixed Base Operator	SWY	Stop-way
FSS	Flight Service System	TH	Threshold
FY	Fiscal Year	TL	Taxilane
GA	General Aviation	TODA	Takeoff Distance Available
GPS	Global Positioning System	TOFA	Taxiway Object Free Area
HIRL	High Intensity Runway Lights	TORA	Takeoff Run Available
IEMT	Intermediate Emergency Medical Technician	TSA	Taxiway Safety Area
IFR	Instrument Flight Rules	TVOR	Very High Frequency Omni range on an Airport
ILS	Instrument Landing System		
IMC	Instrument Meteorological Conditions	TW	Taxiway
LDA	Landing Distance Available	USGS	United States Geological Society
LOC	Localizer	VASI	Visual Approach Slope Indicator
MALS	Medium Intensity Approach Lighting System	VFR	Visual Flight Rules
		VOR	Very High Frequency Omni range

Appendix B

PUBLIC OUTREACH PROGRAM

Public Outreach
Community Input

The airport is so important. We have a unique opportunity to plan our airport to what and how we want to see it. Once all the improvements are done, we know it will attract business, visitors, and tourists to our region.

Crownpoint Chapter House Workshop participant

Public Outreach is a key component to the Navajo Nation Airport System Master Plan (NNASMP) Program. This activity was envisioned to provide information to Navajo Nation stakeholders, who might not otherwise, have access to the study information sources directly. A key component of this, bi-lingual outreach effort, was to provide groups with information at the locations where they traditionally met to govern their local regions; the Chapter House. The information presentations explained the purpose of the study, the airport master plan process, and the determination of airport needs. Each community had the opportunity to engage in two-way communication with the airport study team. The outcome was an in-depth and honest exchange of the community's vision, issues and recommendation for their airport and future. Each of the following topics is a summary of the wealth of information provided directly by the individual Chapter House communities.

Economic Development

A high level of input was obtained from all the study airport communities pertaining to the direction and role each airport played in their future economic development. Major economic development topics included development of business centers, attracting fixed based operators, securing bulk mail delivery centers, tourism enhancements, development of trade zones, in-land port development, and flight school businesses. Currently air medical transportation services are the dominate users of the airport system. The primary future business opportunity categories are indicated below:

Expanded Air Medical Evacuation Service
Navajo Based Recreation and Tourism Business
Community Based Recreational Vacation Sites
Development of Local Vacation Tour Industry
Airport Based Business Development

Two Chapter Houses are considering a regional approach to the future of their community airports. Of note the Shiprock community is developing a community master plan that would include a regional airport concept. The capacity of current airport locations to expand to meet future growth was also heavily discussed at Tuba City, where neighboring Chapter Houses are considering a regional approach to the airport's future growth

Infrastructure Improvements

Second only to economic development, infrastructure improvements were the most discussed topic at the community outreach meetings. Community participants called for improvements that might, in the long term, also benefit the community. Those types of improvements included water, sewer, drainage, and electrical systems; for future extensions beyond the airport boundaries. On-airport improvement discussions were centered on expanding the capacity of the runways to accept larger airplanes for future tourism business expansion and improvement medevac flight operations.

The Chapter House workshops provided the community with information on the process of evaluating existing conditions and assets at the study airports. Community leadership and members voiced their concerns about current maintenance practices and what steps would be taken to maintain any new built infrastructure

Land Withdrawal

Currently there are a number of land statuses within the Navajo Nation. The issues that arose at all the Chapter House meetings was the effect of airport improvements on current land status designations. Land use withdrawal processes can be lengthy and may require the participation of a number of Navajo Nation divisions and departments; including Navajo Nation Division of Land Resource, Bureau of Indian Affairs, Bureau of Land Management, State, County, private and other entities. Within the Chapter House's governing hierarchy, the Community Land Use Planning Committee plays a major role in approving land withdrawal and business development.

There is also the personal and emotion factor involved as land which has historically been used and/or occupied by a community or clan is proposed for development that would change its' land status and use. Addressing this issue in the NNASMP will include both identification of current land status with the airport boundaries and recommendations for actions if necessary for future improvements.

The Airport Layout Plan (ALP) prepared for each study airport will include the most current land use designation. Future recommendations for individual airport development will address current land use and proposed land use to comply with development recommendations, and regulations.

Time Frame of Study Recommendations

Many Chapter officials and members were concerned about the timeline for the current study and future development recommendations. In a number of Chapters, it was very clear that the expectation of the officials was that the study recommendations and future development must adhere to Navajo governance tenants, which include process representation and Chapter Acceptance Resolution.

Participation by the Community in Airport Development

Chapter House officials and local activist attended the Chapter House Workshops. As information begins reaching more community members and the Program develops more input from the Public Advisory Committees, each community will become more vested in fully participating and contributing to the outcomes and recommendations of the airport study.

Security

There was much discussion by local residents of night landings and suspicious behavior at many of the airports. While anecdotal in nature, security of rural airport property was a very important issue for local communities, who see these occurrences as inappropriate and possibility illegal activities. In addition, overflights of culturally sensitive areas were a concern of both Chinle and Crownpoint Chapters. The communities expressed a strong desire that sensitive areas be protected as the plans move forward to development airport system wide improvements

Local Presence, Management and Maintenance

Currently, except for Window Rock Airport, management and maintenance of the study airports is centralized within the Navajo Department of Transportation. This centralization currently makes the best use of resources under today's budgetary constraints and staffing limitations. Many of the Chapter

House workshop attendees would like to see more local management and maintenance, especially as airports are developed.

Self-sufficiency, Education and Training

As workshop attendees vocalized their wishes for more local management and maintenance of their local airport sites; they began to realize that having qualified aviation professionals within their communities would require engaging local colleges and encouraging curriculum that would foster the skill sets necessary to effective airfield operations and maintenance.

A suggestion was made by the Crownpoint Workshop group, to engage the Crownpoint University and Work Force Development organizations to develop airport operations and pilot training curriculums. Bringing these curriculums to university branches on the Navajo Nation would encourage and recruit more Navajo students into the aviation professions.

Satisfaction with Airport's Name

The power of a name and its value has long been recognized as being influenced by a place/person character or identity. Chapter House workshop participants were asked to voice their satisfaction with their region's airport name. Based on the written response and the vocal objects to a number of airport's current names, a through categorization and analysis of suggested changes will become part of the reporting content of the Working Papers and final reports. Of note, most proponents of airport name changes, seek names that reflect their Navajo language heritage and future more regional and/or global identities.

Appendix C

CHAPTER RESOLUTIONS

Chinle Chapter Government

THE NAVAJO NATION

RESOLUTION OF THE CHINLE CHAPTER
NAVAJO NATION
CHIN-AUG-14-051

SUPPORTING THE PLANNING AND DEVELOPMENT OF THE CHINLE AIRPORT FOR INCLUSION IN THE NAVAJO NATION AIRPORT SYSTEM MASTER PLAN FOR SUBMITTAL TO THE FEDERAL AVIATION ADMINISTRATION NATIONAL AIRPORT CAPITAL IMPROVEMENT PROGRAM FOR FUTURE FEDERAL FUNDING.

WHEREAS:

1. Chinle Chapter, a recognized certified local government of the Navajo Nation, vested with the power and authority to advocate on behalf of its constituents for the improvement of health, education, safety, and general welfare; and
2. The Chinle Chapter community members participated in a Navajo Department of Transportation workshop on July 31st, 2014, which provided opportunity for community members to make comments and recommendations concerning the future of the local airport, and
3. The Navajo Department of Transportation is authorized by the Navajo Nation Council and Federal Aviation Administration to conduct community outreach and airport evaluation concerning the future of five (5) airport development needs of the Navajo Nation, and
4. The Navajo Department of Transportation requests community representative to serve on the public Advisory Committee of the airport, Navajo Nation System Master Plan (NNSMP) to serve as point of contact and communicator for the local community.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Chinle Chapter hereby supports the planning and development of the Chinle Airport for inclusion in the Navajo Nation Airport System Master Plan for submittal to the Federal Aviation Administration National Airport Capital Improvement Program for future Federal funding.
2. The Chinle Chapter approves Danny Wilson Halwood Jr. (Project Coordinator) to act as the Chinle Chapter representative to serve on the Public Advisory Committee of the Navajo Nation Airport System Master Plan (NNASMP) to serve as a point of contact and communicator for the local community.

CERTIFICATION

We, hereby certify that the foregoing chapter resolution was duly considered by the Chinle Chapter at a duly called meeting in Chinle, Navajo Nation (Arizona) at which a quorum was present and that the same was passed by a vote of 25 in favor, Ø opposed, and 3 abstained, this 17th day of August 2014.

Motioned by: ROSELYNE YAZZIE

Second by: TIMOTHY BEGAY

Andy R. Ayze, President

Myron McLaughlin, Vice President

Cynthia Hunter, Secretary / Treasurer

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PHONE: 928-871-7842 - FAX: 871-3023

Curran Hannon, President
Alfred Mike, Sr., Vice-President
Gloria Smiley, Secretary/Treasurer
Jonathan Hale, Council Delegate
Joseph Peshlakai, Grazing Official
Russell Gould, CSC
Teresa Tabaha, AMS

Ben Shelly, Navajo Nation President
Rex Lee Jim, Navajo Nation Vice President

RESOLUTION OF THE St. Michaels CHAPTER

The StMichael Chapter supports the planning and development of the WindowRock Airport for inclusion in the Navajo Nation Airport System Master Plan (NNASMP) for submittal to the Federal Aviation Administration (FAA) national Airport Capital Improvement Program for future Federal funding.

WHERE AS:

1. The St. Michaels Chapter is a recognized chapter of the Navajo Nation, and is the delegated government authority with respect to local matters consistent with Navajo Laws, including customs, traditions and Local matters, and
2. Pursuant to Resolution No. CAP-34-98, the Navajo Nation Council adopted the Navajo Nation Local Governance Act (LGA), Title 26 of the Navajo Nation Code, which directs local chapters to promote all matters that affect the local community members and to make appropriate decisions, recommendations advocate on their behalf; and
3. The St Michaels Chapter community members participated in a Navajo Department of Transportation workshop on date which provided opportunity for community members to make comments and recommendations concerning the future of the local airport, and
4. The Navajo Department Of Transportation is authorized by the Navajo Nation Council and Federal Aviation Administration to conduct community outreach and airport evaluation concerning the future of five (5) airport development needs of the Navajo Nation; and
5. The Navajo Department of Transportation requests a community representative to serve on the Public Advisory Committee of the airport Navajo Nation Airport System Master Plan (NNASMP) to serve as point of contact and communicator for the local community.

NOW THEREFORE BE IT RESOLVED:

1. The St Michaels Chapter supports the planning and development of the up grade Airport for inclusion in the Navajo Nation Airport System Master Plan (NNASMP) for submittal to the Federal Aviation Administration (FAA) national Airport Capital Improvement Program for future Federal funding; and
2. The St Michaels Chapter approves up grade ___ to act as the St Michael Chapter representative to serve on the Public Advisory Committee of the Navajo Nation Airport System Master Plan (NNASMP) to serve as a point of contact and communicator for the local community.

CERTIFICATION

We hereby certify that the foregoing resolution was duly considered by the St Michaels Chapter at a duly called meeting at the ___________ at which a quorum was present and that the same was passed by a vote of 44 in Favor, and 0 Opposed, 4 Abstained on the 10th day of Aug., 2014.

MOTIONED: Brian UpShaw SECONDED: Joe Lee YAZZIE

Chapter President

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(Tuba City Chapter Resolution to be inserted)

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(Crownpoint Chapter Resolution to be inserted)

08-11-14-065-SHIP

Resolution of the Shiprock Chapter

SHIPROCK, NAVAJO NATION

SUPPORTING THE PLANNING AND DEVELOPMENT OF THE TSE'BIT'AI REGIONAL AIRPORT FOR INCLUSION IN THE NAVAJO NATION AIRPORT SYSTEM MASTER PLAN (NNASMP) FOR SUBMITTAL TO THE FEDERAL AVIATION ADMINISTRATION (FAA) NATIONAL AIRPORT CAPITAL IMPROVEMENT PROGRAM FOR FUTURE FEDERAL FUNDING

WHEREAS:

1. The Shiprock Chapter of the Navajo Nation acts on this resolution pursuant to the authority conferred upon the chapter through Navajo Nation Code title 26, Chapter 1, Section 1, Part B which states, "Through adoption of this Act, the Navajo Nation Council delegates to chapters governmental authority with respect to local matters consistent with Navajo Nation laws, including customs and tradition"; and

2. Shiprock Chapter community members participated in a Navajo Department of Transportation workshop on August 05, 2014 which provided opportunity for community members to make comments and recommendations concerning the future of the local airport; and

3. The Navajo Department of Transportation is authorized by the Navajo Nation Council and Federal Aviation Administration to conduct community outreach and airport evaluation concerning the future of and the development needs of the five (5) airport located on the Navajo Nation; and

4. The Navajo Department of Transportation requests a community representative to serve on the Public Advisory Committee of the Navajo Nation Airport System Master Plan (NNASMP) to serve as point of contact and liaison for the local community.

NOW THEREFORE BE IT RESOLVED THAT:

1. The Shiprock Chapter membership recommends and supports the planning and development of the Tse'bit'ai Regional_Airport for inclusion in the Navajo Nation Airport System Master Plan (NNASMP) for submittal to the Federal Aviation Administration (FAA) National Airport Capital Improvement Program for future Federal finding; and

2. The Shiprock Chapter members appoints the Shiprock Planning Commission Chairperson, Viviene Tallbull to act as the Shiprock Chapter representative to serve on the Public Advisory Committee of the Navajo Nation Airport System Master Plan (NNASMP) to serve as a point of contact and liaison for the Shiprock community.

Motioned by: Charley P. Joe

Seconded by: William Lee

CERTIFICATION

We hereby certify that the foregoing resolution was presented and considered at a duly called Chapter meeting at which a quorum was present and that the same was approved by a vote of 32 in favor, -0- opposed and -0- abstentions on this 11th day of August, 2014.

Duane H. Yazzie, President

Dr. J. Kaibah Begay, Secretary/Treasurer

Tommie Yazzie, Vice-President

Russell Begaye, Council Delegate

Appendix D

GRANT PROGRAM GUIDE

Grant Program Guide

1. OVERVIEW
   Introduction
2. DESCRIPTION OF GRANT PROGRAMS
   A. FEDERAL AVIATION ADMINISTRATION (FAA)
      1. AIRPORT IMPROVEMENT PROGRAM OVERVIEW
         a) Authorizing Legislation
         b) Funding Breakdown
   B. ARIZONA DEPARTMENT OF TRANSPORTATION (ADOT)
      1. AVIATION FUND
         a) Authorizing Legislation
         b) Funding Breakdown
   C. NEW MEXICO DEPARTMENT OF TRANSPORTATION (NMDOT)
      1. NM FUNDING
3. FIVE-YEAR AIRPORT CAPITAL IMPROVEMENT PROGRAM
   A. PROGRAM DEVELOPMENT
   B. KEY DATES
4. FUNDING PROCESS
   A. FAA PROCESS
   B. ADOT PROCESS
   C. NMDOT PROCESS
   D. PROCESS FLOWCHART
5. GRANT APPLICATIONS FORMS
   A. FAA
   B. ADOT
   C. NMDOT
6. STANDARD GRANT AGREEMENT FORMS
   A. FAA
   B. ADOT
   C. NMDOT
7. GRANT ASSURANCES AND REQUIREMENTS
   A. REFERENCE ADVISORY CIRCULARS
   B. ADOT AIRPORT DEVELOPMENT GUIDELINES
   C. NMDOT GRANT GUIDE
8. REIMBURSEMENT PROCESS
   A. DELPHI E-INVOICING
   B. ADOT REIMBURSEMENT FORM
   C. NMDOT REIMBURSEMENT FORM
9. GRANT AWARD LETTER EXAMPLES
10. BEST PRACTICES GUIDES

Appendix E

ARIZONA SENATE BILL 1317 — AUTHORIZING FUNDING BILL

HOUSE OF REPRESENTATIVES
SB 1317 tribal airports; state aviation fund

OVERVIEW
SB 1317 adds Indian Reservations as eligible entities for the State Aviation Fund (Fund) for projects related to publicly owned and operated airport facilities.

HISTORY
Arizona Revised Statutes (A.R.S.) § 28-8202 establishes the Fund. The Fund consists of aviation fuel taxes or motor vehicle fuel taxes deposited by the Arizona Department of Transportation (ADOT), monies deposited from the sale of abandoned aircraft, flight property taxes, registration fees, license taxes and penalties, and monies received from the operation of airports. ADOT is required to distribute the monies that are appropriated by the Legislature. Currently, statute requires monies to be appropriated from the Fund for planning, designing, developing, acquiring of interests in land, construction, and improvement of publicly owned and operated airport facilities in counties and incorporated cities and towns. In this context, publicly owned and operated airport facility means an airport and appurtenant facilities in which one or more agencies, departments or instrumentalities of this state, or a city, town, or county of this state holds an interest in the land on which the airport is located that is clear of any encumbrance that might preclude or interfere with possession, use, or control of the land for public airport purposes for a minimum period of twenty years.

State of Arizona Senate
Fifty-first Legislature
First Regular Session 2013

Introduced by:
Prime Sponsor Senators Jackson Jr., Farley, Lopez
Prime Sponsor Representatives Gonzales, Peshlakai, Steele
Co-Sponsor Senators Bradley, Cajero, Bedford
Co-Sponsor Representative Dalessandro

Chapter 239, Senate Bill 1317

Be it enacted by the Legislature of the State of Arizona:
Section1. Section 28-8202, Arizona Revised Statutes, is amended to read:
START STATUTE28-8202. State aviation fund

A. A state aviation fund is established consisting of the following:

1. Aviation fuel taxes or motor vehicle fuel taxes deposited by the department.
2. Monies deposited by the department as a result of the sale of an abandoned aircraft as defined in section 28-8243 or seized aircraft.
3. The amount of flight property tax that the department of revenue has deposited pursuant to section 42-14255.
4. Registration fees, license taxes and penalties collected pursuant to article 4 of this chapter.
5. Monies received by the department from the operation of airports under this article and articles 2 through 5 of this chapter.

B. On notice from the department, the state treasurer shall invest and divest monies in the state aviation fund as provided by section 35-313, and monies earned from investment shall be credited to the fund.

C. The department shall administer monies that are appropriated by the legislature from the state aviation fund.

D. The board shall distribute monies appropriated to the department from the state aviation fund for planning, design, development, acquisition of interests in land, construction and improvement of publicly owned and operated airport facilities in counties, incorporated cities and towns and indian reservations. The board shall distribute these monies according to the needs for these facilities as determined by the board. No more than ten per cent of the average annual revenue that the fund received for the past three years may be awarded to any one airport in grants in any fiscal year. For the purposes of this subsection, "publicly owned and operated airport facility" means an airport and appurtenant facilities in which one or more agencies, departments or instrumentalities of this state, a city, town or county of this state or an indian tribe or tribal government holds an interest in the land on which the airport is located that is clear of any reversionary interest, lien, easement, lease or other encumbrance that might preclude or interfere with the possession, use or control of the land for public airport purposes for a minimum period of twenty years.

Appendix F

AIRFIELD INVENTORY REPORTS AND PHOTOGRAPHS

Chnle Airport – Approach to Runway 18

Approach end of Runway 18 looking north
No obstructions within the Part 77 imaginary surfaces
Markings are weathered and faded
Pavement is in fair condition, however there is surface cracking over 60% of the runway

Approach end of Runway 18 looking south. Departure end fairly clear with low hills in the distance. No close in obstructions off the side of the runway.

A closer look at Runway 18 end looking north. An example of longitudinal pavement cracking prevalent down the runway short of 1500 feet from south end.

Areas of Concern - Runway 18/36

Extensive cracking throughout the runway surfaces, most with vegetation established inside of the cracks.

Lateral cracking with vegetation beginning to work its way into most of the cracks.

Longitudinal cracking full length of the runway

Approach to Runway 36

Approach end of Runway 36 looking north No obstructions within the Part 77 imaginary surfaces. Markings are weathered and faded and pavement is in fair condition.

Runway 36 looking South. Pavement cracking and vegetation within cracks are in evidence. Pavement is in fair condition.

Evidence of pavement failure on north end of the runway. Possible subgrade issues.

Taxiway Markings

Taxiway hold bars. Markings are in poor condition

Lead in lines show recent painting but hold bars are badly faded.

Close up of marking and asphalt cracking and vegetation on North end of the runway.

NAVAID's and Lighting

Windsock and segmented circle. Facilities were in good condition.

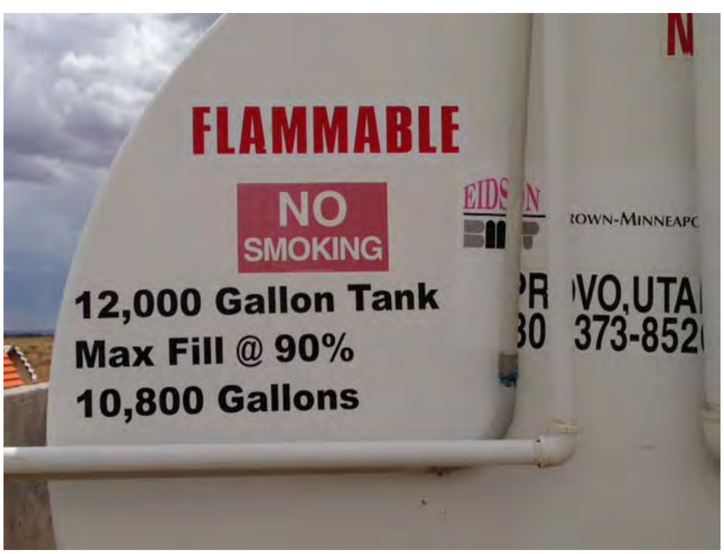
Two box VASI system. Facilities were in fair condition.

Runway lighting appears to be in fair condition. Lighting system appears to be in cans as opposed to stake mounted.

Facilities

Generator building and rotating beacon.

Fuel farm and containment structure. Privately owned by Air Med operator.



Close up of 12,000 Gallon Jet-A fuel tank.

Window Rock Airport – Approach to Runway 20

Approach end of Runway 02 looking to the North. Marking are very poor and faded.

Taxiway tie in to Runway 20. Pavement in fair condition. Markings are very poor and faded.

Threshold of Runway 20 looking to the South. Pavement cracking is prevalent throughout the length of the runway.

Areas of Concern

Typical cracking patterns throughout the length of the runway.

Vegetation issues on runway shoulder areas.

Cracking and possible pavement failure issues at mid-field on Runway 02/20.

Areas of Concern

Taxiway to Runway 20 exhibits cracking with vegetation growing into the cracks.

Runway lights are stake mounted and vulnerable to rodent damage.

Taxiway lights are also stake mounted and vulnerable to rodent damage.

Facilities

Fuel Farm. Property of the Navajo Nation.

Large maintenance hangar, and Terminal Building.

Terminal Building and Pilot Services

Facilities

Terminal Signage.

Interior of Navajo Nation Hangar.

Exterior of Navajo Nation Hangar.

NAVAID's, Lights and Weather Systems

VASI System. Poor condition.

REIL System. Fair to Good condition.

AWOS – Automatic Weather Observation System

Tuba City Airport – Approach to Runway 15

Approach end of Runway 15 looking north
No obstructions within the Part 77 imaginary surfaces
Markings are weathered and faded
Pavement is in fair condition, however there is surface cracking over 60% of the runway

Approach end of Runway 15 looking south. Departure end fairly clear with low hills in the distance. No close in obstructions off the side of the runway.

A closer look at Runway 15 end looking south. An example of longitudinal pavement cracking prevalent down the runway short of 1500 feet from south end.

Areas of Concern - Runway 15

Approximately 1,500 feet south of the approach end of Runway 15, a large section of cracked, rough and heaved pavement. Possibly the result of expansive soils in the pavement sub-grade.

Major crack and associated heaving occurring transverse across the runway.

A couple of rounded "humps" have also developed that extend two or three inches above the pavement grade.

NOTAM for this area: "Rough Pavement"

Wide Block Cracking with old crack seal

vegetation growing through cracks

Looking north from mid field, vegetation has begun to work its way into the open cracks

West side of the runway at mid field a section of the shoulder has begun to crack and fail.

Considerable vegetation has invaded the cracking pavement in several areas.

Approach to Runway 33

Look South from the last 1000 feet of Runway 33. These pavements appear to be newer than the rest of the runway. An apparent extension south of the Taxiway into the parking area.

From threshold of Runway 33 looking south. Markings are faded however pavement appears to be in better condition than the north end.

Looking North from the threshold of Runway 33.

Taxiway and Aircraft Parking Area

Taxiway Lead-in Line and Hold Bars located on the South end of the runway.

Aircraft Parking and Tie-down area. Approximately a dozen tie down sites.

Aircraft parking area, and generator building.

Airport NAVAID's

Wind Sock is located on the West side of the airfield and appears to be in good condition.

Airport is equipped with VASI lights on both ends of the runway. They are operational and in good condition.

Airport has an operational rotating beacon that appears to be reasonably new and in good shape.

Crownpoint Airport – Approach to Runway 18

Approach end of Runway 18 looking south.
Example of longitudinal cracking in foreground.
A large dip in the runway occurs at mid field.

Runway 36 end looking North.

Major crack occurring transverse across the runway. Vegetation in cracks is becoming an issue.

Areas of Concern

Pavement conditions are fair throughout the runway length.

Shoulder areas rise slightly to the west of the runway. Possible intrusion into the 7 to 1 transition side slope.

mple of cracking and potential halt failure near mid=field.

Areas of Concern

Pavement markings are badly faded.

Electrical control panel. Good Condition

Airport Beacon.

Navaids and Lights

PLASI Approach Light

egmented Circle

Lighted Wind Sock

Navaids and Lights

Stake mounted runway end light.

Entry Gate.

Shiprock Airport – Approach to Runway 02

Approach end of Runway 02 looking north. No obstructions within the Part 77 imaginary surfaces. Markings are weathered and faded. Pavement is in fair to poor condition, however there is surface cracking over majority of the runway

Approach end of Runway 2 looking south. Departure end fairly clear. No close in obstructions off the side of the runway.

A closer look at Runway 2 end shows an example of longitudinal pavement cracking prevalent down the runway.

Areas of Concern - Runway 02/20

Looking towards mid field many lateral cracks are visible in the runway.

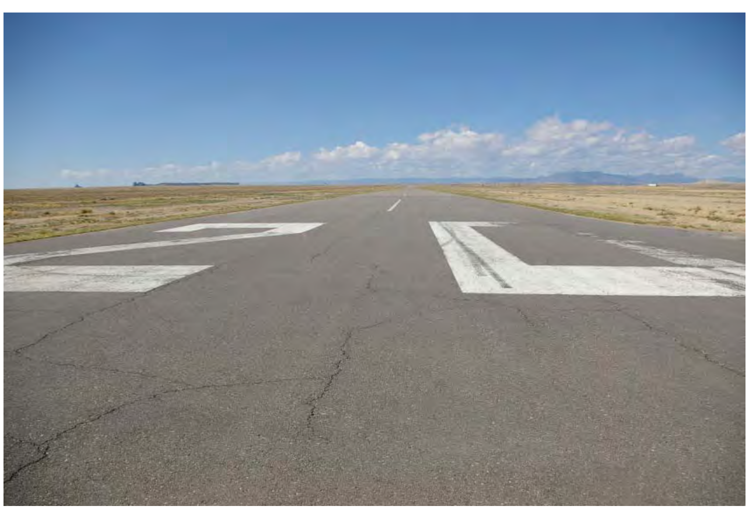
Example of lateral crack in the runway filled with dirt and some vegetation.

Runway cracks have been crack sealed in past years, but continue to widen requiring additional crack seal or repair.

Areas of Concern - Runway 02/20

Example of both longitudinal and lateral cracking present throughout the runway.

Center line markings are faded and in poor condition.



Runway 20 approach looking down the runway. Pavement cracking is evident and in need of crack sealing.

Areas of Concern – Runway 02/20

View from the approach end of runway 20. No apparent close in obstructions

Parallel Taxiway with widespread cracking. Pavements is fair condition, with previous crack seal applications in evidence.

Additional view of partial parallel taxiway looking to the south.

Facilities

Entry gate off of highway.

Unlighted wind sock.

Segmented circle assembly.

Facilities

Airport beacon. Appears to be non-operational

Airport entry sign.

OUR BUSINESS IS AVIATION. OUR PRIORITY IS YOU.

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