

CHAPTER 5

SYSTEM ADEQUACY ANALYSIS

CHAPTER 5 – SYSTEM ADEQUACY ANALYSIS

The previous chapter of the Nebraska Aviation System Plan identified and described the process used to stratify the airport system based on demand for aviation services. Following the demand evaluation, functional roles were developed for the airports, and facility and service standards were established. Airports were classified as being in one of four functional categories: National, Regional, Local, and Limited. Exhibit 4-1 (previous chapter) graphically depicted the distribution of system airports among these four functional categories.

Chapter One identified a process to evaluate the existing performance of the Nebraska airport system based on goals or criteria and specific objectives or benchmarks. Four system performance criteria categories were identified:

- ❑ Access
- ❑ Economic
- ❑ Physical
- ❑ Social/Cultural

Within these four categories, specific benchmarks or objectives were developed to measure the airport system's performance for the four goal categories. This chapter presents the analysis of the measurement process to determine the adequacy of Nebraska's existing airport system. Based on the results of the adequacy analysis, the next task in the Nebraska Aviation System Plan will determine where enhancements to the State's airport system may be warranted, and will also identify and review available options for undertaking such enhancements.

This chapter is organized to review system performance criteria and the benchmarks associated with each as follows:

Performance Criteria – ACCESS

- ❑ Airports Serving Population Centers
- ❑ Airports Accommodating Medical Flights
- ❑ All-Weather/Instrument Coverage
- ❑ Surface Access of Airports

Performance Criteria – ECONOMIC

- ❑ Airports Serving Economic/Trade Centers
- ❑ Airports Meeting Business/Air Cargo Needs
- ❑ Airports Meeting Agricultural Aviation Needs

Performance Criteria – PHYSICAL

- ❑ Airports Meeting Minimum Facility and Service Standards
- ❑ Airports Meeting FAA Operational Capacity Guidelines
- ❑ Airports Meeting PCI Goals

Performance Criteria – SOCIAL CULTURAL

- ❑ Airports Serving Tourism/Cultural Centers
- ❑ Airports Serving More Isolated Areas

The following sections of this chapter discuss the system performance criteria with their associated benchmarks. The ability of Nebraska’s airport system to comply with each of the benchmarks is also noted.

ACCESS

Four objectives were identified for the access goal category. An adequate airport system provides reasonable access to its users. In general terms, access refers to the ability of the airports to be accessed from the ground and from the air. Access is sometimes referred to as “coverage,” especially as it relates to the ability of people to access an airport on the ground in terms of driving time or distance.

Each of the four objectives is discussed below.

Airports Serving Population Centers

It is reasonable to assume that airports should be located in proximity to existing and potential users. To determine the service coverage of airports, analyses of drive times from each of the existing airports were performed using a Geographic Information System (GIS). This system is a map-based system in which driving speeds are assigned to various roads and a mathematical process is used to calculate the distances that can be driven from the airports in a given time period. These calculations result in the development of drive time or coverage shapes for each airport.

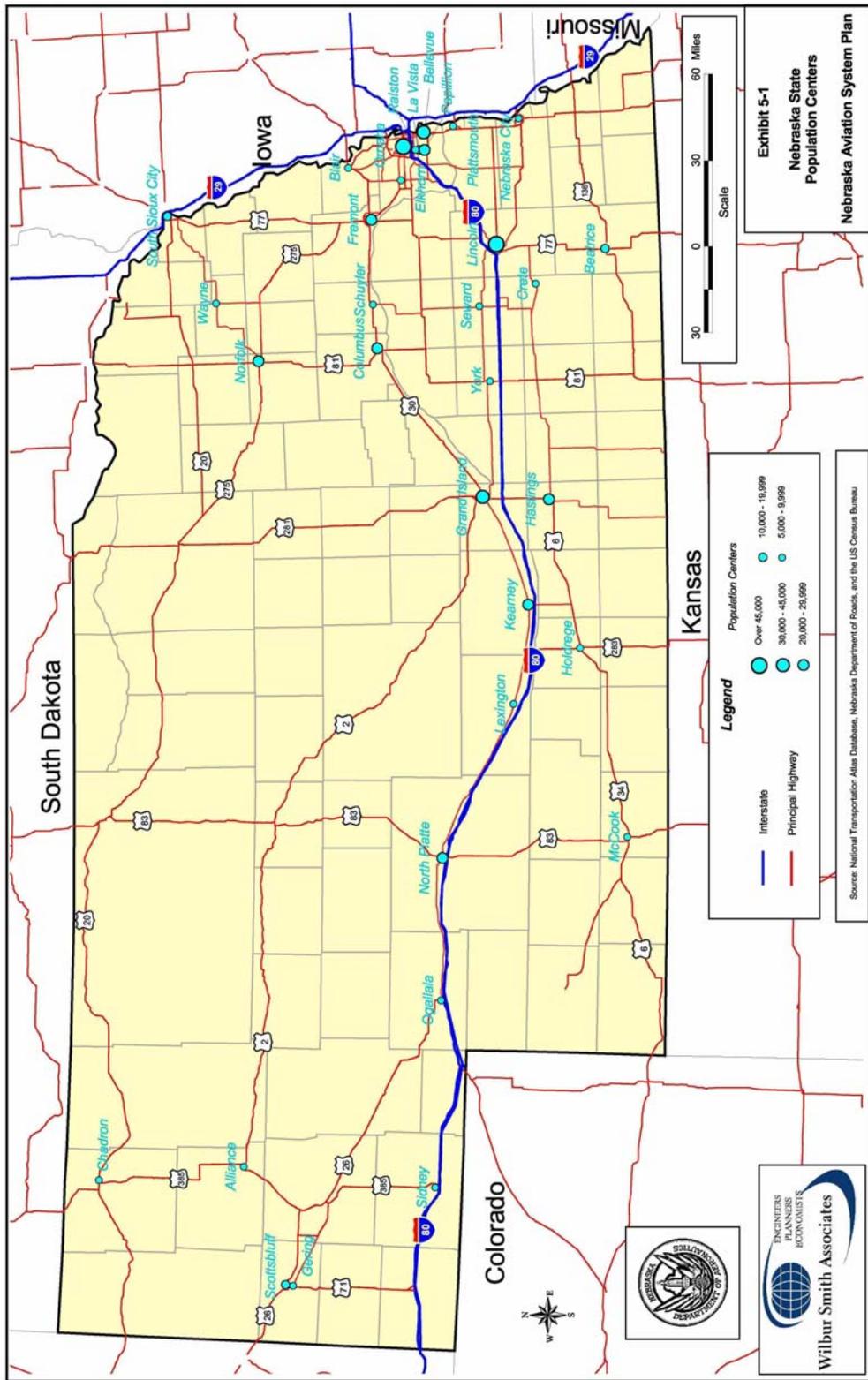
For purposes of this analysis, 30-minute drive times were used for all airports. FAA guidelines indicate that, as a general rule, general aviation airports should be located within 30 minutes of their users. Airports with scheduled airline service typically have larger service areas because users are more willing to drive further to access the national air transportation system via scheduled commercial airlines. Airports such as Omaha may have a service area of more than 200 miles as it relates to scheduled airline service and the distance people are willing to drive to use this service. This is especially true when interstate access is provided to the airport. The presence of Interstate 80 and the accessibility of the commercial airports serving Lincoln and Omaha help to expand this service area beyond the traditional 30-minute general aviation drive time.

The focus of this study, however, is on general aviation. While larger service areas are likely for the commercial service airports, the analysis of drive times was based on access to general aviation facilities. In the NASP, specific delineation of commercial service was not examined because the emphasis of the study is on aviation services as a whole. Therefore, 30-minute drive times were used for all system airports.

In addition to Nebraska airports, there are airports located outside the State, but near the border, that also provide air access to residents of Nebraska. These include the border states of South Dakota, Iowa, Missouri, Kansas, Colorado, and Wyoming. These airports and the coverage they provide to the State are examined in a subsequent chapter.

Through coordination with NDA and the PAC, it was determined that population centers of 5,000 or more persons would be used as the baseline for aviation service needs. Any area identified as having a population of at least 5,000 persons was identified as needing access to a higher level of aviation service. For purposes of this analysis, the higher level was determined to be access to a National or Regional airport. **Exhibit 5-1** depicts the population centers in Nebraska with at least 5,000 persons. The next step

EXHIBIT 5-1



was to determine aviation service provided to these centers. **Exhibit 5-2** presents the population centers along with the composite 30-minute drive times for system airports in Nebraska identified as National and Regional. As shown in this exhibit, there are no population centers of 5,000 or more that lie outside the service areas for the existing airport system. There are, however, numerous airports that fall in the other two categories (Local and Limited) located throughout the State that serve population centers of less than 5,000 persons.

The next analyses examined the coverage of the airports by category to determine how the existing classification system served the State as a whole, both in population served, as well as geographic land area encompassed within the 30-minute drive times from the various airports. **Exhibit 5-3** depicts the coverage provided by the airports currently classified as National. As shown, a concentration of National airports exists in eastern Nebraska, especially around Omaha. But the remainder of the National airports provides coverage along the I-80 corridor and serves the major population centers of the State. As noted on Exhibit 5-3, approximately 1,309,858 persons or 78.4 percent of the State's total population resides within 30 minutes driving time from the airports identified as National. In terms of land area, National airports only cover 27 percent of the State's geographic area with the identified 30-minute drive times from the 17 Nebraska National airports.

Exhibit 5-4 provides the coverage by the airports currently classified as Regional. For Regional airports there is also a concentration in eastern Nebraska along the Missouri River and the I-80 corridor, with much overlapping coverage near the cities of York, Cozad, Nebraska City, and Grant. The remainder of the Regional airports are scattered across the northern half of the State. Since the majority of the population centers occur along the river and I-80 corridor, this type of facility services the majority of the State's population. Exhibit 5-4 reports that approximately 1,244,405 persons or 74.5 percent of the State's total population resides within 30 minutes driving time from the airports identified as Regional. It should be noted that these service areas overlap much of the coverage provided by the airports identified as National. The population and geographic region identified for the Regional airports is not additional to the population or land area covered by the National airports. This is also true for the Local and Limited airports. The Regional airports provide coverage to 37 percent of the State's land area.

Exhibit 5-5 displays the coverage provided by the airports currently classified as Local. As shown, Local airports are spread out almost evenly across the State, with overlaps occurring in the northeast region, near Ord in the central part of the State, and near Superior in the south-central region. Exhibit 5-5 also shows that approximately 284,606 persons or 17 percent of the State's total population resides within 30 minutes driving time from the airports identified as Local. These airports are dispersed farther across the State, as evidenced by the fact that these airports provide coverage to 40 percent of the State's land area.

Exhibit 5-6 provides the coverage by the airports currently classified as Limited. Limited airports are located in the eastern half of the State, with overlaps occurring in the east-central region near Utica and in the southeast part of the State near Tecumseh. Exhibit 5-6 also illustrates that approximately 356,716 persons or 21.3 percent of the State's total population resides within 30 minutes driving time from the airports identified as Limited. The Limited airports provide coverage to approximately 30 percent of the State's land area.

Exhibit 5-7 depicts the overall coverage provided by the four airport classifications with shading depicting the various coverages provided by the four airport classifications. As identified, when combining the airports and discounting the overlaps, the 90 airports that comprise the Nebraska Aviation System serve 98.9 percent of the State's population and 84 percent of the State's land area. This indicates that nearly all of the State's population has adequate access to general aviation airport services provided

EXHIBIT 5-2

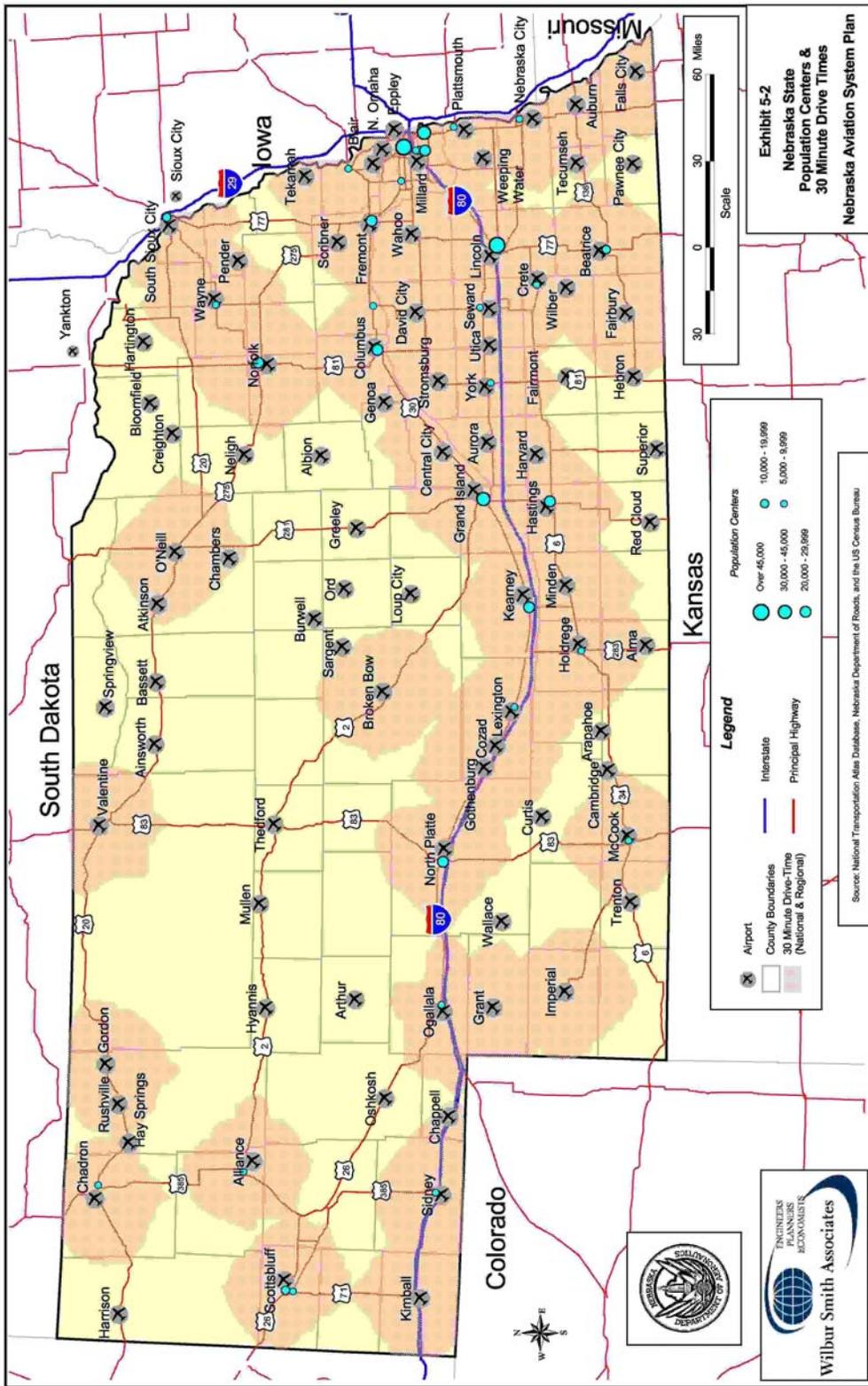


EXHIBIT 5-3

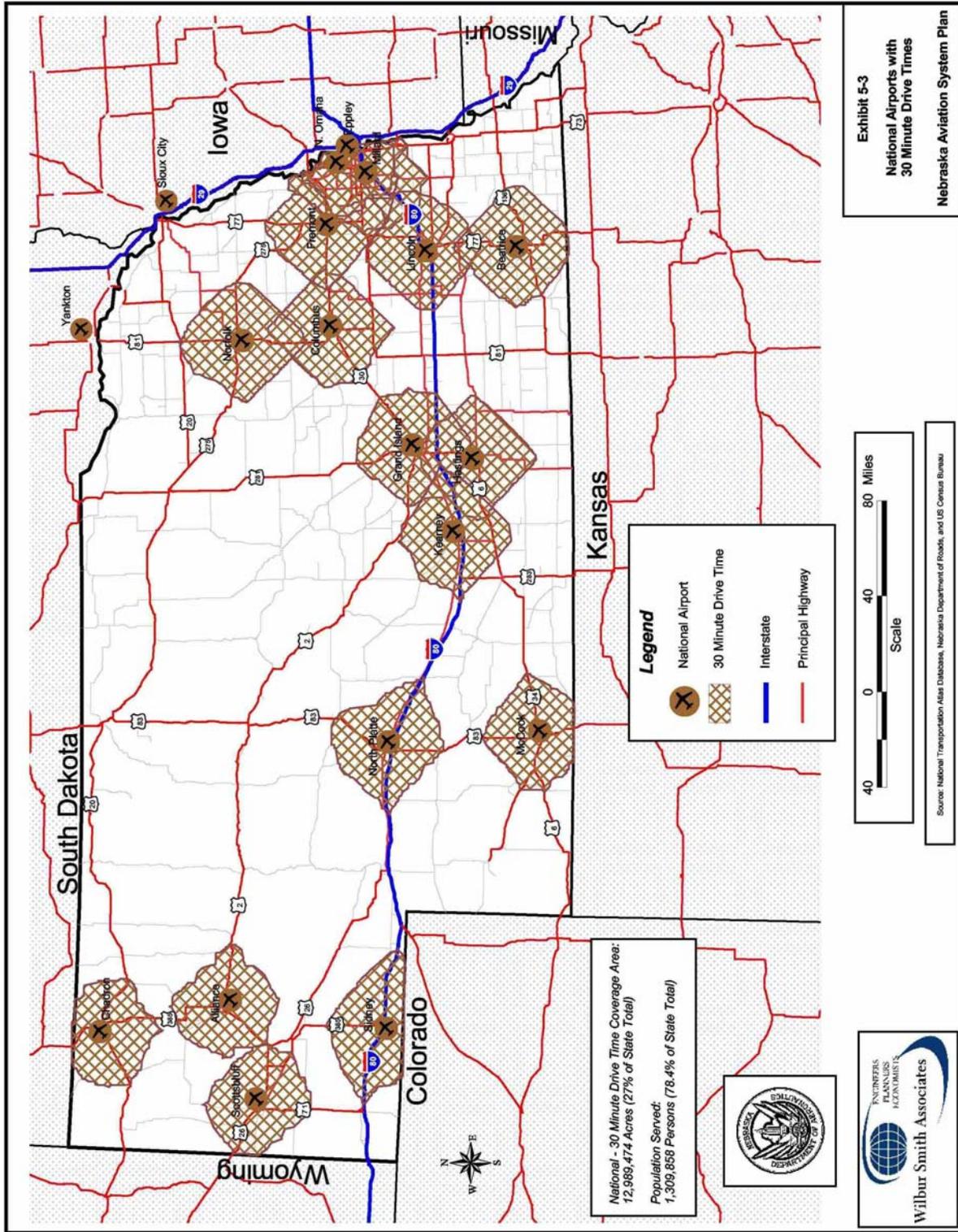


Exhibit 5-3
National Airports with
30 Minute Drive Times
Nebraska Aviation System Plan

EXHIBIT 5-4

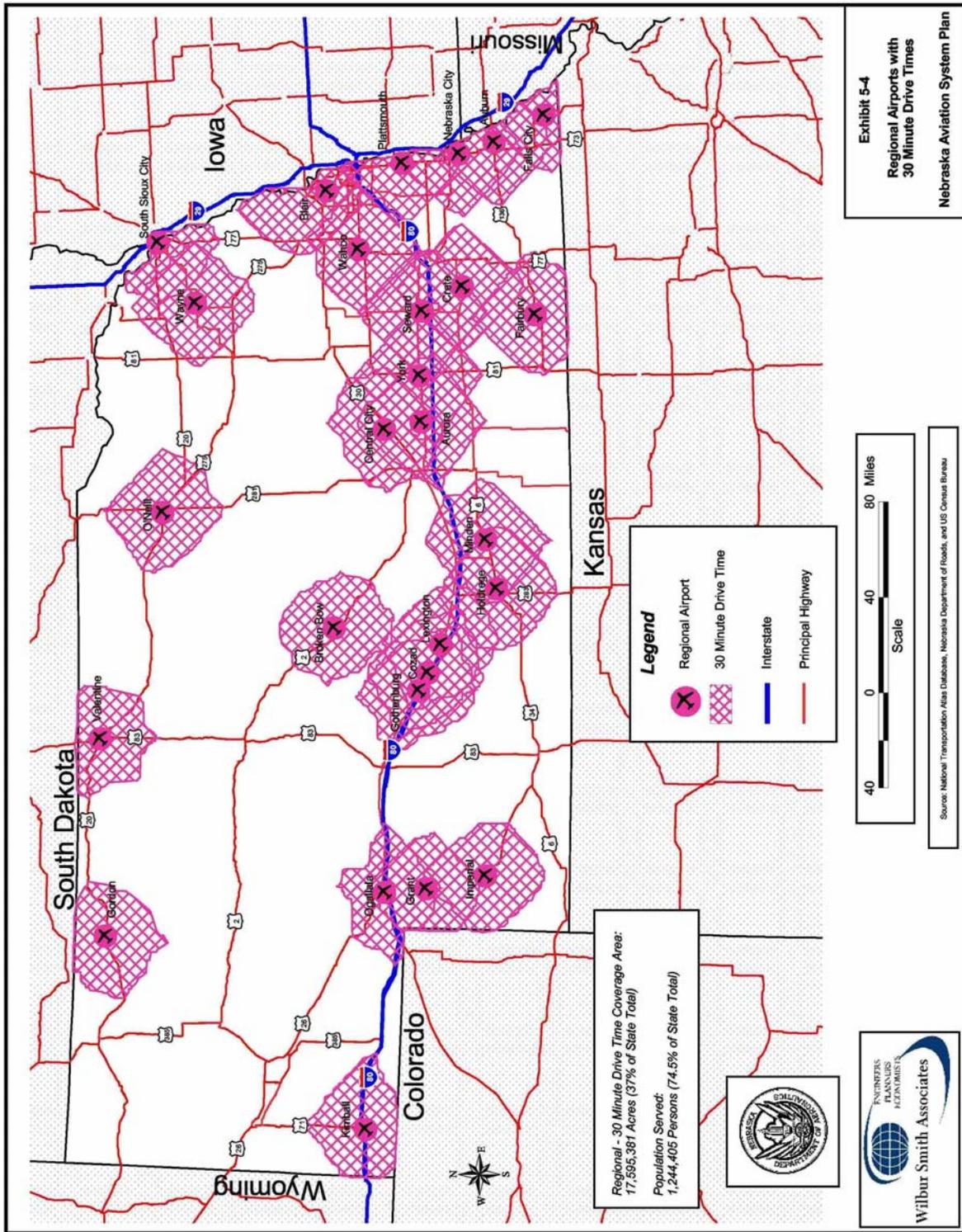


Exhibit 5-4
Regional Airports with
30 Minute Drive Times
Nebraska Aviation System Plan

EXHIBIT 5-5

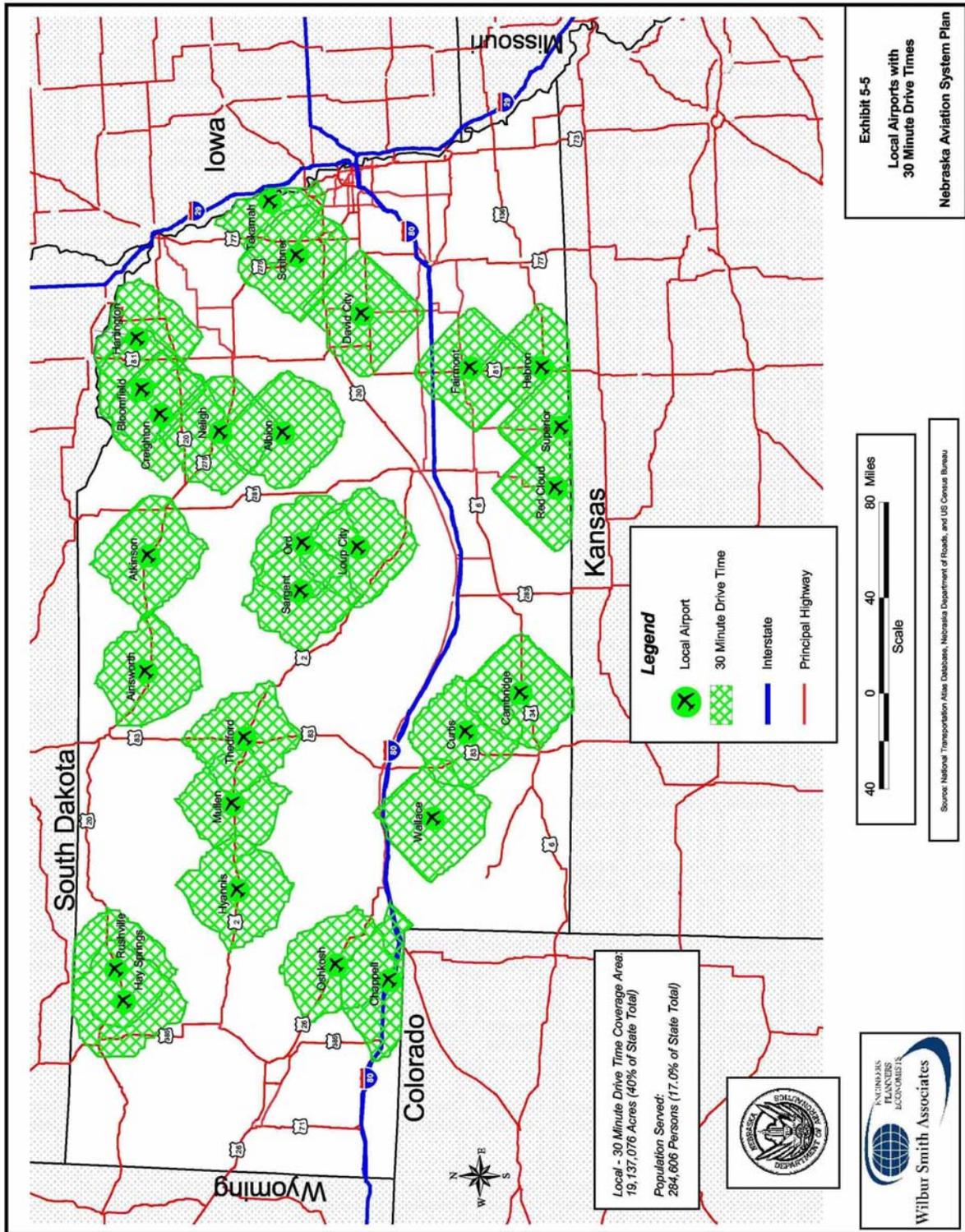


EXHIBIT 5-6

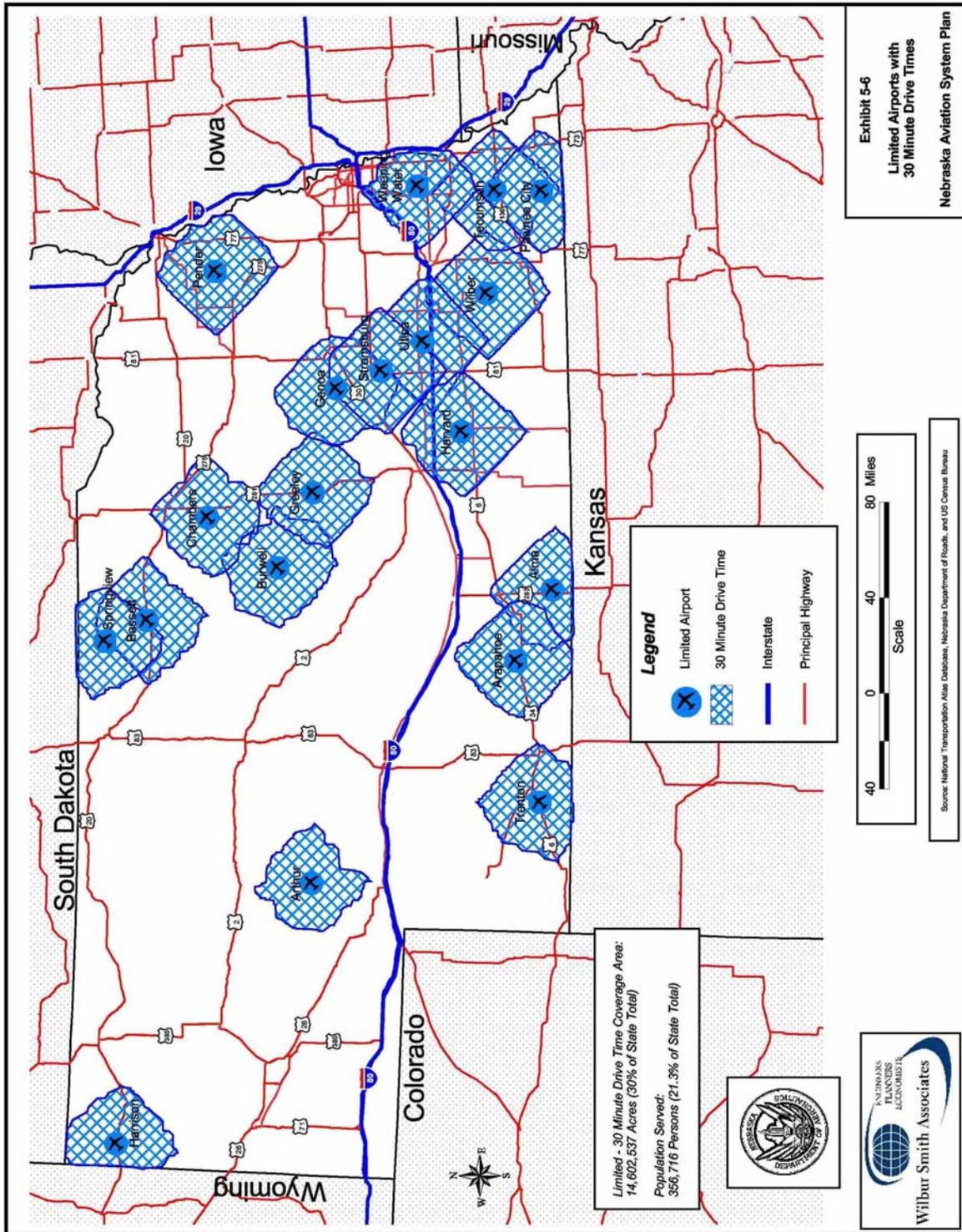
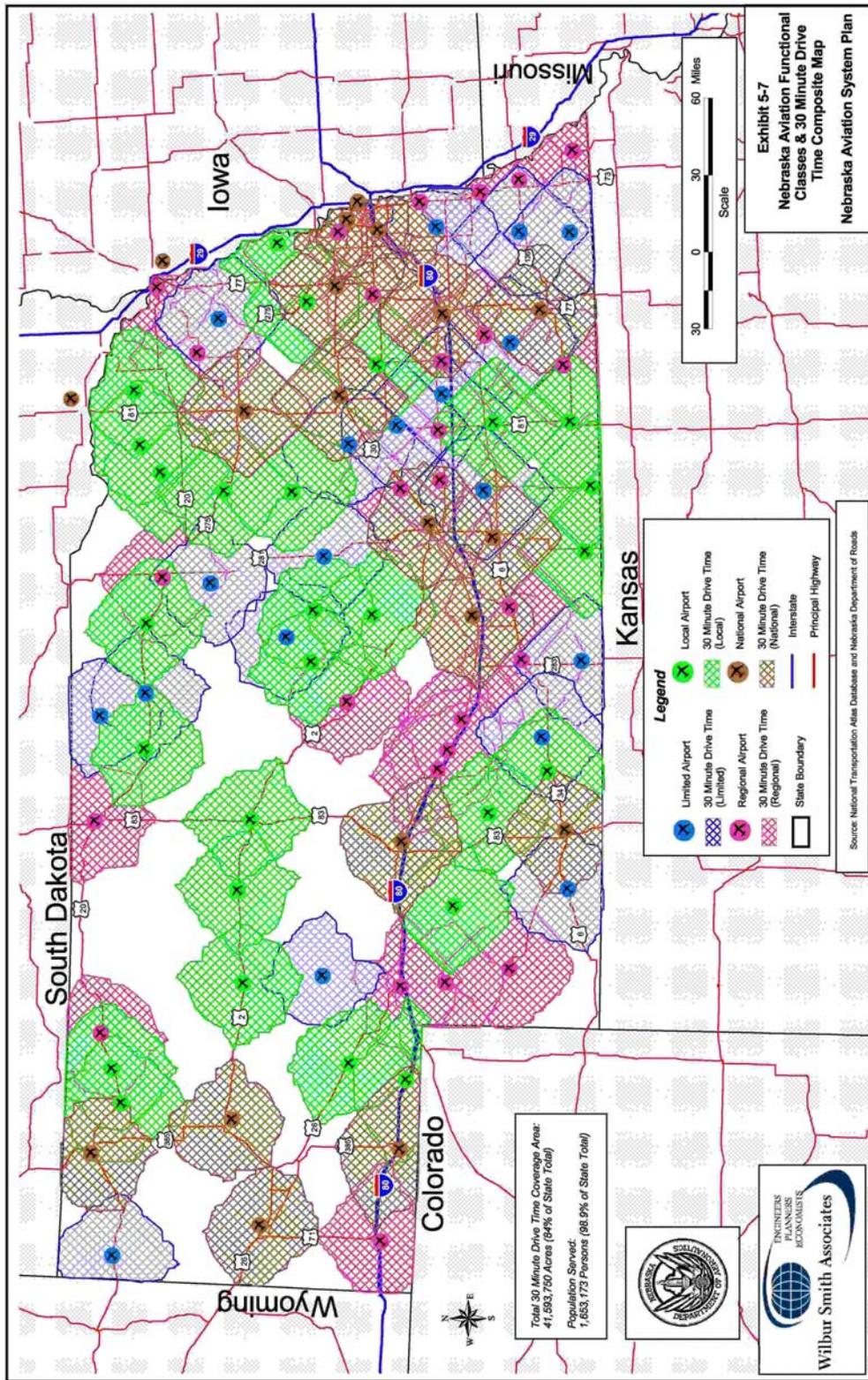


Exhibit 5-6
Limited Airports with
30 Minute Drive Times
Nebraska Aviation System Plan

EXHIBIT 5-7



by the existing airports. **Exhibit 5-8** depicts the service areas without the differentiation of airport categories. This exhibit shows the areas throughout the State that do not have access to an airport within a 30-minute drive. The largest areas without access include much of Cherry County and parts of the following counties:

- | | | |
|------------------------------------|---------------------------------------|---------------------------------|
| <input type="checkbox"/> Sioux | <input type="checkbox"/> Scotts Bluff | <input type="checkbox"/> Brown |
| <input type="checkbox"/> Dawes | <input type="checkbox"/> Hooker | <input type="checkbox"/> Rock |
| <input type="checkbox"/> Box Butte | <input type="checkbox"/> McPherson | <input type="checkbox"/> Boyd |
| <input type="checkbox"/> Sheridan | <input type="checkbox"/> Keith | <input type="checkbox"/> Custer |
| <input type="checkbox"/> Morrill | <input type="checkbox"/> Lincoln | <input type="checkbox"/> Dundy |
| <input type="checkbox"/> Garden | <input type="checkbox"/> Logan | |
| <input type="checkbox"/> Banner | <input type="checkbox"/> Blaine | |

There are a few other small gaps, but the majority of the land area in the other counties is located within a 30-minute drive of an existing system airport. Again, as noted on Exhibit 5-7, 98.9 percent of the State's population is located within a 30-minute drive of an existing system airport, indicating that the areas noted to be without access are nearly unpopulated.

The analysis has shown that the majority of Nebraska is located within 30 minutes of an airport that accommodates general aviation activity. In fact, examination of previous exhibits shows a tremendous overlap in coverage throughout the state when all airports are considered. The next chapter of the NASP will address options related to excess coverage provided by Nebraska airports.

Airports Accommodating Medical Flights

In Nebraska, a State with a concentration of population in the east and more widespread population throughout the western portion of the State, access to hospital facilities is a critical factor. The PAC, as well as the Department of Aeronautics, identified sufficient access to airports to accommodate medical flights as a top objective for the NASP. Many non-urban hospitals host medical specialty clinics on a regular basis. While some hospitals utilize rotorcraft/helicopters, fixed-wing aircraft are also used to transport patients for critical care. The locations of hospitals with 20 or more short-term beds were obtained from the Nebraska Department of Health and Human Services. For purposes of this study, these hospitals are referred to as primary hospitals. These primary hospital locations were mapped (see **Exhibit 5-9**) and the 30-minute drive times for airports in the National and Regional categories were overlaid to determine where deficiencies in service exist. The following communities were identified as having a primary hospital, but not having an identified National or Regional airport:

- Ainsworth
- Ord
- Creighton
- Albion
- Neligh
- Osmond
- Plainview
- West Point

In addition to primary hospitals, hospitals identified by the Nebraska Department of Health and Human Services as critical access hospitals were also examined in relation to airport locations. Critical access hospitals were defined based on location as well as service criteria. While many of the primary hospitals

EXHIBIT 5-8

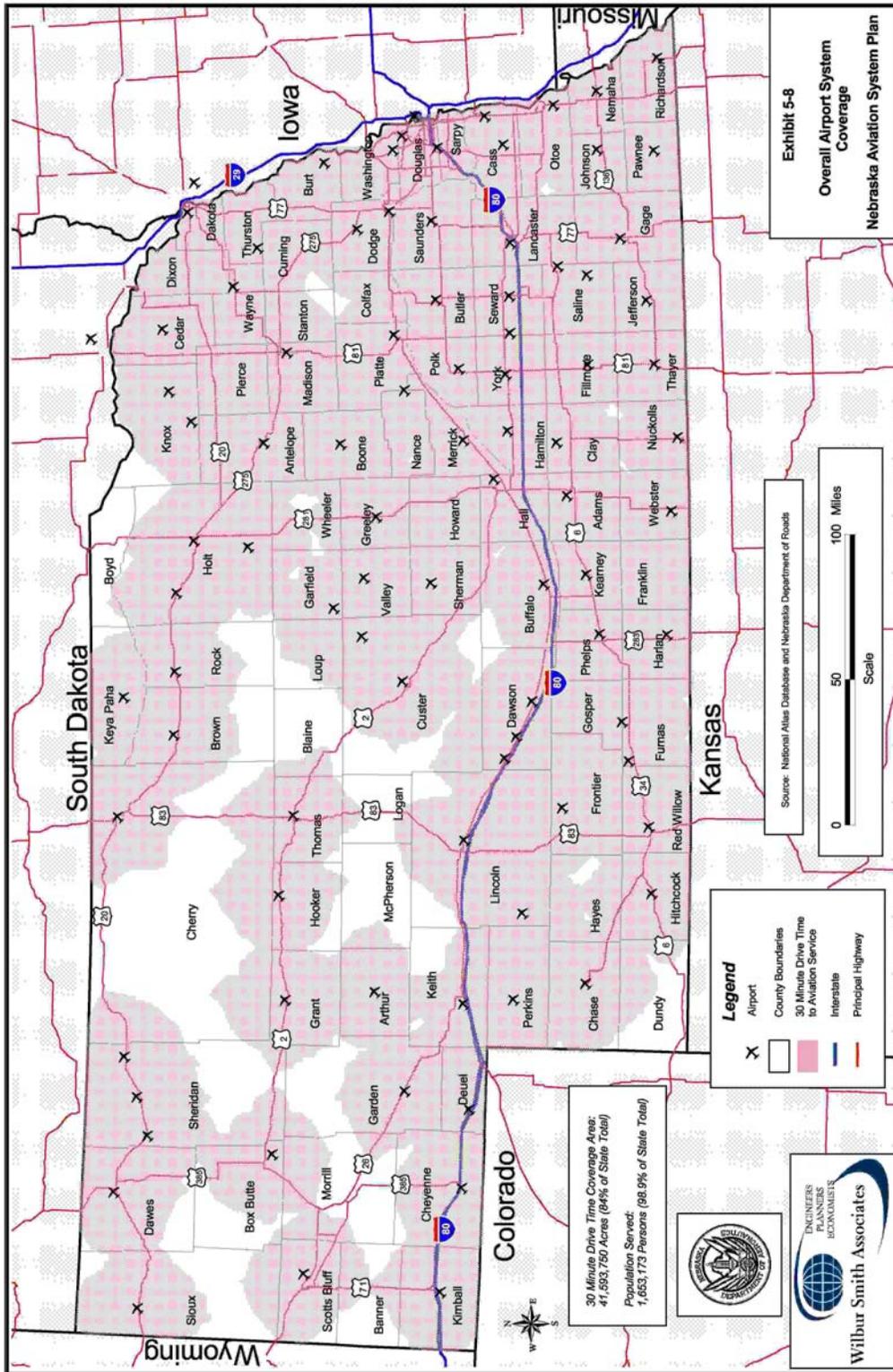
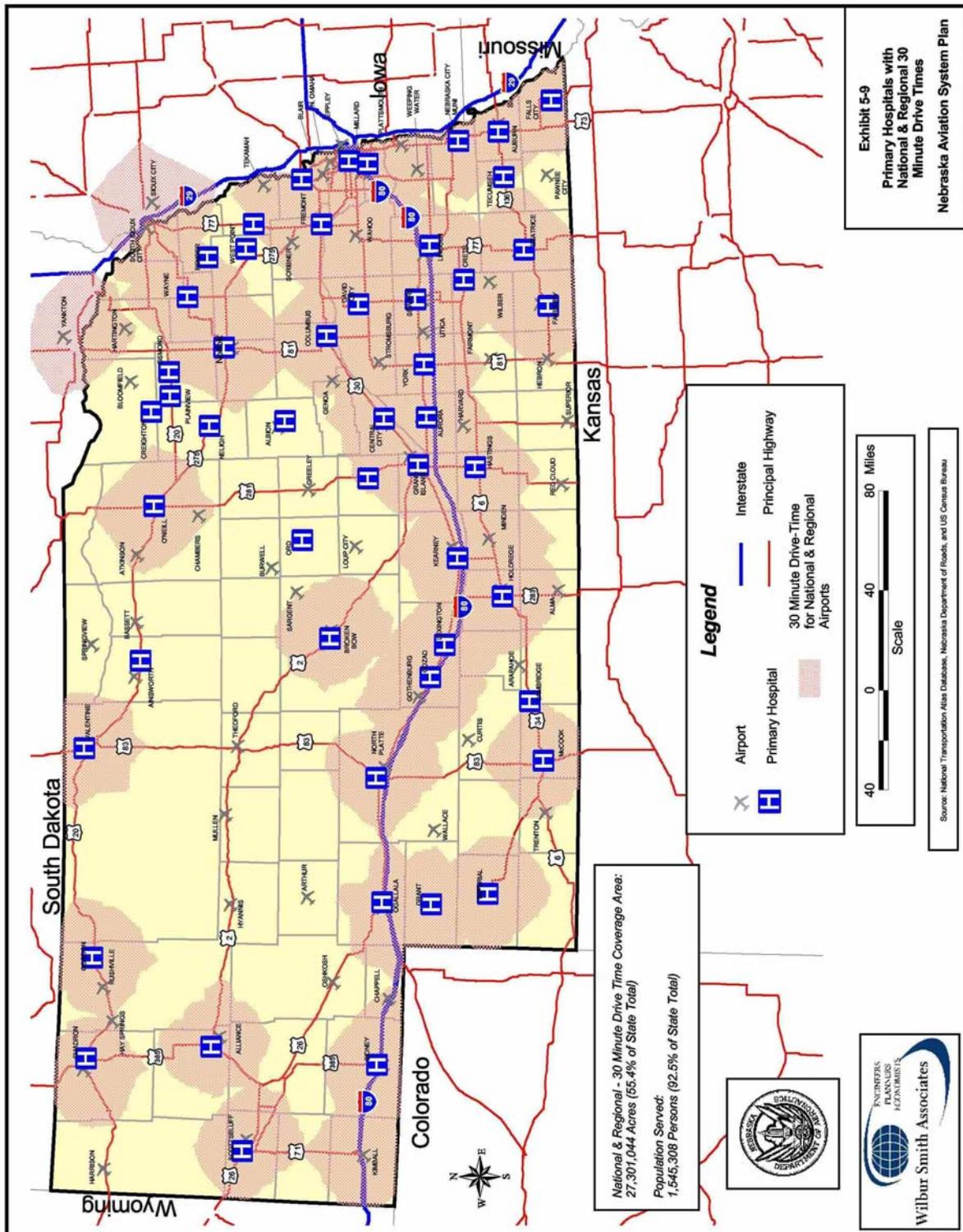


EXHIBIT 5-9



are also defined as critical access, there are additional critical access hospitals that do not meet the short-term bed definition used in this study to define primary hospitals. The critical access hospitals were mapped (see **Exhibit 5-10**) and the 30-minute drive times for airports in the National, Regional, and Local categories were overlaid to determine where deficiencies in service exist. The following communities were identified as having either a primary or a critical access hospital, but not having an identified National, Regional, or Local airport:

- ❑ Benkelman
- ❑ Bridgeport
- ❑ Lynch
- ❑ Pawnee City

All-Weather/Instrument Coverage

In order for an airport system to be completely functional, access must be available during all weather conditions. Access to an airport can be limited at times due to poor weather or the unavailability of facilities that allow access during inclement weather. All-weather/instrument coverage was examined both in terms of the types of approaches available at the airports throughout the State, as well as the availability of weather reporting services.

Precision approach systems provide electronic longitudinal and glide slope information to aircraft during their approach and landing procedures at an airport. These systems allow aircraft to locate an airport and land on a specific runway during periods of poor visibility and/or inclement weather. Operators of some of the most demanding general aviation aircraft typically prefer to operate at airports with precision approaches. The reliability that these systems provide by allowing operators to land and depart airports during periods of inclement weather is also important to business aircraft because it minimizes the periods of time that airports are closed because of poor visibility; therefore, it reduces delays related to airport closures, rerouting of aircraft, and ground travel times associated with not being able to access the nearest airport to the final destination.

In addition to precision approaches, the availability of non-precision approaches was examined. Non-precision approaches provide electronic information to aircraft during their approach and landing procedures at an airport. In general, non-precision approach systems provide information that aids in the location of an airport and a specific runway; however, these systems do not provide glide slope information to aircraft during the approach. While not as advanced or expensive to install or maintain as precision approaches, non-precision approaches support airport operations during periods of poor visibility and inclement weather when visual approaches are not possible.

Exhibit 5-11 depicts 30-minute drive times for the airports that have precision and non-precision approaches. As shown, coverage for these airports is extensive in Nebraska. The percentage of the State's land area within a 30-minute drive time of an airport with a precision approach is 14.4 percent. With precision and non-precision approaches, 66.7 percent of the land area is covered. It is estimated that 1,104,449 persons or 66.1 percent of the State's population is within 30 minutes of an airport that currently has a precision approach. Approximately 1,579,927 persons or 94.5 percent of the State's population is within 30 minutes of an airport that currently has at least a non-precision approach.

On-site weather reporting equipment at an airport can complement that facility's precision or non-precision approach capabilities, as well as promote an increased safety margin during periods of

EXHIBIT 5-10

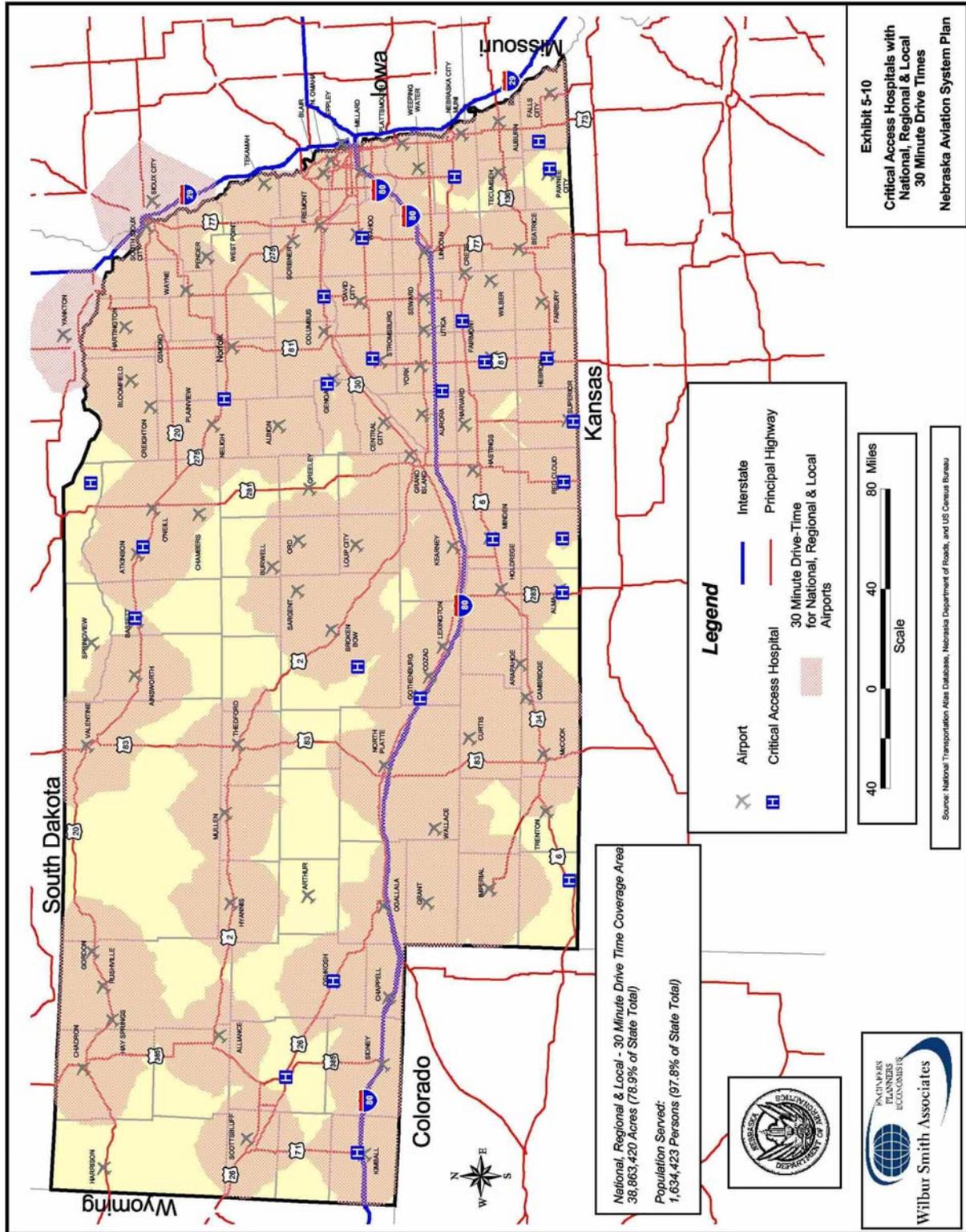
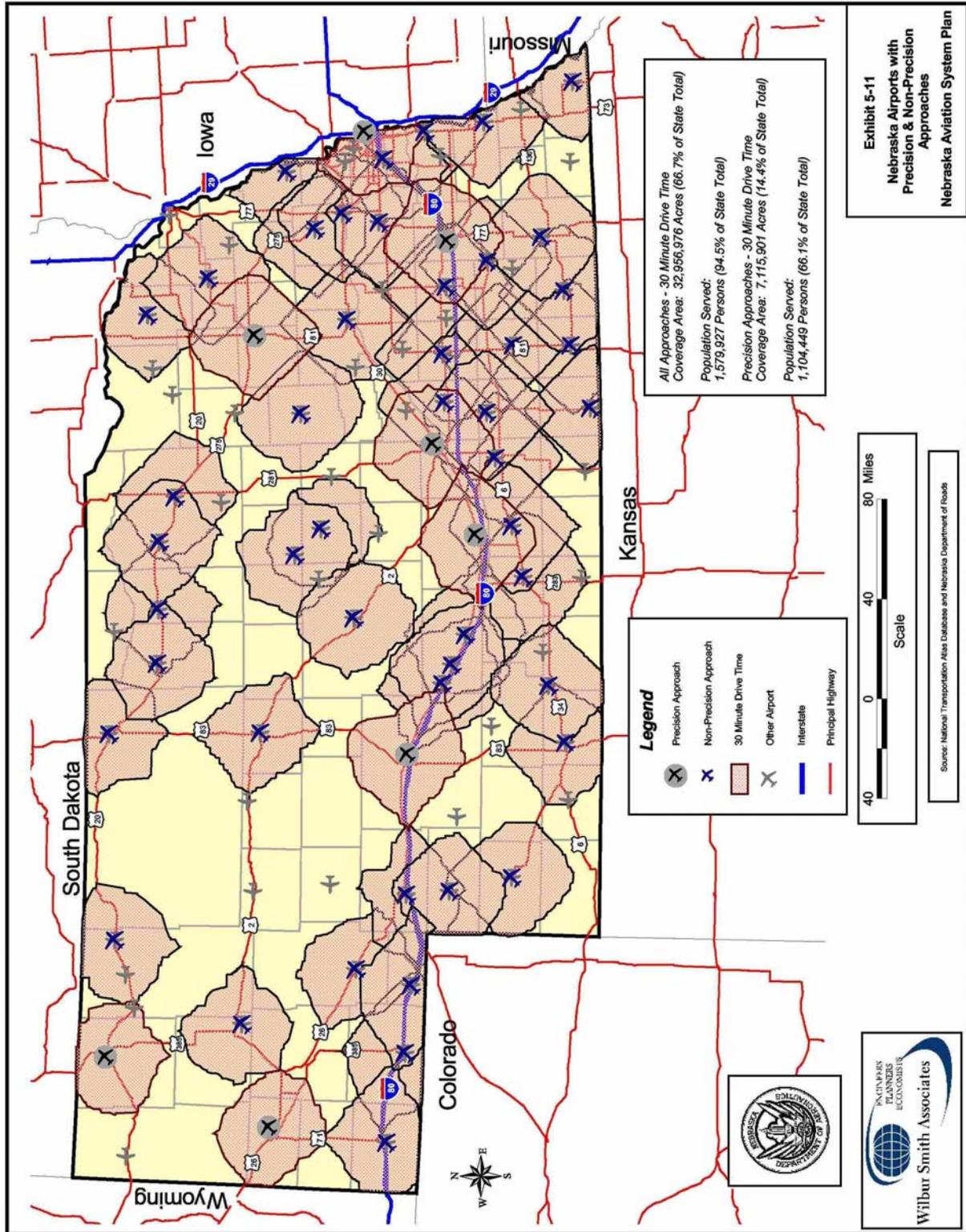


EXHIBIT 5-11



inclement weather. By providing on-site weather reporting equipment at airports throughout the State, pilots are ensured sufficient information related to weather conditions at their destination airport, as well as other potential backup airports, to make informed decisions regarding their operations during inclement weather. Those airports that currently have an operational automated weather observation system (either AWOS or ASOS) were identified. **Exhibit 5-12** shows 30-minute drive times for airports identified as having weather systems. The percentage of the State's land area within a 30-minute drive time of an airport with a weather system is 45 percent. It is estimated that 1,446,256 persons or 86.5 percent of the State's population is within 30 minutes of an airport that currently has a weather system.

Surface Access of Airports

All-weather coverage refers to the ability of pilots to land at airports during all weather conditions. Access to the airport on the ground is also an important factor. The surface of the access roads is important, as it can dictate the types of users that are likely to operate at the airport. For example, an airport that is served by air cargo needs to be accessible by large trucks that can deliver the cargo either to or from the airport. Therefore, the availability of a paved road from the community to the airport, and on the airport itself, is important for this type of airport.

Based on data provided by NDA through its on-site visits to the airports throughout the State, it is estimated that 27 airports in the State have paved access roads (see **Exhibit 5-13**). Further analysis of airport surface access is subsequently presented as part of the evaluation of the airport minimum standards.

ECONOMIC

Airports play an important role in helping to meet the economic needs of the State. Airports are used for business and recreational purposes, but the importance of airports to businesses throughout the State is growing. Many of the top national firms use general aviation aircraft in their business to transport employees, and also have customers and suppliers who come to visit via general aviation airports. The importance of commercial airline service is generally recognized, while general aviation airports continue to quietly serve some of these needs. In fact, there are fewer than 500 airports in the U.S. that are served by commercial airlines, compared to more than 4,000 public general aviation airports.

In business surveys conducted throughout the U.S., employers were asked to rank the importance of commercial service and general aviation airports compared to other factors in their decision-making process of selecting a new or relocated site. Time and again, the location of a commercial service airport typically ranks in the top three out of 15 factors, while the location of a general aviation airport ranks in the top 10.

For this study, the importance of airports to serve the State's economic and trade centers was recognized. In addition, airports located to serve business and air cargo needs, as well as agricultural aviation needs, were also examined.

Airports Serving Economic/Trade Centers

As discussed in previous sections, much of the State's population is focused in eastern Nebraska. While this focused population supports economic activities in the large communities of Omaha and Lincoln, other, smaller communities also serve as economic and trade centers for other regions of the State. Similar to

EXHIBIT 5-12

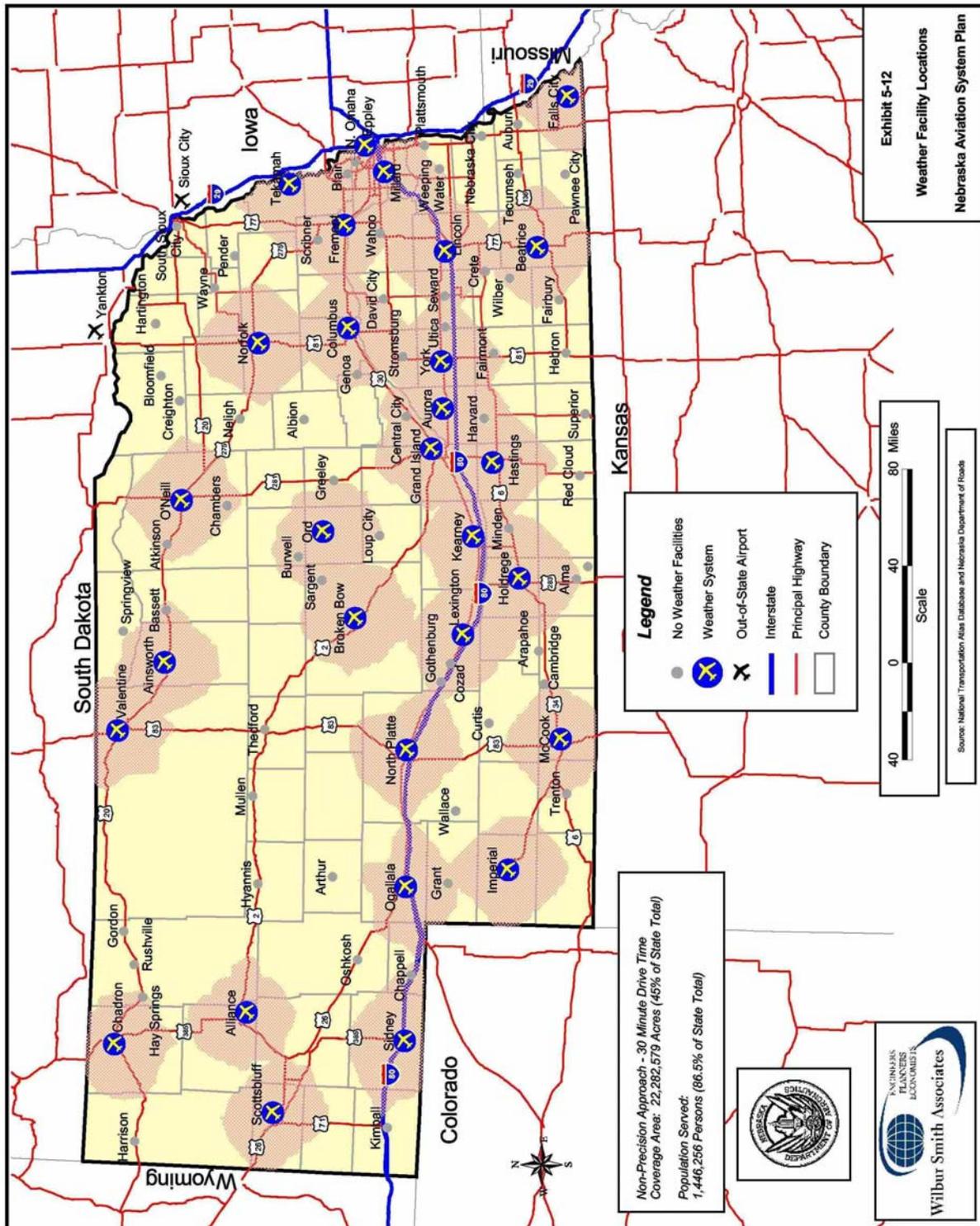
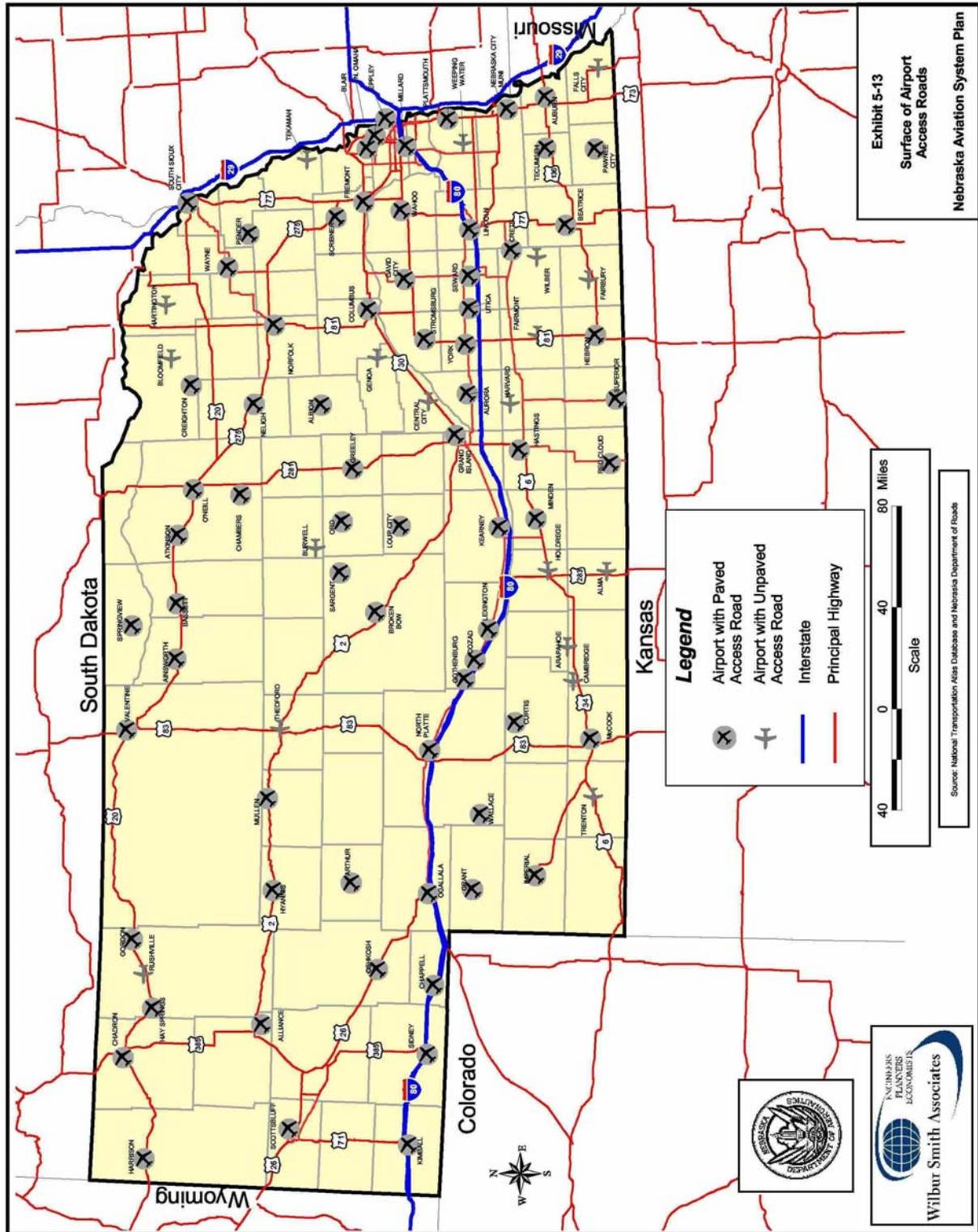


EXHIBIT 5-13



other states with rural agricultural histories, Nebraska's distant population areas still require trade in terms of shopping, retail, and services. Economic/trade centers were determined by examining total net taxable retail sales in each town throughout the State. As these sales figures were examined, trends were identified wherein higher levels of sales existed in comparison to other towns. When these figures are merely ranked from high to low, the revenues in Omaha and Lincoln far outweigh those found in other towns. But when the figures are examined in a more geographical nature, centers are located throughout the State. For purposes of this analysis, all communities with 1999 total net taxable retail sales in excess of \$12 million were identified (see **Exhibit 5-14**).

These economic/trade centers were compared to both the location of airports identified as National and Regional and the 30-minute drive times for these airports (see **Exhibit 5-15**). As shown in Exhibit 5-15, the following communities had net taxable retail sales in excess of \$12 million, but are not located within a 30-minute drive of an airport currently identified in the National or Regional categories:

- Creighton
- Hartington
- Neligh
- Ainsworth
- Albion
- Ord
- Superior
- Bridgeport
- West Point
- Geneva

Airports Meeting Business/Air Cargo Needs

The provision of airports to meet the needs of air cargo demand is also an important economic factor. The use of air cargo is determined by the need of companies to transport goods at a faster speed than can be provided via surface transport. Companies that typically benefit from increased speed of distribution or better stock availability of commodities being shipped via air cargo include the following:

- Aeronautics equipment and parts
- Automotive equipment and parts
- Pharmaceuticals
- Computers and computer components
- Diagnostic equipment
- Medical equipment
- Software
- Textiles/garments
- Perishables – flowers, fruit, vegetables, and fish
- Economical perishables – printed material
- Telecommunications equipment – cell phones, beepers
- Photographic film

These commodities are high in value, relatively lightweight, and time-critical.

Locations of companies throughout Nebraska that fall in these categories were obtained from the Nebraska Department of Economic Development. Using the zip codes from these companies, their

EXHIBIT 5-14

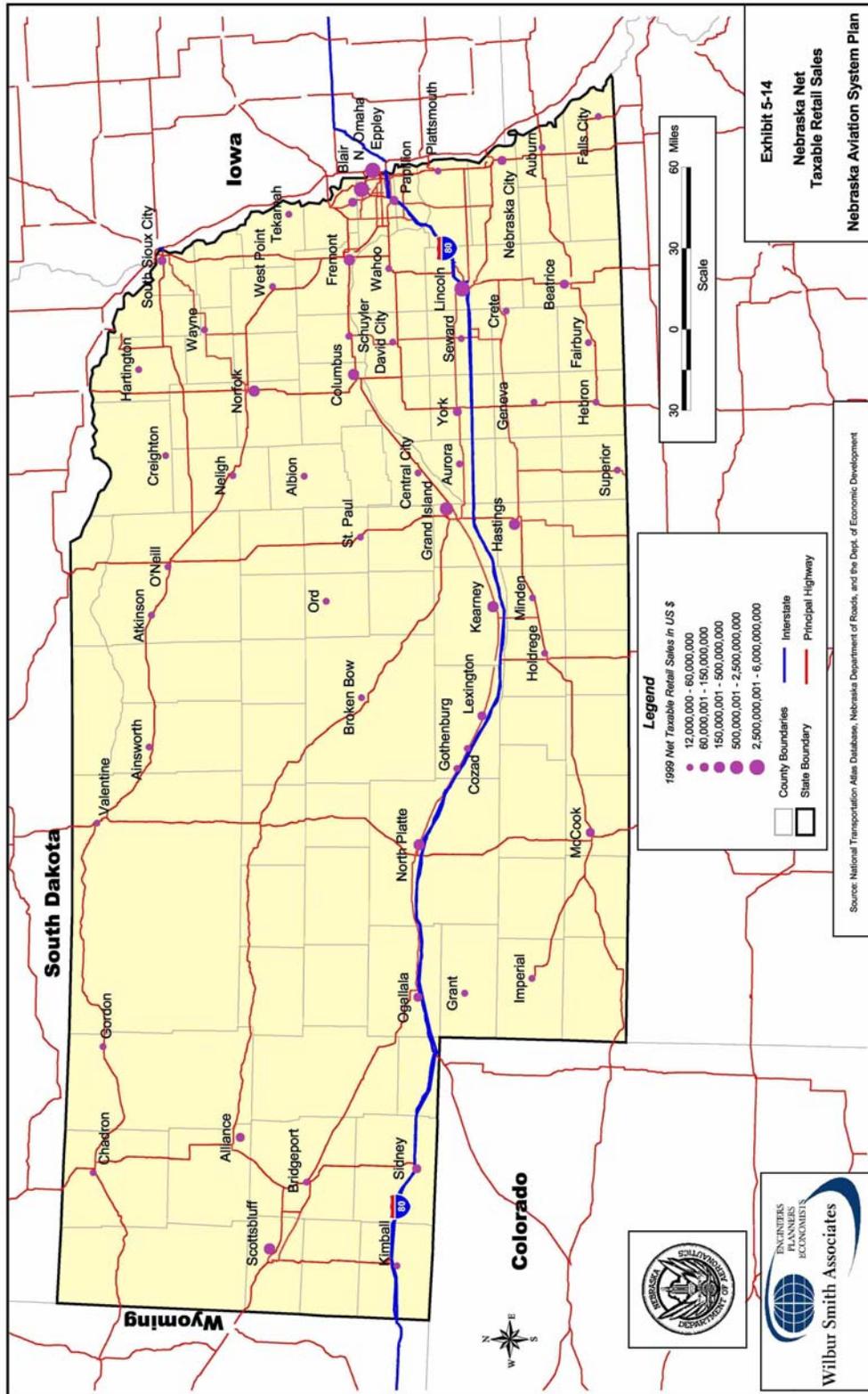
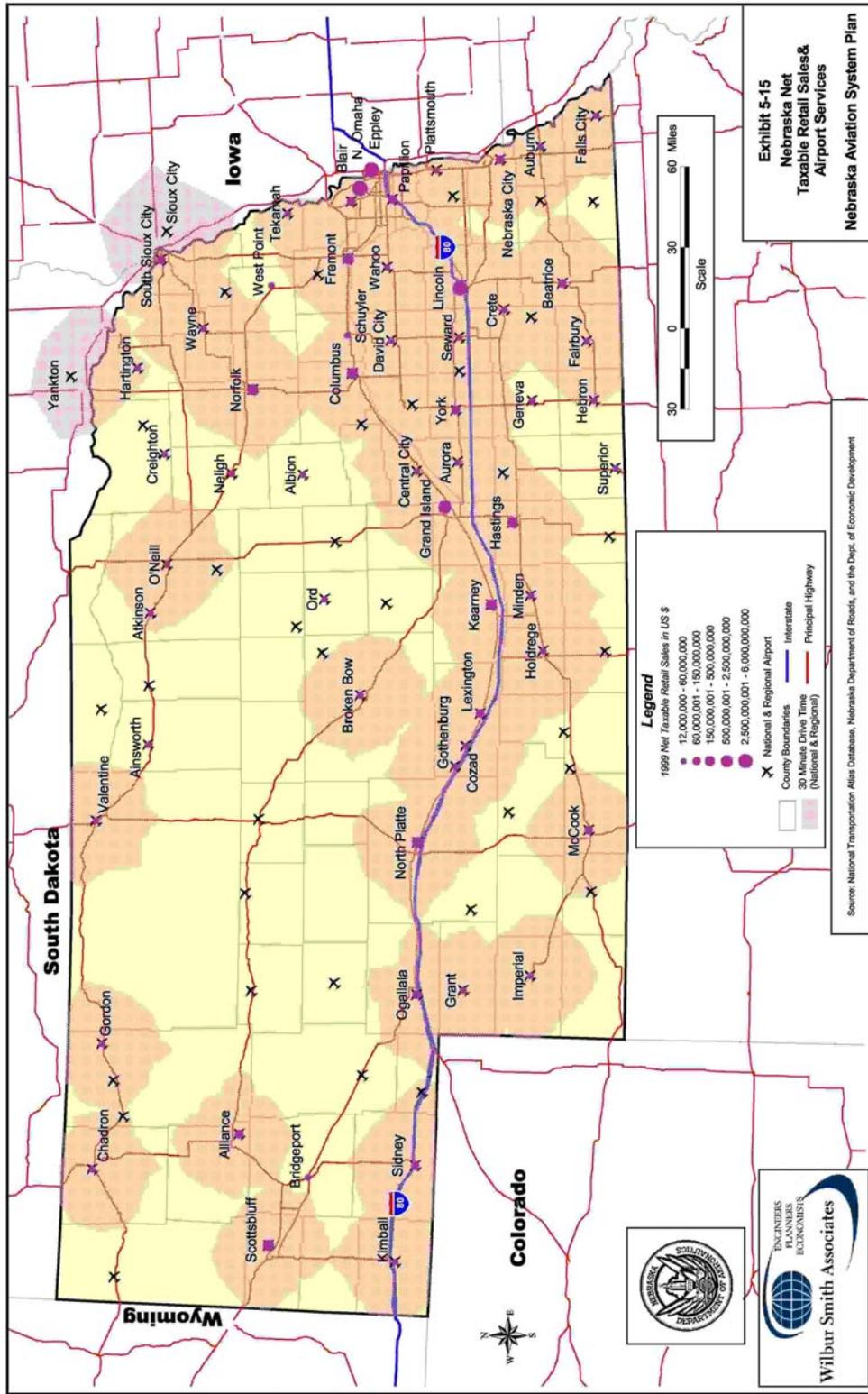


EXHIBIT 5-15



locations were mapped on **Exhibit 5-16**, as were the locations of airports that are currently served by air cargo operators. In addition, 30-minute drive times for the National airports were also identified. As shown, there are numerous companies located outside the 30-minute drive times of National airports, as well as distant from airports currently served by air cargo operators.

It is important to note that air cargo development is typically an evolutionary process. The truck is usually the first transportation service used to transport goods. Goods can be trucked to their final destination or to an intermediate transfer point, possibly an airport. The airport could be either one where goods movements are combined, or where they are moved to an all-cargo or commercial carrier for transport to another destination. Once trucking is not sufficient, small aircraft are typically flown on short routes to the hubbing complex of the air cargo carrier. Depending on the carrier and the weight and frequency of the goods, the aircraft used to transport goods could range in size from small, general aviation aircraft, such as a Beech 99 or Cessna Caravan aircraft. Once the smaller aircraft are outgrown by the size, weight, and frequency of the goods, carriers typically move to larger aircraft such as the Boeing 727 or DC-9 to transport higher weight goods on longer routes.

The adequacy of airports meeting business/air cargo needs is, therefore, difficult to determine. For this study, it was determined that if airports were developed to serve the identified economic/trade centers, it is likely that the air cargo needs would also be able to be met.

Airports Meeting Agricultural Aviation Needs

Agriculture continues to be the largest industry in Nebraska. It is estimated by the Nebraska Agricultural Statistics Service that one-half of Nebraska workers depend on agriculture (and the many related industries involved in all phases of the food and fiber chain from production to marketing) for their employment. Nebraska's 46.4 million acres in farms and ranches is divided between cropland and other land used primarily for pastures and rangeland to support the State's livestock industry. Corn, soybeans, winter wheat, and sorghum are the State's leading crops, usually utilizing about 15.5 million acres of cropland. Corn and winter wheat are grown statewide, while most soybeans are produced in the eastern portion of the State. Counties that produce sorghum lie in the southeastern third of the State. Dry, edible beans and sugar beets are produced in irrigated fields in western Nebraska.

Many crops require agricultural application to ensure their eventual harvesting. Those crops that require the highest intensity of aerial spraying include the following:

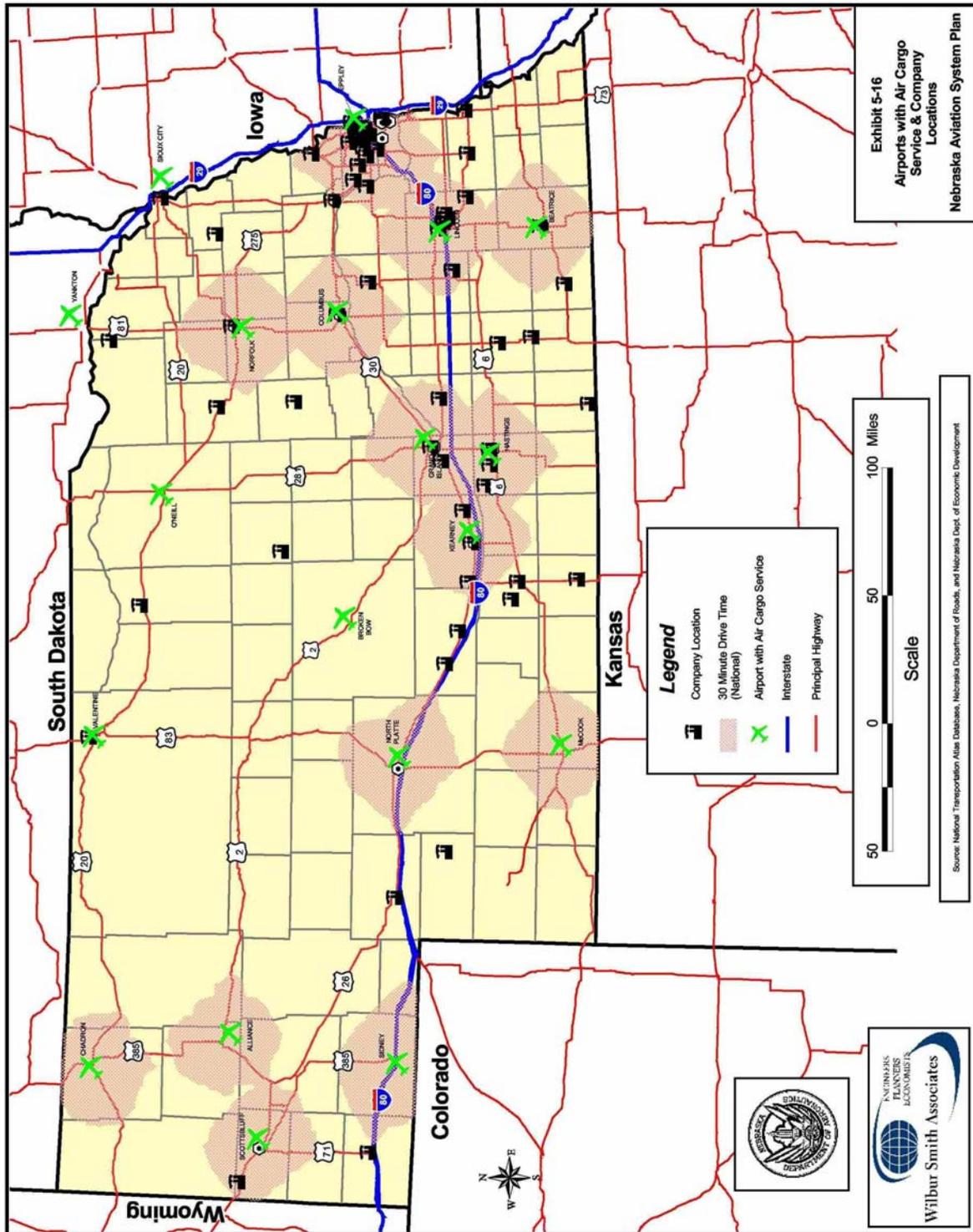
- Corn (for grain and silage)
- Potatoes
- Sugar beets

In addition to these high-intensity crops, the following require a moderate level of aerial spraying:

- Dry, edible beans
- Sorghum (for grain and silage)
- Soybeans
- Sunflowers
- Wheat

The intensity of aerial spraying requirements were determined based on crop production in terms of acres harvested, which was supplied by the U.S. Department of Agriculture, National Agricultural Statistics

EXHIBIT 5-16



Service. The various crop production figures were divided by crop. Those crops noted to have high or moderate aerial spraying requirements were summed by county, and the percentage of the crops requiring moderate to high levels of aerial spraying as opposed to total acres being harvested were determined. As shown in **Exhibit 5-17**, the counties with the highest percentage of their crops requiring aerial application included Phelps, Hall, Hamilton, Kearney, Merrick, and York.

While aviation is needed for these high-intensity crops, the actual facility needs for aerial applicators are minimal compared to other aviation industry requirements. Aerial applicators can operate on turf strips, and many are operated at private airports that service the farms. It was determined that the existing airport system was adequate to serve the agricultural aviation needs of Nebraska.

PHYSICAL

An important goal of any aviation system is to provide physical facilities to meet the needs of the users. The mission of airports is to provide quick, convenient, and safe transportation of people and goods. An adequate airport system needs certain facilities to process the movement and storage of aircraft and to meet the needs of the people who use airports.

Physical performance of the aviation system is determined by examining the ability of the airports to meet at least minimum standards. Minimum standards can be defined in terms of facilities and services. These minimum standards were developed as part of the previous chapter for each of the four functional classifications. It is important to note that facility and service objectives delineated in this section are just that, objectives. It is possible that airports included in or recommended for an increase in their classification in later analyses may, for one or more reasons, be unable to comply with certain facility and service objectives. An airport's inability to meet the facility and service objectives for its classification does not necessarily preclude that airport from performing that role or function within the system, but will be considered in the analysis of options to meet identified system deficiencies.

In addition to examining the ability of the airports to meet minimum facility and service standards, the ability of the airport system to operate efficiently from a capacity standpoint was also reviewed. The airport system's existing pavement conditions were also evaluated to provide a measurement of the system's performance.

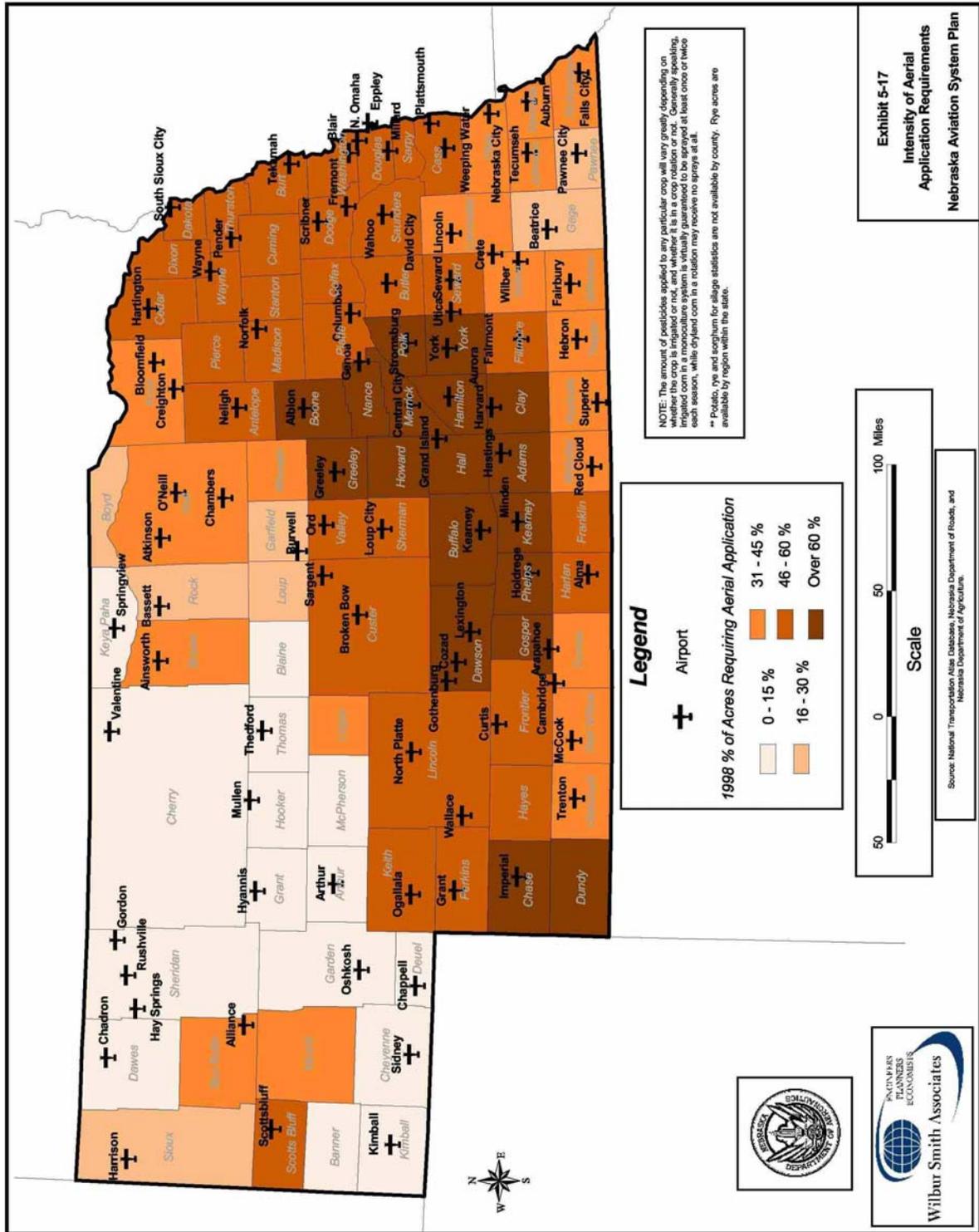
Airports Meeting Minimum Facility and Service Standards

In Chapter Four, facility and service standards were developed for each of the four airport classifications. In this analysis, the adequacy of the existing system to meet the identified standards will be examined on the classification level, as well as specifically for the various facilities and services.

The Federal Aviation Administration (FAA), through its Advisory Circulars, develops guidance related to the planning and design of airport facilities. These Advisory Circulars summarize airport development guidelines that focus on airport safety and secondarily promote economy, efficiency, and longevity of airport facilities. FAA standards related to airport safety are generally referred to as "design standards." Design standards typically refer to runway and runway area dimensional criteria that are required to safely support the operation of a class of aircraft at an airport. Design standards can also refer to requirements related to specific airport facilities such as runway condition.

The following facility and service standards were analyzed for the four airport classifications:

EXHIBIT 5-17



- Runway length
- Runway width
- Crosswind runway
- Taxiway
- Navigational aids (NAVAIDs)
- Lighting
- Weather
- Visual Approach Aids
- Services
- Fixed-Base Operators (FBO)
- Fuel
- Facilities
- Ground access

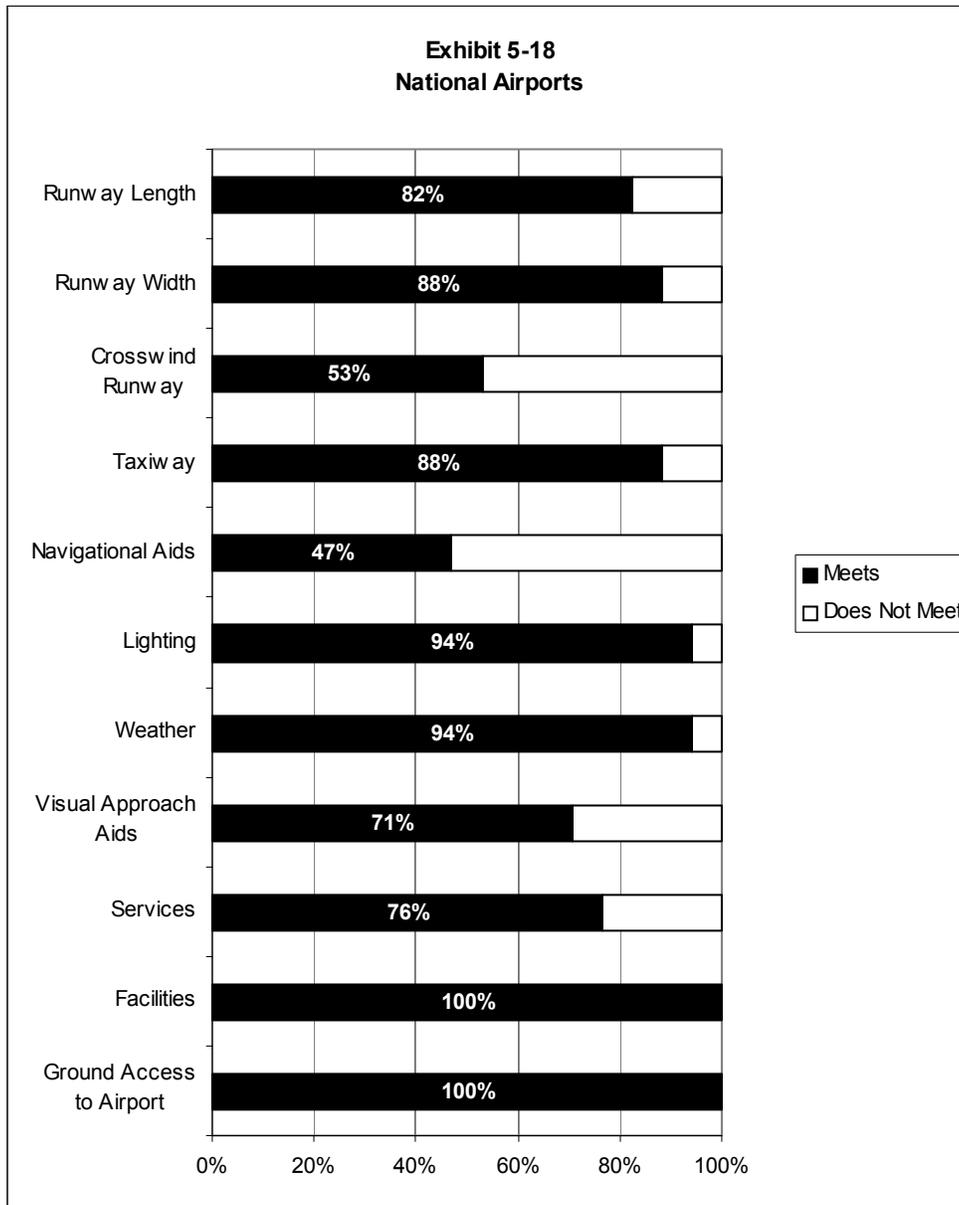
Functional Classification Facility and Service Standards Summary

The ability of the airports in the four categories to meet the standards set for each is presented below.

National Airports

Through the demand analysis conducted in Chapter Four, 17 airports were identified in the National category. The existing facilities and services at these 17 airports were compared to the standards set for the National category airports to determine the existing adequacy of the system if these airports were maintained in this category.

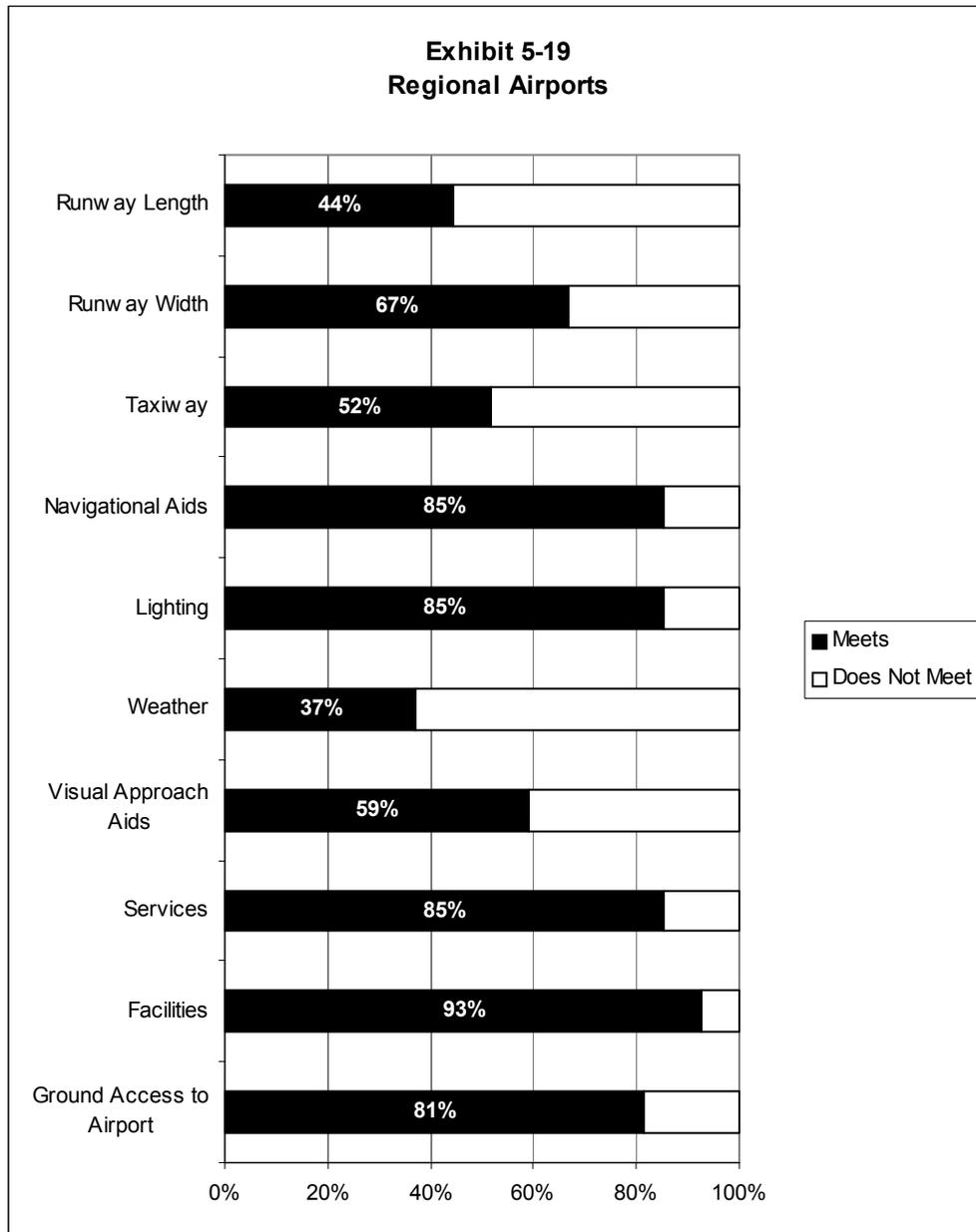
Exhibit 5-18 presents a summary of the existing National airports' abilities to meet the standards set for facilities and services.



Regional Airports

Chapter Four identified 27 airports that currently fall in the Regional category. The existing facilities and services at these 27 airports were compared to the standards set for the Regional category airports to determine the existing adequacy of the system if these airports were maintained in this category.

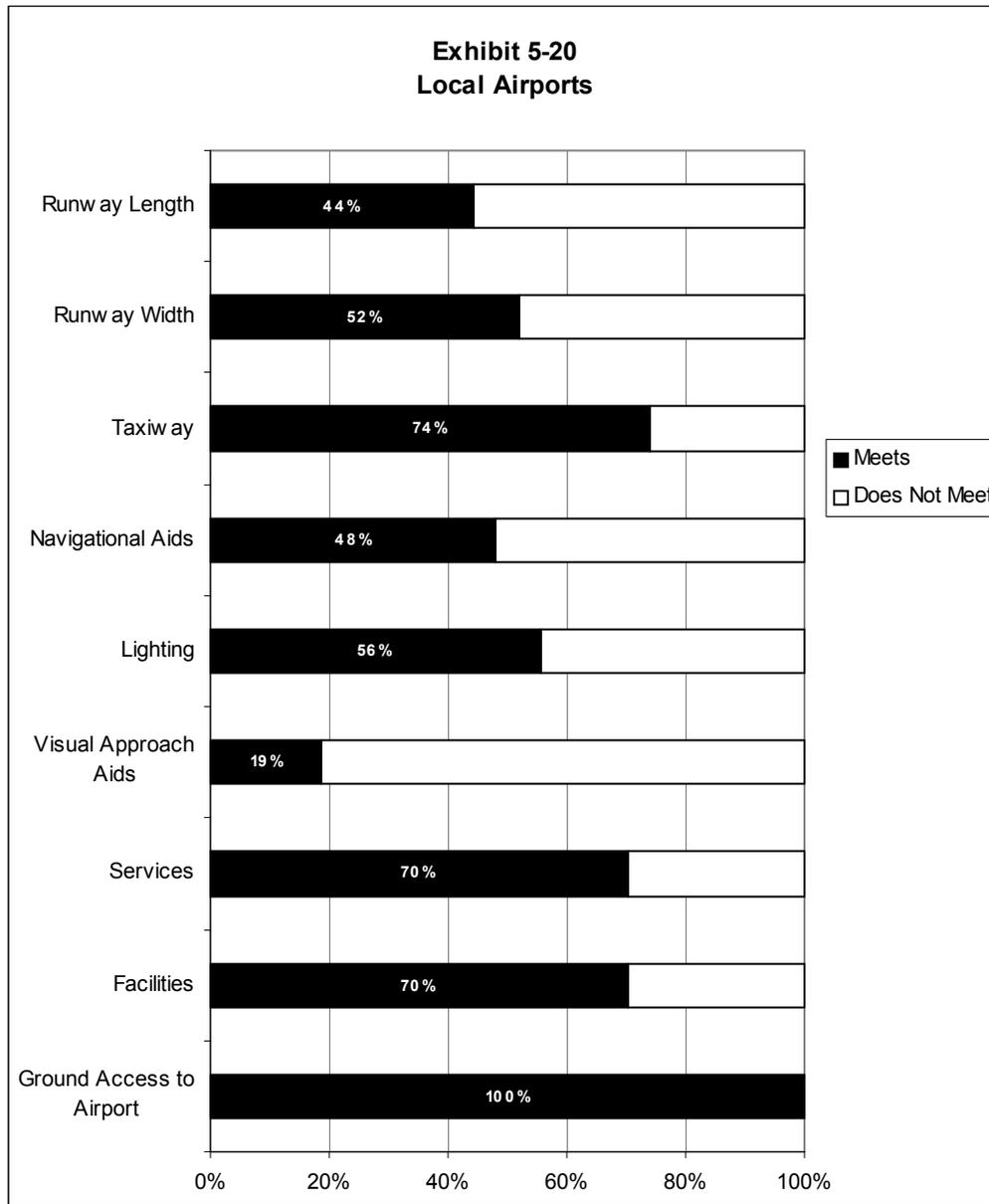
Exhibit 5-19 presents a summary of the existing Regional airports’ abilities to meet the standards set for facilities and services.



Local Airports

Through the demand analysis conducted in Chapter Four, 27 airports were identified in the Local category. The standards set for Local category airports were compared to the existing facilities and services at these 27 airports. Consequently, a determination was made of the existing adequacy of the system if these airports were maintained in this category.

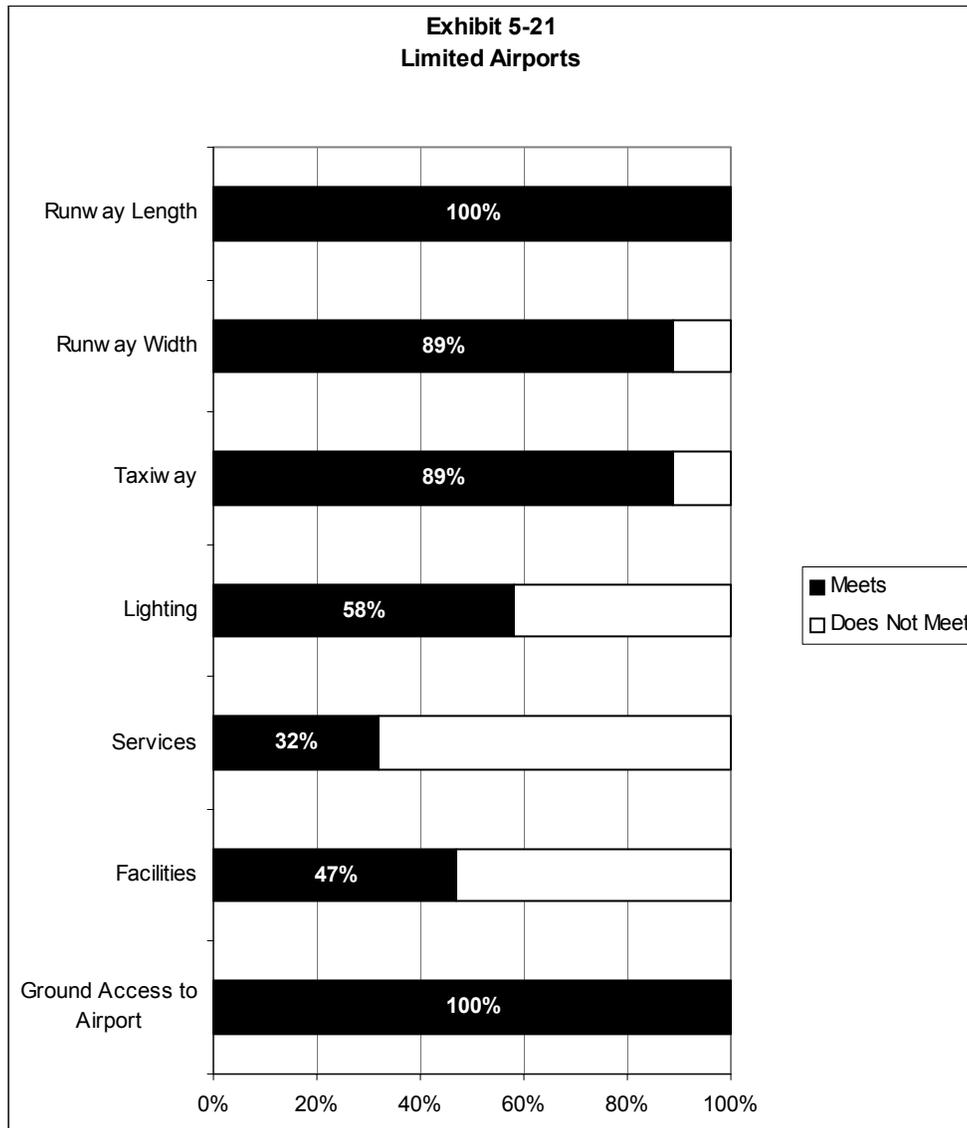
Exhibit 5-20 provides a summary of the existing Local airports’ abilities to meet the standards set for facilities and services.



Limited Airports

The demand analysis conducted in Chapter Four resulted in 19 airports being classified as Limited. The existing facilities and services at these 19 airports were compared to the standards set for the Limited category airports to determine the existing adequacy of the system if these airports were maintained in this category.

Exhibit 5-21 presents a summary of the existing Limited airports’ abilities to meet the standards set for facilities and services.

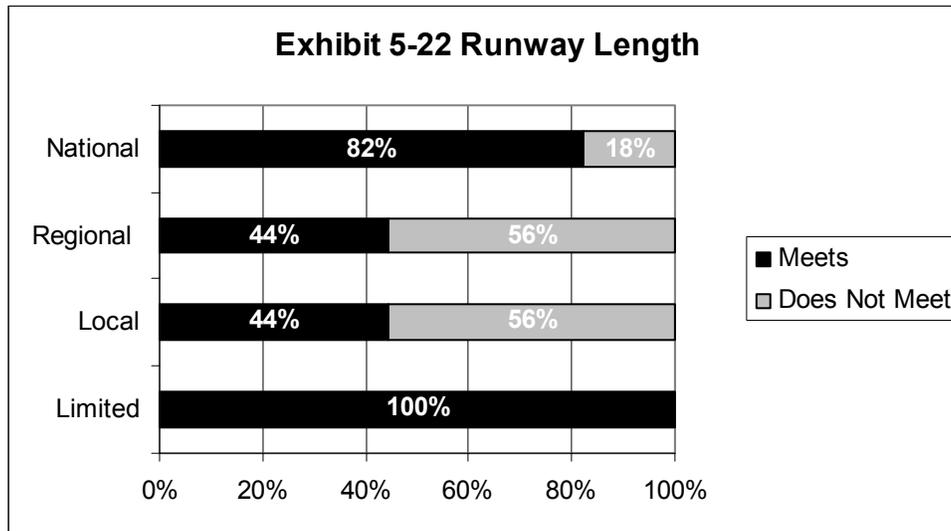


Specific Facility and Service Standards

Runway Length

The length of the primary runway of each system airport was examined compared to the runway length standards set for the four categories of airports based on their identified role in the Nebraska Aviation System. **Exhibit 5-22** shows that 14 out of 17 National Airports have primary runways that meet minimum length standards. The three airports that do not meet the standard include the following:

- Chadron
- Millard
- North Omaha



The analysis showed that 12 out of 27 Regional Airports' primary runways meet the minimum standard length. Those airports that do not meet the minimum standard include the following:

- Auburn
- Aurora
- Blair
- Broken Bow
- Central City
- Cozad
- Crete
- Fairbury
- Gothenburg
- Grant
- Imperial
- Minden
- Ogallala
- Seward
- South Sioux City

The analysis showed that 12 out of 27 of the Local Airports met the minimum length standards for the primary runway. Those Local Airports whose primary runway lengths were not adequate included:

- Bloomfield
- Chappell
- Creighton
- Curtis
- David City
- Hay Springs
- Loup City
- Mullen
- Neligh
- Oshkosh

- ❑ Red Cloud
- ❑ Rushville
- ❑ Sargent
- ❑ Thedford
- ❑ Wallace

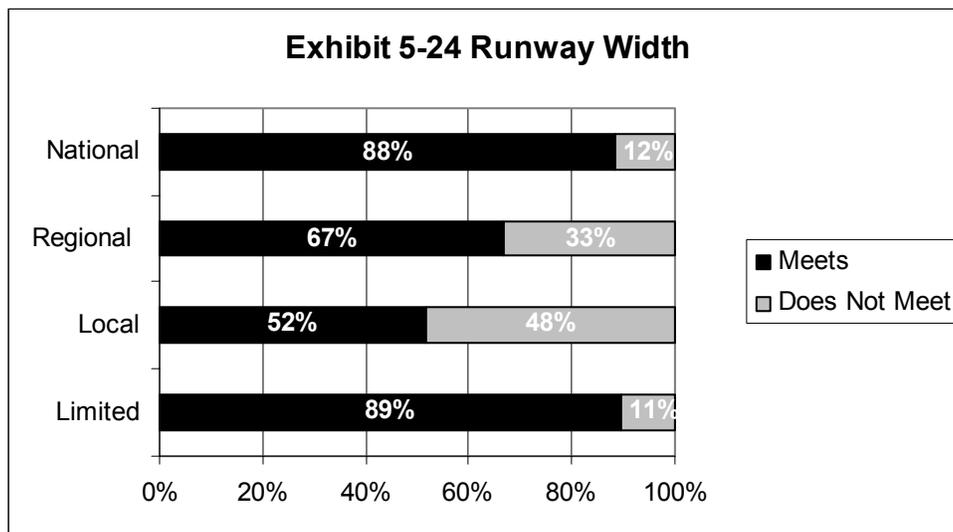
All 19 of the Limited Airports’ primary runway lengths were adequate to meet the minimum standard.

Runway Width

Runway width design standards generally dictate that as the wingspan of the design aircraft at an airport increases, so should the width of the runway. Current FAA design standards related to runway width are summarized in **Exhibit 5-23**.

Exhibit 5-23						
Runway Width Standards (ft)						
Airplane Design Group						
Aircraft Approach Category	I	II	III	IV	V	VI
A/B	60	75	100	150		
C/D	100	100	100	150	150	200

The primary runway of each system airport was examined compared to the runway width standards identified in the previous chapter for the four categories of airports. **Exhibit 5-24** summarizes the results of the runway width analysis.



As shown, 15 of 17 National and 18 out of 27 Regional Airports currently meet the identified primary runway width requirements. The analysis showed that 14 of 27 Local and 17 out of 19 Limited Airports met the runway width standards. In general, the airports with adequate runway length are comparable to the airports that have sufficient runway width to meet the identified criteria.

Crosswind Runway

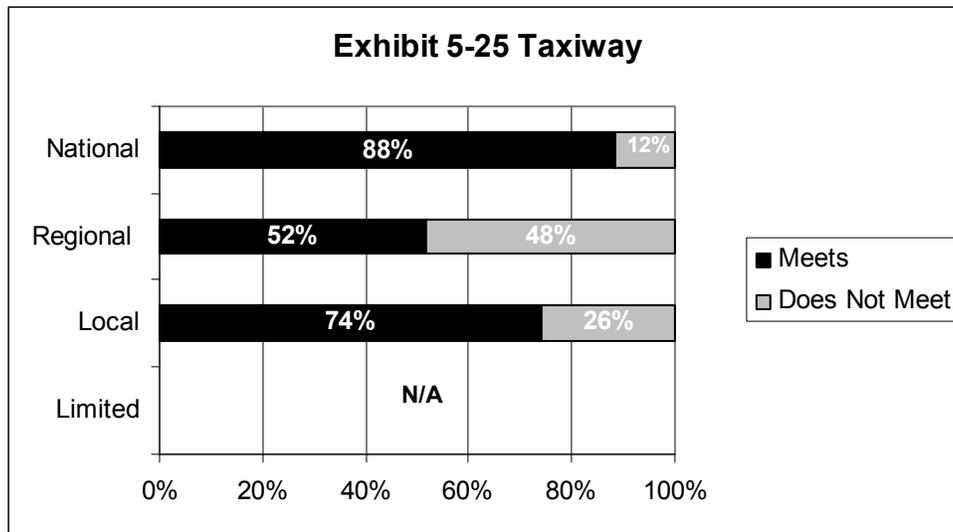
As previously mentioned in Chapter 4, only the National Airports have minimum standards for crosswind runways. The minimum facility standards for National Airports indicate that a crosswind runway be required if it is needed to meet 95 percent wind coverage. Of the 17 National Airports in the system, 9 meet the National crosswind requirements.

Taxiway

The taxiway benchmark has minimum standards for National, Regional, and Local Airports. The taxiway requirements are as follows:

- National Airports – Full Parallel
- Regional Airports – Partial Parallel
- Local Airports – Turnarounds & Connectors
- Limited Airports – Not Applicable

The ability of the airports to meet these standards is presented in **Exhibit 5-25**.

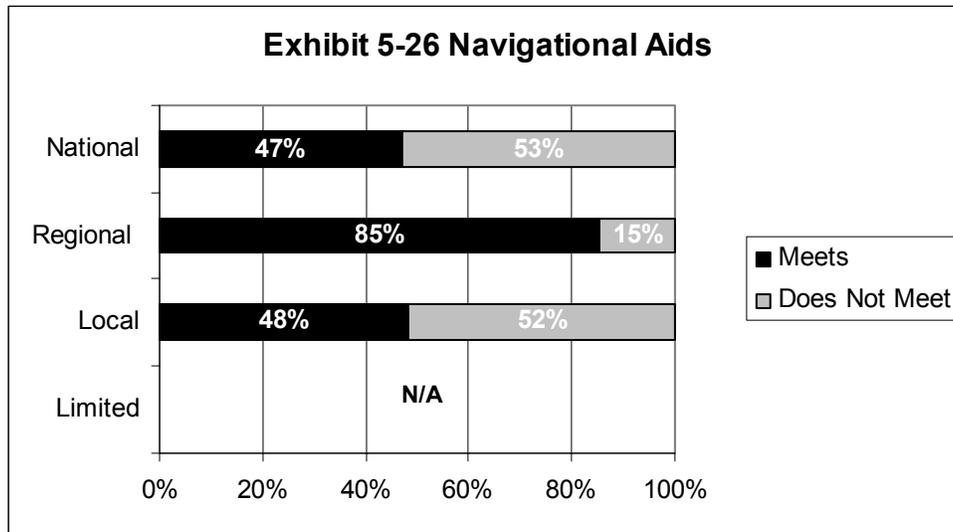


The above summary reveals that 15 of the 17 National Airports in the system, and only 14 of 27 Regional Airports meet the minimum taxiway standards. Meanwhile, of the 27 Local Airports, 20 met the minimum requirements related to taxiway needs.

Navigational Aids (NAVAIDs)

Navigational aids (NAVAIDs) provide two primary services to airport operations, precision guidance to a specific runway and/or non-precision guidance to a runway or the airport itself. The basic difference

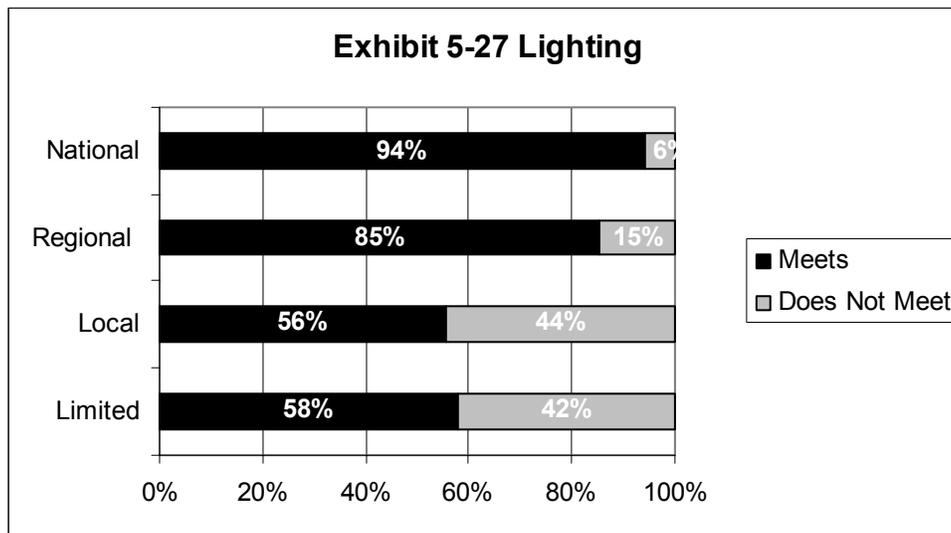
between a precision and a non-precision NAVAID is that precision provides electronic descent, alignment, and position guidance, while the non-precision provides only alignment and position location information. The need for precision and non-precision NAVAIDs is usually determined by design standards based on safety considerations and operational needs. The type, purpose, and volume of aviation activity expected at the airport are factors in the determination of an airport’s eligibility for NAVAIDs. For this analysis, NAVAID recommendations were included in the minimum facility and service standards developed for the four classes of airports. The analysis of the existing Nebraska airports to meet their identified facility and service standards related to NAVAIDs is presented in **Exhibit 5-26**.



As shown, less than half of the airports currently identified as National meet the standard for NAVAIDs (8 out of 17). For the 27 Regional Airports in the Nebraska Aviation System, 23 met the NAVAIDs objective. It was determined that of the 27 Local Airports, 13 airports met the NAVAID objective. This objective is not applicable to the Limited Airports because no approach was determined to be necessary for this class of airports.

Lighting

For the NASP, lighting was identified in terms of runway lighting, as well as a beacon to identify the location of an airport at night. Runway lighting is in the form of high intensity (HIRL), medium intensity (MIRL), or low intensity (LIRL). The minimum facility standards identified in Chapter Four for each of the four airport classifications recommended specific lighting for each class of airports. **Exhibit 5-27** presents a summary of the adequacy of the existing airports to meet the lighting standards by classification.

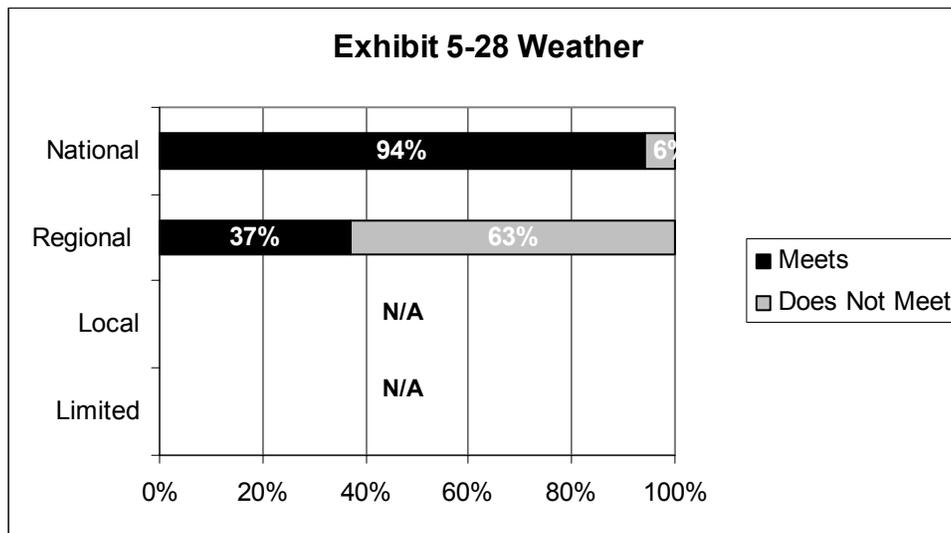


Weather

Weather reporting facilities provide measurements and process surface weather observations for use by pilots wanting to access an airport. There are various types of weather reporting facilities, including the following:

- ❑ Automated Observation Weather System (AWOS) – This equipment automatically gathers weather data from various locations on an airport and transmits the information directly to pilots by means of computer-generated voice messages over a discrete frequency.
- ❑ Automated Surface Observation System (ASOS) – The ASOS is the primary surface weather observation system of the U.S. The ASOS has more sophisticated capabilities than the AWOS. The ASOS provides continuous minute-by-minute observations and performs the basic observing functions necessary to generate a Surface Aviation Observation (SAO) and other aviation weather information.
- ❑ Low Level Wind Shear Alert System (LLWAS) – Provides the air traffic control tower with information on wind conditions near the runway. It consists of an array of anemometers that read wind velocity and direction around the airport and signal the sudden changes that indicate wind shear.
- ❑ Limited Aviation Weather Reporting Station (LAWRS) – This system can be supplemental to an existing ASOS or AWOS system to provide additional weather data.
- ❑ Super Unicom – The Super Unicom is FAA certified for altimeter settings among other weather data, which is required for GPS approach implementation.

For benchmark analysis, the existing weather detection facilities at each airport in the Nebraska airport system were identified and compared to the facility standards for the various airport classifications. **Exhibit 5-28** summarizes the results of this analysis by airport functional level. As shown, weather reporting facilities were only recommended for the National and Regional airport classifications.



Of the 17 National Airports in Nebraska, 16 meet the FAA’s minimum weather system facility requirements, with only North Omaha falling short. Only 10 out of 27 Regional Airports meet the minimum requirements.

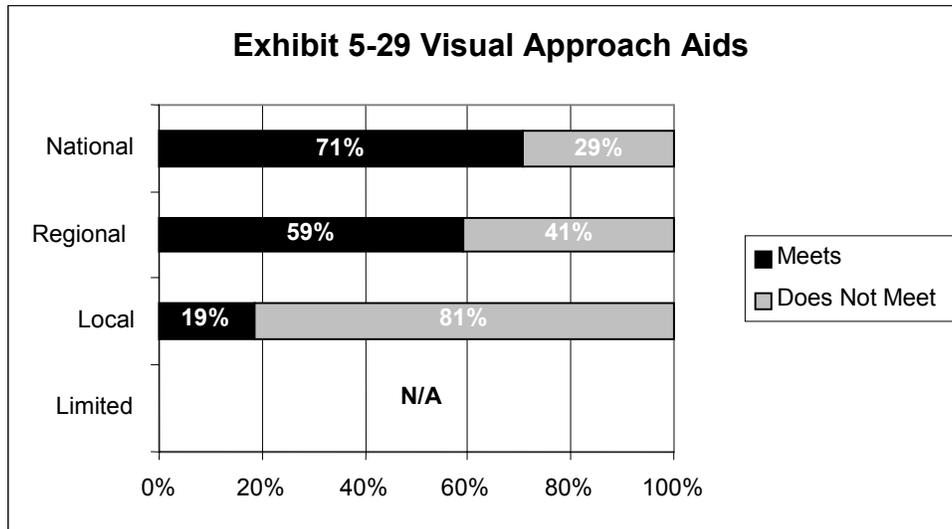
Visual Approach Aids

Information presented for system airports presented in the **Exhibit 5-29** include the analysis of these types of Visual Approach Aids:

- ❑ Medium Intensity Approach Lighting System (MALS) – An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on final approach for landing. A MALS is a standardized arrangement of white and red lights, consisting of extended centerline lighting, with crossbars sited at specific intervals back along the approach path from the threshold before the runway is reached.
- ❑ Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) – A MALSR is a MALS with runway alignment indicator lights that provide the pilot with information on the alignment with the centerline of the runway.
- ❑ Omni Directional Approach Lighting System (ODALS) - ODALS consists of seven omni directional flashing lights located in the approach area of a nonprecision runway.
- ❑ Runway End Identification Lights (REILs) – An airport facility in the terminal area navigation system consisting of one flashing white high-intensity light installed at each approach end corner of the runway and directed toward the approach zone, which enables the pilot to identify the threshold of usable runway.
- ❑ Precision Approach Path Indicators (PAPIs) – A system of lights on an airport that provides visual descent guidance to the pilot of an aircraft approaching a runway. PAPIs provide 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 he or she is “on path” if seeing red/white. The pilot is “above the path” if he or she sees white/white and “below the path” if he or she sees red/red.

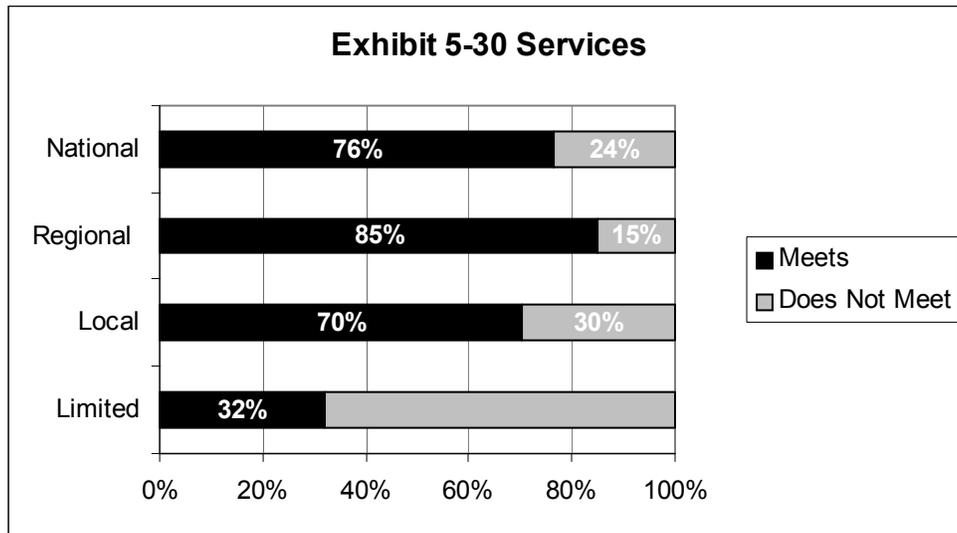
- Visual Approach Slope Indicators (VASIs) – Similar to PAPIs, but VASIs are no longer manufactured and are being replaced by PAPIs at the end of their useful life.



In terms of meeting the standards set for visual approach aids, 11 of the 17 National Airports, 15 of the 27 Regional Airports, and 5 of the 27 Local Airports meet their identified minimum standards. Limited airports were not recommended to have any minimum standards for visual approach aids.

Services

While an airport’s facilities such as runways and taxiways are important to its use, the provision of services also contributes to an airport’s activity levels. Services were identified as phone, restroom, fixed-base operator (FBO), maintenance, fuel, ground transportation, and communications. The availability of these services at the airports and the minimum standards set for the four airport classifications were reviewed for this analysis. The availability of fuel and the presence of an FBO were examined separately in subsequent sections. **Exhibit 5-30** summarizes the results by airport classification for the other services examined in this analysis.

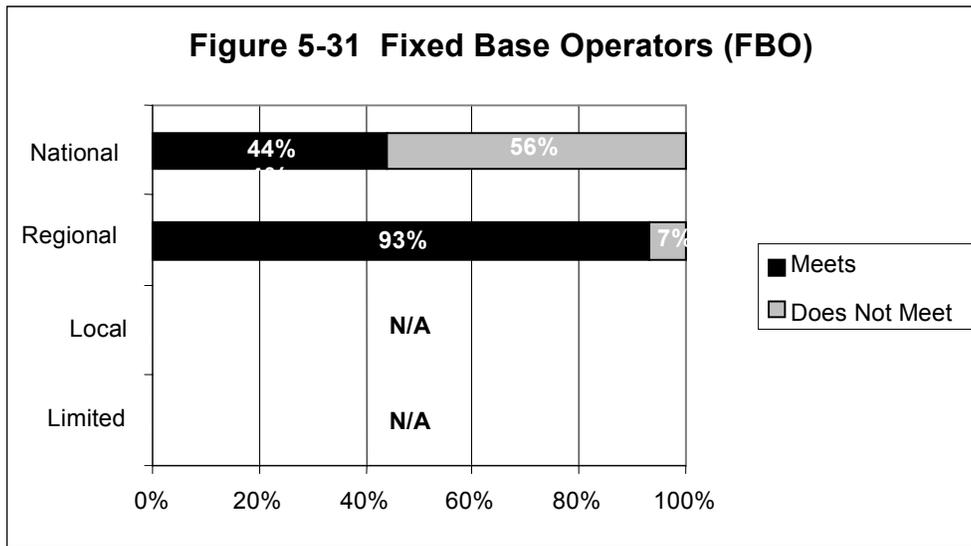


As shown, many of the airports in Nebraska do not provide sufficient facilities to meet the identified minimum standards. For the National airports, the following are the specific services lacking at the four National airports:

- ❑ Columbus – lacks a remote communications outlet (RCO)
- ❑ Fremont – lacks an RCO and ground transportation
- ❑ Millard – lacks an RCO
- ❑ North Omaha – lacks an RCO, jet fuel, and ground transportation

Fixed-Base Operators (FBO)

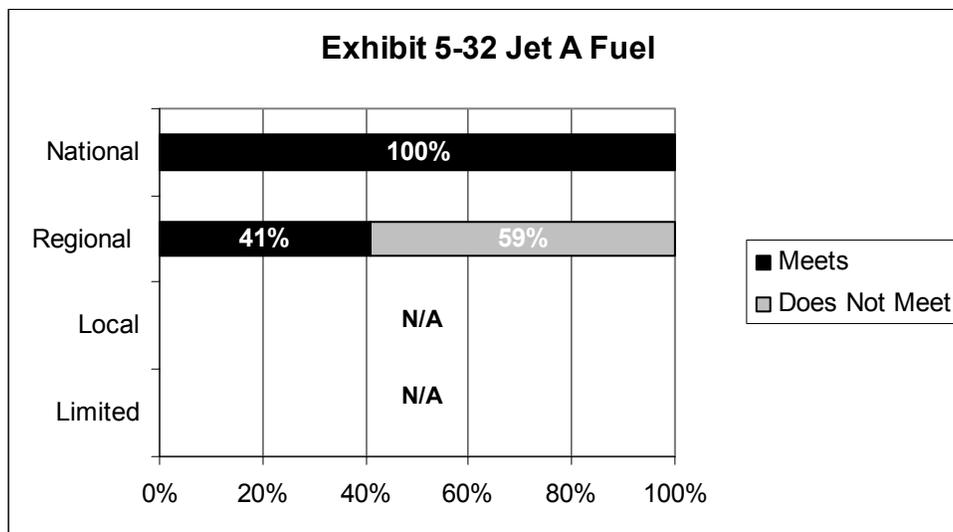
The Nebraska Aviation System provides that in order for National and Regional class airports to meet the minimum facility and service objectives, a fixed base operator should provide service at the airports. **Exhibit 5-31** summarizes the results by airport classification for the presence of an FBO at the National and Regional airports.



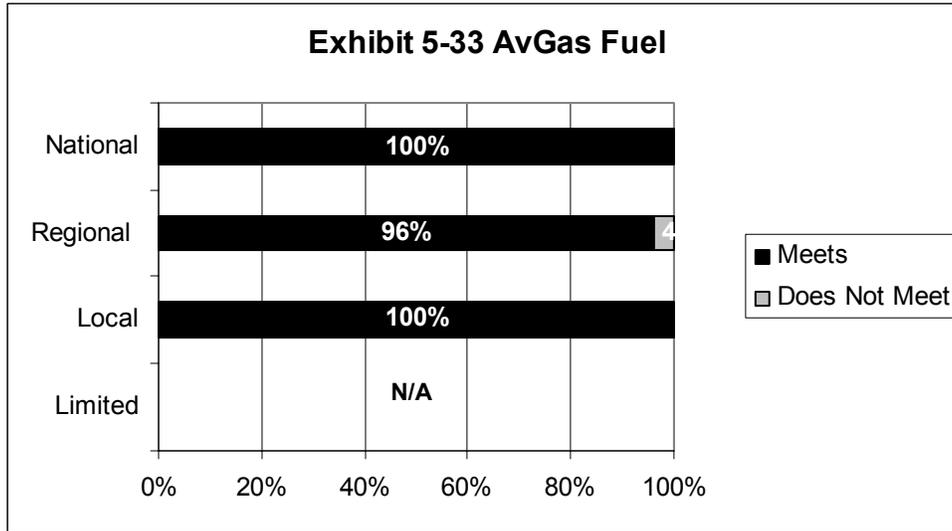
As shown, 12 out of 17 National airports in Nebraska have an FBO, while 25 out of 27 Regional Airports in the system currently meet the identified minimum standard.

Fuel

Fuel is an important indicator of the type and level of activity that occurs at an airport. Airports that provide jet fuel are more likely to be used by larger and more sophisticated aircraft. For purposes of this analysis, provision of jet fuel versus AvGas was analyzed separately. The minimum facility and service standards identified that National and Regional Airports should provide jet fuel and AvGas, and that Local Airports should provide AvGas. Exhibits 5-32 and 5-33 present the results of the analysis for jet fuel and AvGas.



Of the 17 National Airports in the system, 16 meet the Jet A fuel facility requirements, while 11 out of 27 Regional Airports met the objective for jet fuel.



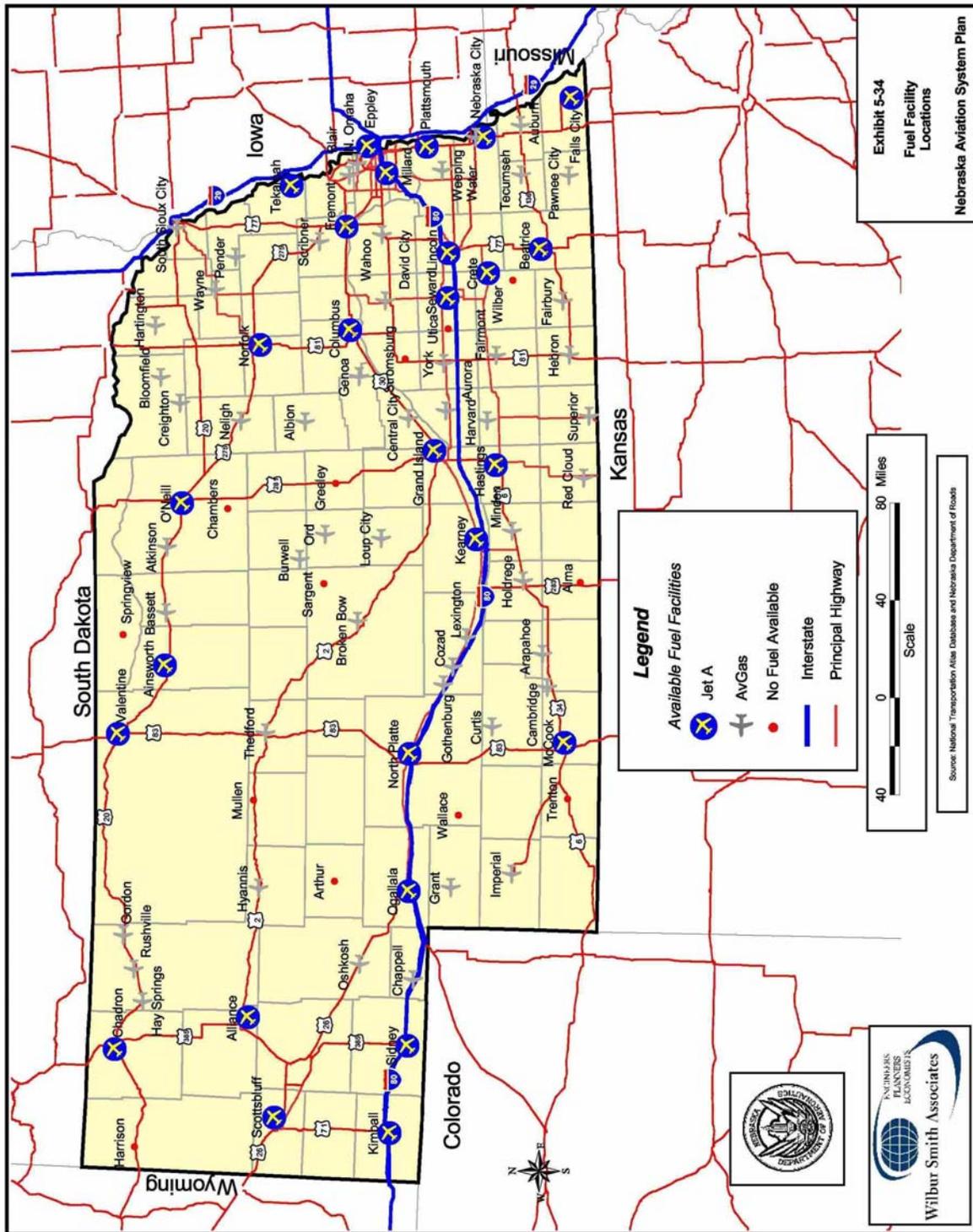
While examining the AvGas facilities for the Nebraska airports, it was determined that all 17 of the National Airports in the system met the objective for providing AvGas. Of the 27 Regional Airports in the Nebraska Aviation System, 26 met the AvGas objective. For the Local Airports, data were only available for 23 airports and these 23 airports all reported that they provided AvGas.

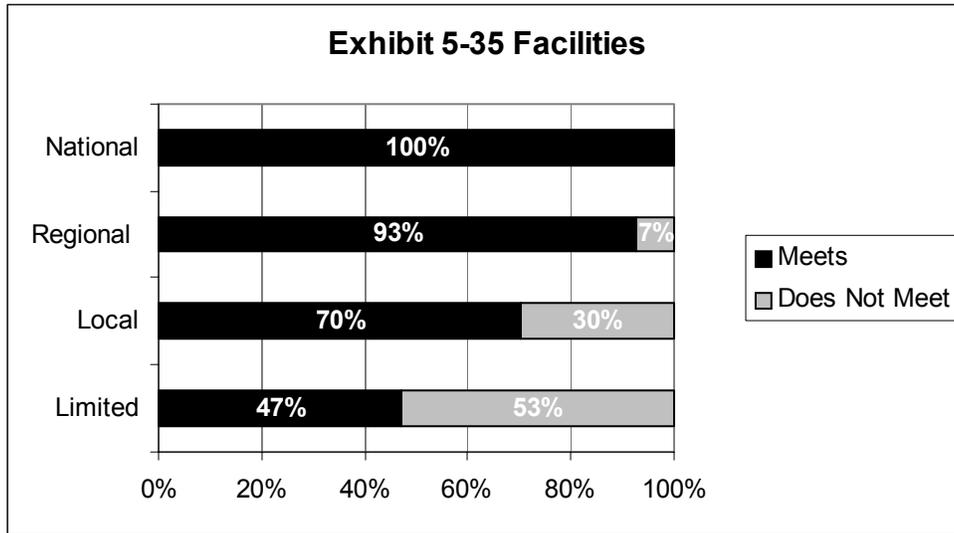
Exhibit 5-34 geographically displays the airports in the Nebraska Aviation System and the types of fuel facilities, if any, available at each.

Facilities

For analysis of the facilities benchmark, existing items such as terminal, aircraft apron, hangars, auto parking, pilot’s lounge, etc. were examined at each airport in the Nebraska airport system. Chapter Four presented the minimum standards for facilities for the four airport classifications. **Exhibit 5-35** summarizes the results of the facilities analysis by airport functional level.

EXHIBIT 5-34

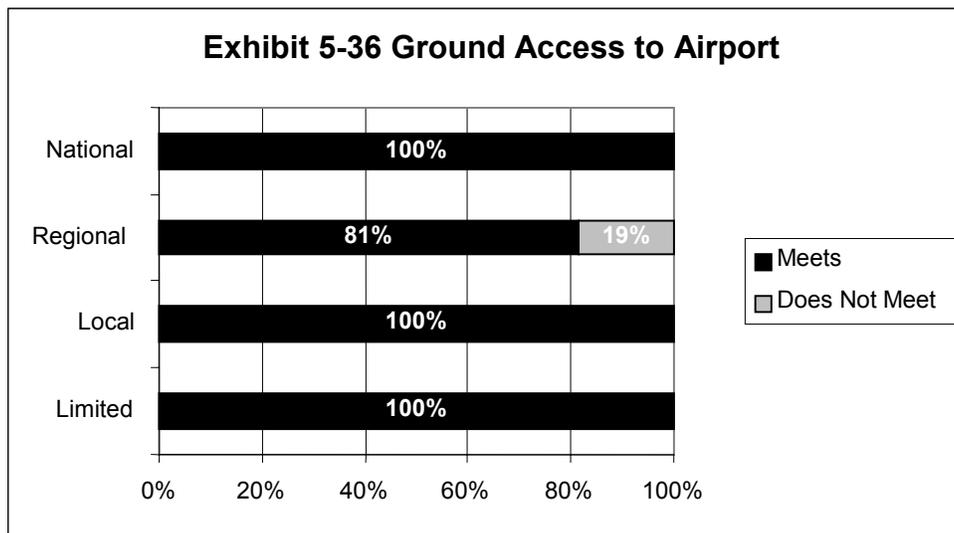




The results showed that all 17 of the National Airports in the system met the facilities objective. Additionally, of the 27 Regional Airports in the Nebraska Aviation System, 25 met the facilities objective. For the Local Airports, 19 of the 27 reported facilities that met the objective at this level, and 17 of the 19 Limited Airports in the Nebraska Aviation System reported facilities that meet the Limited Airport minimum requirements.

Ground Access To Airport

The condition of the ground access from the Central Business District (CBD) to the airport was also analyzed as part of the minimum standards. The analysis focused on whether the road was paved and if signs were provided directing users to the airport. The existing condition of this route was examined at each airport in the Nebraska airport system and summarized by airport functional level in **Exhibits 5-36**.



As shown above, all of the 17 National Airports in the Nebraska Aviation System meet the objective for ground access from the CBD to the airport. Approximately 22 of the 27 Regional Airports in the Nebraska Aviation System met the ground access objective. For the Local Airports, all 27 in the system reported meeting the objective at this level. All 19 Limited Airports reported facilities that meet the ground access objective.

Airports Meeting FAA Operational Capacity Guidelines

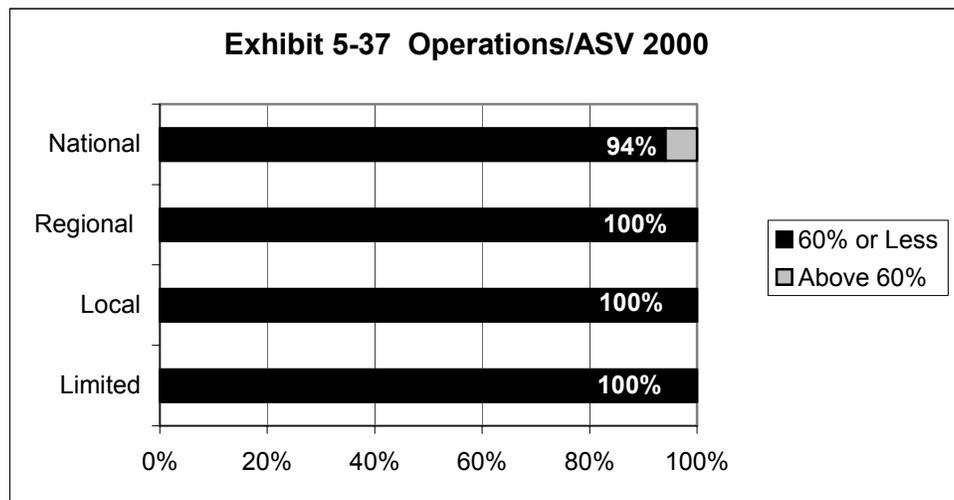
An adequate airport system should provide ample capacity to accommodate current and future activity levels. The adequacy of Nebraska's airport system, as it relates to activity, was evaluated based on the relationship between operational capacity and annual operational demand levels. The benchmark used in this study to review operational capacity and delay was the relationship between each airport's annual service volume (ASV), which measures an airport's ability to process activity, as well as each airport's current and future annual operational levels. This benchmark identified those airports operating at approximately 60 percent or less of their annual capacity for the current time frame.

For this analysis, an annual service volume (ASV) for each of the system airports was calculated. ASV represents an estimate of the total number of annual operations an airport is capable of processing when there is always an aircraft ready to take off or land. Each airport's individual ASV was calculated using factors such as the number of taxiways, the spacing of taxiway exits, the mix of the aircraft operating at the airport, the facility's navigational aids, and other factors. Data contained in FAA Advisory Circular 150/5060-5, Change 2 on airport capacity and delay was used to calculate an ASV for each system airport.

Based on prior studies of airport operating capacity, the FAA has determined that when annual operations at an airport reach 60 percent of that airport's calculated annual operating capacity, operational delays can occur. By the time an airport's annual operations consume 80 percent of its available annual operating capacity, noticeable operational delays are likely. An airport can operate even when its annual operational levels exceed 100 percent of its annual capacity, but delays are significant and frequent. For long range planning, the FAA recommends that when operations at an airport reach 60 percent of that facility's annual capacity, plans should be formulated to either increase capacity or to manage demand. When operations reach 80 percent of an airport's annual operating capacity, plans should be implemented to address the capacity shortfall.

For this benchmark, each airport's ASV was compared to its total annual operations for the current time frame. The objective was to identify those system airports whose annual activity levels have exceeded 60 percent of their annual operating capacity.

As shown in **Exhibit 5-37**, in 2000, 99 percent of all system airports were operating below 60 percent of their available operational capacity. Within the Regional, Local, and Limited Airport categories, all airports were operating below 60 percent of their available annual capacity. In the National Airport category, 94 percent of system airports were operating below the 60 percent capacity level in 2000. The one airport in the National Airport category whose operations exceeded 60 percent of its capacity in 2000 was Eppley Airfield. Runway construction is currently underway at Eppley Airfield to address their airfield capacity issue. Construction of this runway will provide sufficient operational capacity for the airport for the long term.

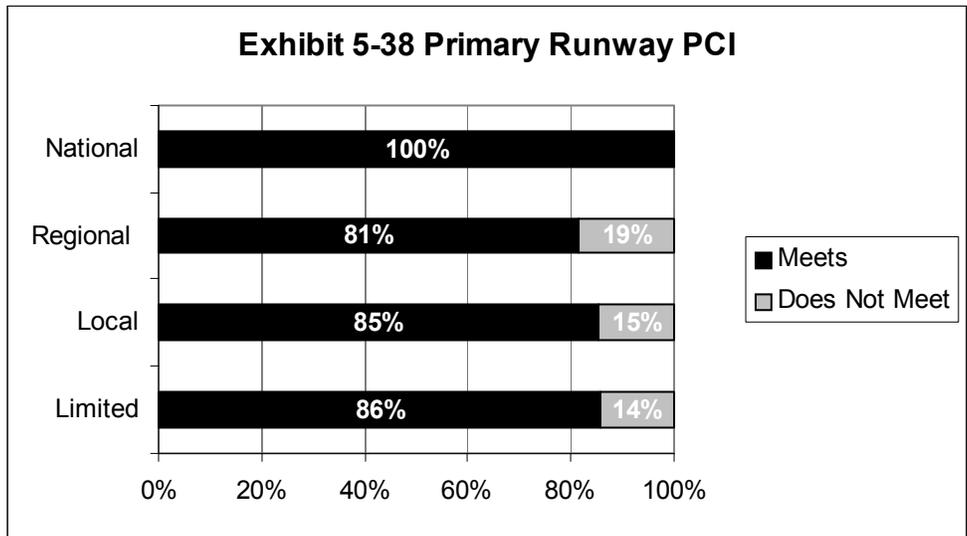


This analysis indicates that sufficient operational capacity is provided with the existing system of airports. While it may appear that excess capacity exists, capacity cannot be considered on a statewide basis as sufficient facilities need to be provided throughout the state to serve demand, even if demand levels are not great.

Airports Meeting PCI Goals

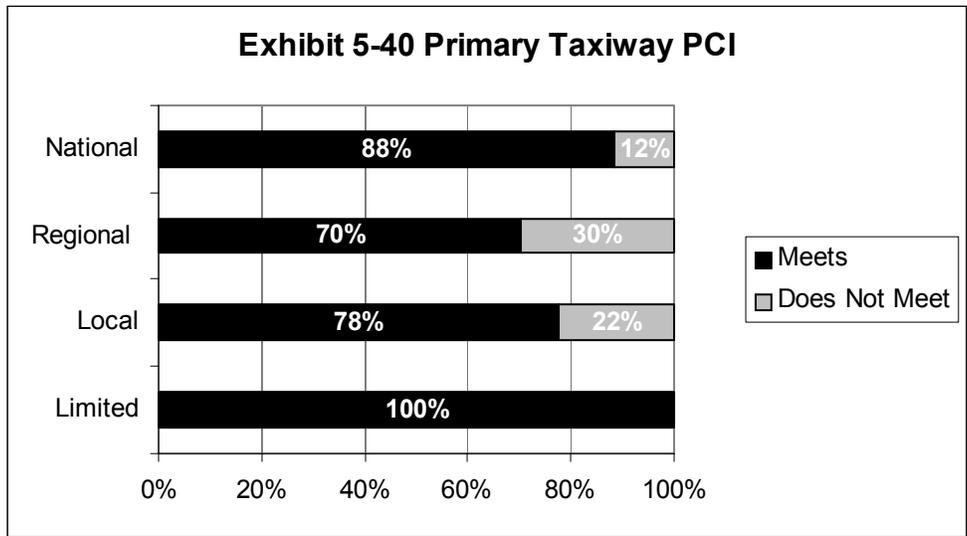
The Nebraska Department of Aeronautics and the FAA regularly invest in maintenance of airport pavement including runways, taxiways, and aprons. NDA inspects pavements to determine their condition. To determine the adequacy of the existing pavement conditions at Nebraska's airports, the pavement condition index (PCI), calculated through on-site inspections at the airports, was used. PCI is expressed as a number between 0 and 100, where 100 represents a pavement in excellent condition. In an actual PCI survey, sections of pavement are inspected for visual signs of deterioration. Generally speaking, an average PCI value greater than 70 represents pavement that is in excellent or good condition that will benefit from preventive maintenance actions such as crack and joint sealing and surface treatments.

PCIs were evaluated for the primary runway, taxiway, and apron area at the Nebraska airports. The analysis focused on airports with PCI ratings above or below 70. **Exhibit 5-38** presents the analysis of the primary runway PCIs. **Exhibit 5-39** graphically depicts the primary runway PCIs.



As shown, primary runway pavements are well maintained throughout Nebraska. All of the National Airports have PCIs for the primary runway at or above 70, while the other three categories are in the 80 percent range.

In terms of PCIs for the primary taxiway, **Exhibit 5-40** presents the analysis. **Exhibit 5-41** graphically depicts the primary taxiway PCIs.



Again, primary taxiways are well maintained throughout Nebraska.

Exhibit 5-42 presents the analysis of the PCIs for the aprons at the Nebraska airports. For aprons, a PCI of over 60 was considered to be adequate. **Exhibit 5-43** graphically depicts the apron PCIs.

EXHIBIT 5-39

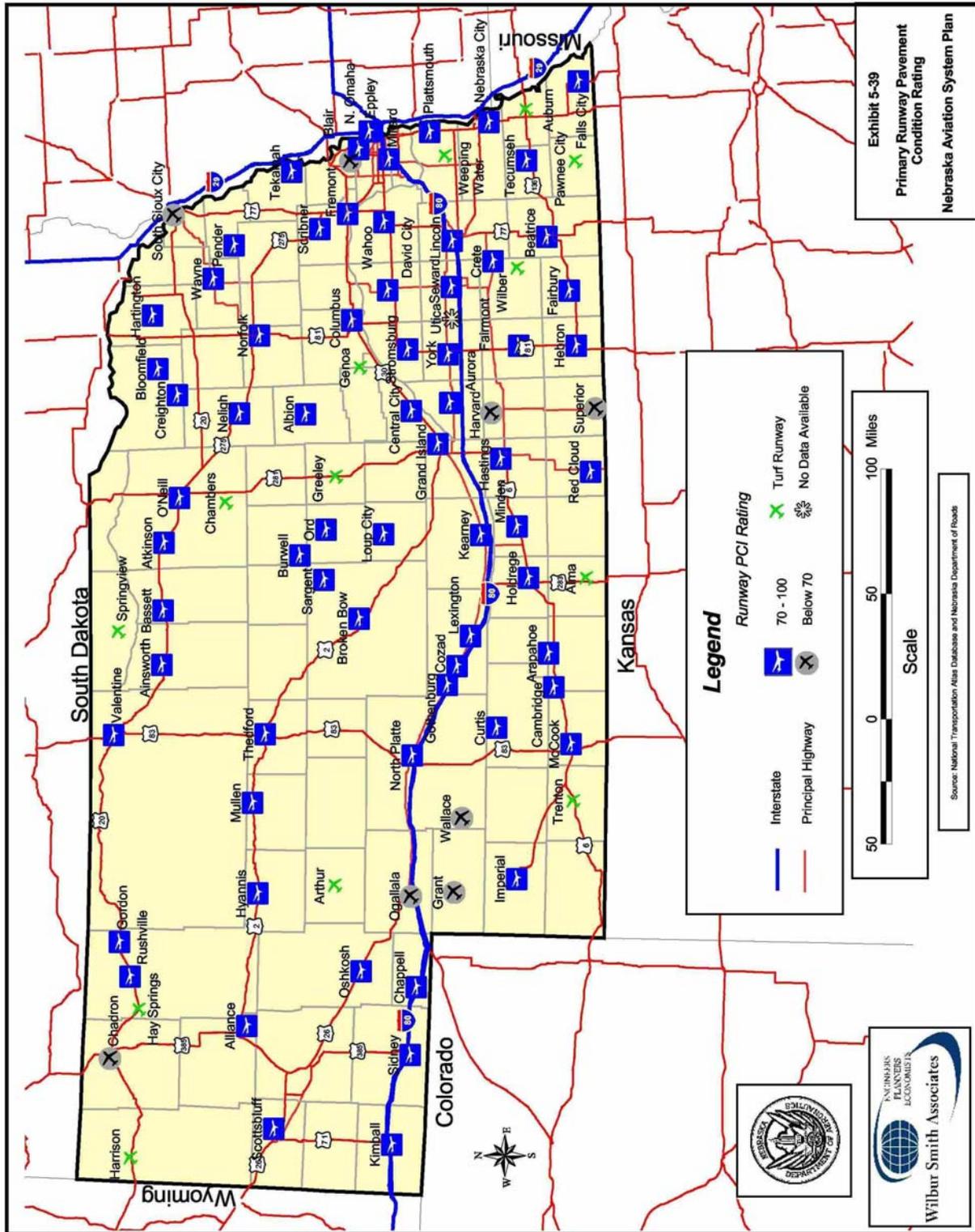
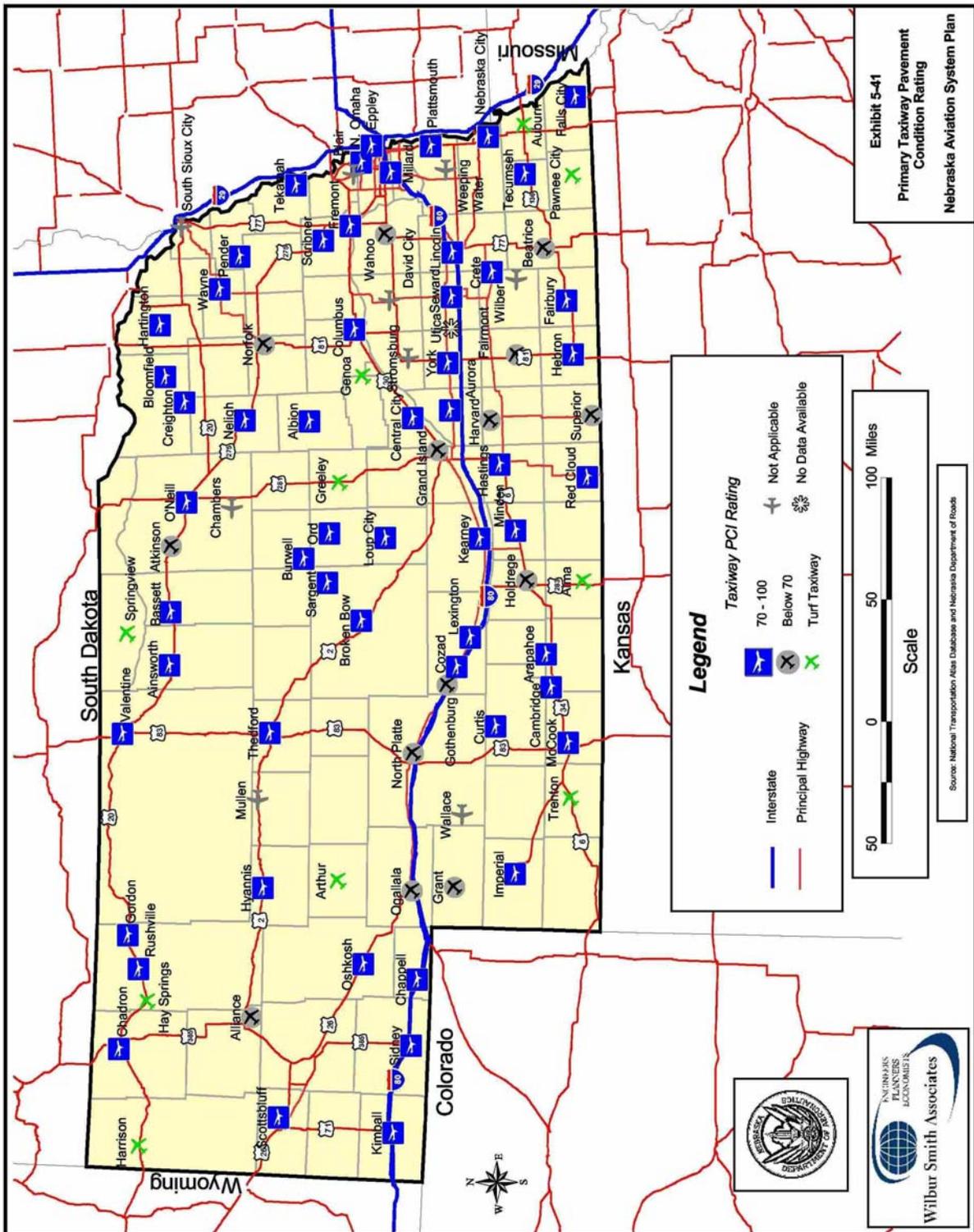
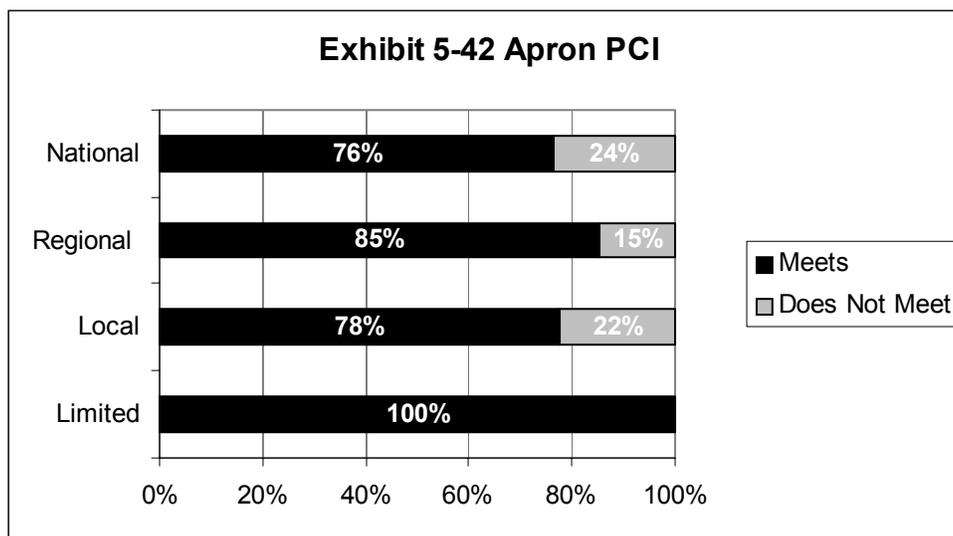


EXHIBIT 5-41





As shown, pavement maintenance is a primary focus of NDA with all four of the airport categories showing greater than 75 percent of the airports with sufficient PCIs.

SOCIAL/CULTURAL

While it was determined that an aviation system needs to meet the economic needs of the State, it is also important for aviation to support social/cultural activities that are associated with Nebraska. Tourist activities such as hunting and population migration into the State because of lifestyle choices should also be supported by the State's airport infrastructure. Through discussions with the study's Planning Advisory Committee, it was determined that analysis of social/cultural resources and the ability of aviation to support these resources should be analyzed.

It was noted that airports should serve the State's tourism and cultural centers, as well as serve more isolated areas. These two items are discussed below.

Airports Serving Tourism/Cultural Centers

Tourism is an important part of Nebraska's economy, serving as the third largest earner of revenue from outside the State after agriculture and manufacturing, according to the Nebraska Department of Economic Development (DED). Information was sought from DED to determine what role aviation might play in supporting this economic sector. Attendance at selected attractions was sought, as well as information on hotel stays.

Review of the information provided revealed that aviation's role could not be specifically identified, as it appeared that many of the attractions were more "drive"-oriented as opposed to flying attractions. For example, attendance at state parks and lakes would most likely be "drive" attractions, as visitors brought their equipment including boats. In addition, the attendance at the attractions was not determined by origin. It was assumed that many of the attendees would actually be Nebraska residents who drove to the attractions versus flying.

EXHIBIT 5-43

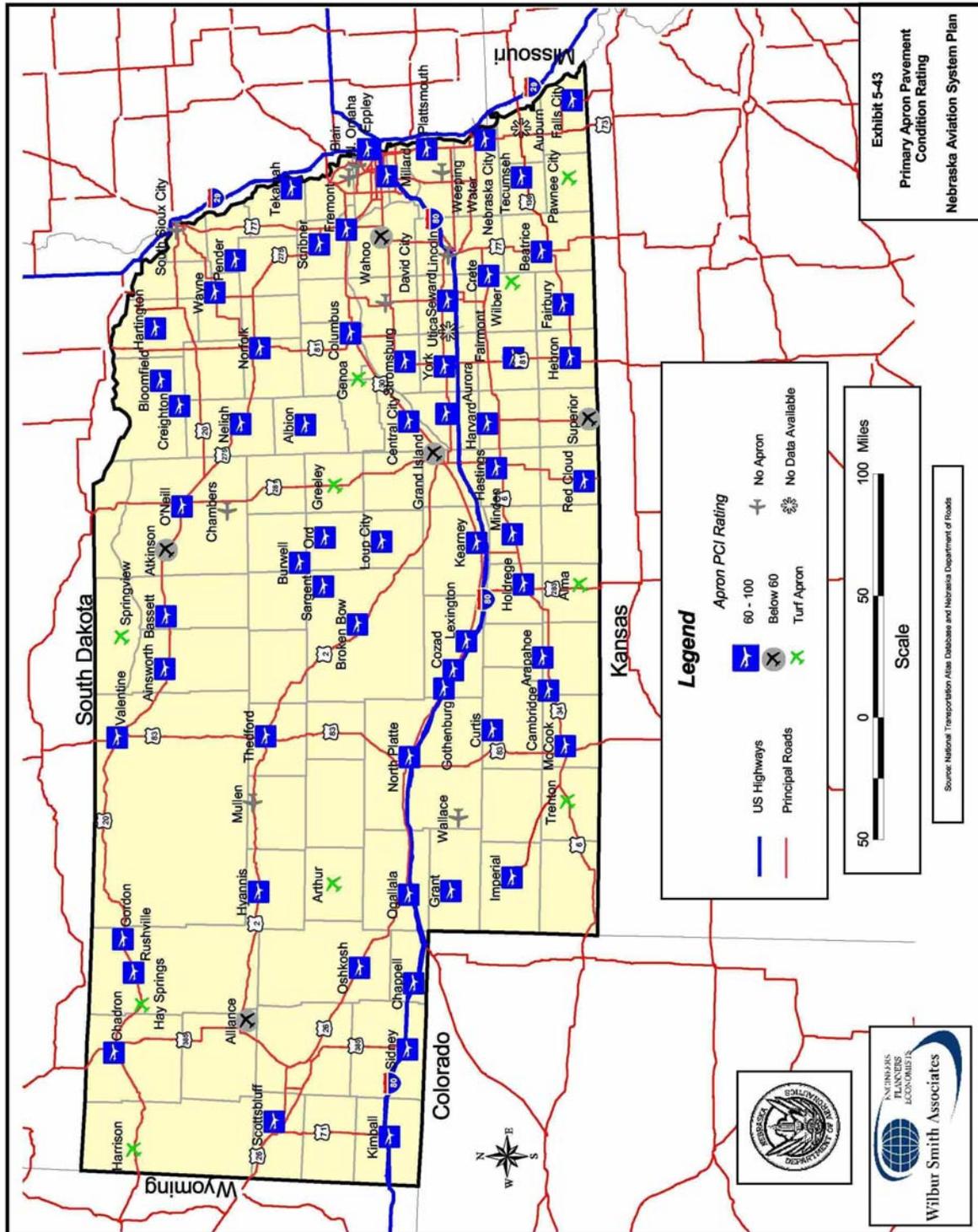


Exhibit 5-43
Primary Apron Pavement
Condition Rating
Nebraska Aviation System Plan

DED did provide information that noted that Nebraskans and visitors to Nebraska made 19.3 million trips in the State in 1999 to destinations 100 miles or more away from home. It was also noted that for trips by visitors, the leading states of origin were, in order, Kansas, Iowa, Colorado, Missouri, South Dakota, Illinois, and Minnesota. The source of this information was not noted.

Therefore, an analysis of Nebraska airports' abilities to serve tourism and cultural centers was not conducted.

Airports Serving More Isolated Areas

Airports provide an important mode of transportation, especially in areas that are not densely populated and that are removed from major metropolitan areas. Previous sections of this chapter have provided information on drive times from the airports in the system, as well as the locations of hospitals in relation to airports capable of accommodating emergency medical flights. It was determined that 98.9 percent of the State's population is within a 30-minute drive time from an existing Nebraska system airport and that 84 percent of the State's land area is covered by the 30-minute drive times of these airports. While this does leave some gaps in coverage of the State's land area, there are no population centers of more than 5,000 in these areas. Generally speaking, the areas that do not fall within the existing coverage of the Nebraska airport system are very sparsely populated and could not support an airport either from a demand or a financial standpoint. Review of the existing airport coverage (see Exhibit 5-8) indicates that airports are adequately provided to geographically serve the State's population and land areas.