Chapter 2 – Inventory of Existing Conditions

Chapter 2 – Inventory of Existing Conditions

The purpose of this chapter is to document the existing facilities and conditions at Kittitas County Airport - Bowers Field (Airport Identifier Code: ELN). The airport is owned and operated by Kittitas County, Washington.

This project replaces the 2004 Airport Master Plan Update[1] and the Kittitas County – Bowers Field ALP Update – Airfield Needs Assessment,[2] which served as primary sources for inventory data. However, where available, more current or comprehensive data have been included in the chapter to illustrate current conditions. Existing airfield facilities were examined during on-site inspections to update facility inventory data. The consultants also worked closely with county staff to review current facility and operational data maintained by the county.

Airport Setting

Bowers Field is located in Ellensburg, in central Kittitas County, Washington. The airport is located just outside the Ellensburg city limits, but within the Ellensburg Urban Growth Area (UGA), approximately two miles north of the city center.

Ellensburg is the largest city in Kittitas County and is the county seat. The U.S. Census Bureau 2014 estimates of population were 42,522 for Kittitas County and 18,774 for the City of Ellensburg (incorporated area only). [3]

[1] Bowers Field Airport Master Plan Update (Bucher, Willis, Ratliff and Associates, 2004)

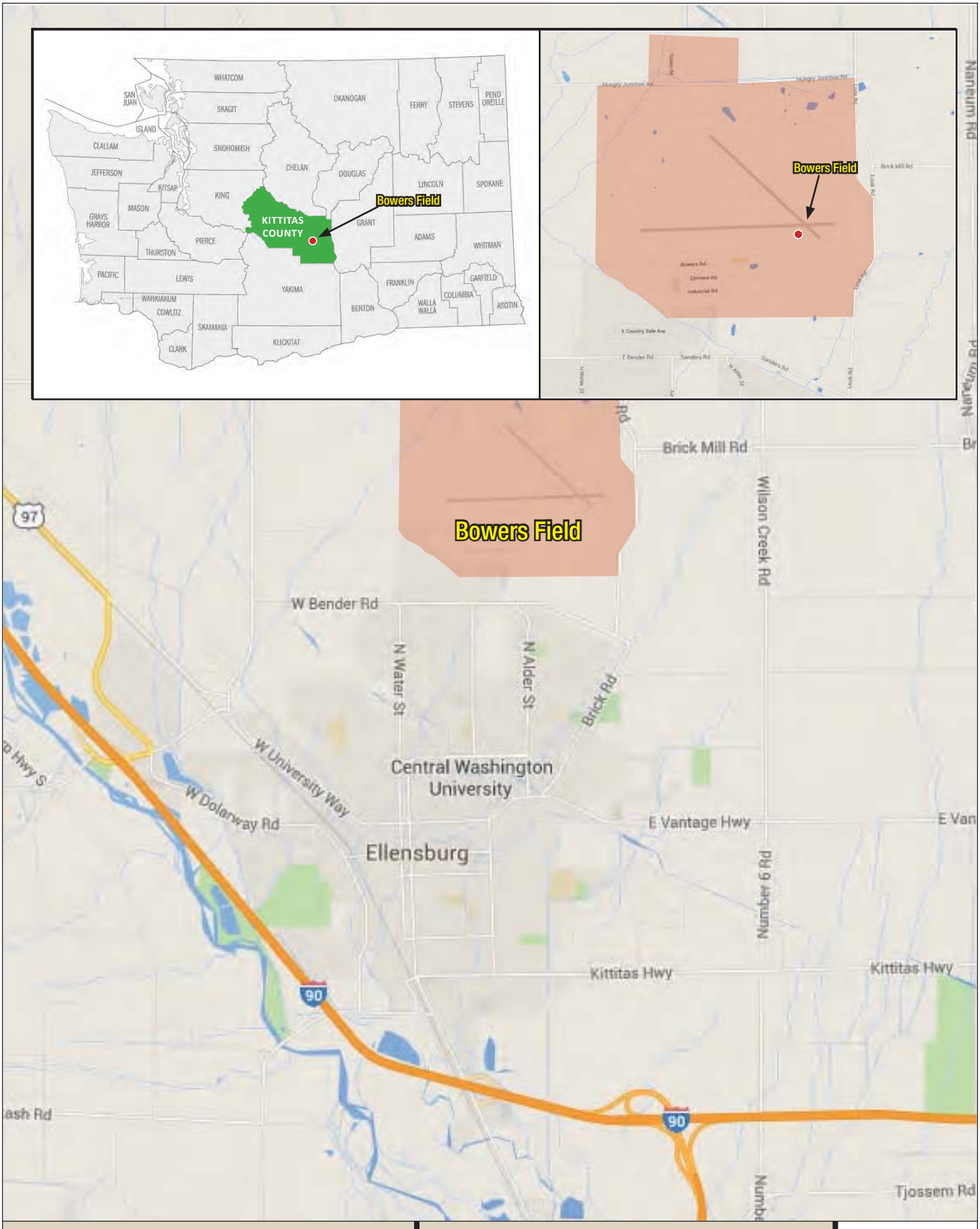
[2] Kittitas County – Bowers Field ALP Update – Airfield Needs Assessment (Century West Engineering Corporation, 2012)

[3] US Census Bureau, QuickFacts, http://www.census.gov/quickfacts/table/PST045214/00,53037,5321240, December 30, 2015.

Kittitas County extends from the east slopes of the Cascade Range to the Columbia River Basin. The County boundary is formed by prominent geographic features including the Cascade and Wenatchee Mountain ranges, and Columbia River. Neighboring counties include: King (west), Chelan (north), Douglas (northeast), Grant (east), Yakima (south & southwest), and Pierce (west).

Ellensburg is located approximately 110 miles east of Seattle and 174 miles west of Spokane on U.S. Interstate 90 (I-90), the main east-west travel route across Washington. Ellensburg is located approximately 35 miles north of Yakima via Interstate 82 (I-82). U.S. Highway 97 travels through Kittitas County and connects with U.S. Highway 2 to access Wenatchee, Leavenworth, and the Puget Sound via Stevens Pass. U.S. Highway 97 is a primary north-south inland route that extends from north-central California to British Columbia.

A location and vicinity map is provided in **Figure 2-1**.



LOCATION MAP
FIGURE 2-1

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

Local and Community Setting

HISTORY

According to the Kittitas County website, Native American inhabitants (Kittitas or Upper Yakama Indians) in the Kittitas Valley can be traced back to at least the early 1700s,[4] although the earliest indigenous peoples in the Columbia Basin can be traced back thousands of years. Historians note that the Kittitas Valley provided a unique and vital food source that included salmon, game, roots and berries, and was a traditional gathering place for tribes located east of the Cascade Mountains. As western settlers arrived in the Kittitas Valley, the Native American population became dispersed. Many initially relocated to the Yakima Valley and lower valleys, and were eventually relocated to the Yakama Indian Reservation, which was created by the Treaty of 1855 with the United States government.

Early settlers began arriving in the Kittitas Valley in late 1860s and Ellensburg was originally platted in 1875. The City of Ellensburg was incorporated in 1883 and elected its first city council members in 1886. Kittitas County was formed in November of 1883 when it was partitioned from the northern part of Yakima County.

According to local records, William Bud Wilson was an early settler who had the first claim and built the first log cabin in 1868 where the City of Ellensburg now stands. In 1870, two cowboys moved a log house to a spot nearby so they could open it as a store. Another young settler made a sign for the store and dubbed it "Robber's Roost." Settlers were few and the post depended on trade in furs and horses with Native Americans to buy supplies. In 1872, John A. Shoudy, a Civil War veteran, bought the store and 160 acres of land. In 1873, Mr. Shoudy started a postal service in Ellensburg. He and his wife Mary Ellen platted the Town of Ellensburg and it was officially filed in April 1875. The new town was named Ellensburg after his wife.[5]

Land was donated to the Northern Pacific Railroad with the hope that Ellensburg would become a rail center to serve the areas farms, forests, and mines. Initially, a rail siding was constructed in the town followed by construction of direct rail service in 1886, which spurred development of markets in cattle, dairy products, timber, wool, and hay. [6]

On July 4, 1889, Ellensburg experienced a catastrophic fire that destroyed 10 business blocks and 200 homes. Following the blaze, Ellensburg quickly rebuilt, including the majority of the city's current historic district, which contains numerous brick and masonry buildings.

Central Washington University (CWU) was established in Ellensburg in 1891, as the Washington State Normal School. 2016 marked CWU's 125th anniversary, which includes all but eight years of the City of Ellensburg's history.

[4] Jennifer Ochran, About The County, https://www.co.kittitas.wa.us/about/history.aspx.

[5] City of Ellensburg Webpage (History)

[6] Ellensburg Comprehensive Plan, 2006 Update (Amended thru 2014), Community Profile, p. 13.

Major components of the region's economy include retail trade, medical services, government and related public administration, manufacturing, agriculture, business services, and tourism. Leading employers include Central Washington University (CWU), Kittitas Valley Healthcare (KVH), the Ellensburg School District, Kittitas County, Anderson Hay & Grain, Elmview, Fred Meyer, and the City of Ellensburg.[7] Detailed historic and projected socioeconomic data (population, employment, income, etc.) will be presented in the Aviation Activity Forecast chapter.

Central Washington University (CWU) is Ellensburg's largest employer with approximately 1,300 employees. University events and campus facilities provide a wide range of amenities to the community and draw visitors year round. The university currently offers undergraduate and graduate degree programs with more than 135 majors offered through its five colleges. Total student enrollment in 2015-2016 was 10,912.[8]

Tourism and recreation are a significant segments of the local economy. Ellensburg's historic downtown and numerous events held throughout the year draw visitors from throughout the United States and internationally. The largest annual event is the combined Ellensburg Rodeo and Kittitas County Fair, which are held over the Labor Day Weekend and attract upwards of 75,000 people over five days. The Ellensburg Rodeo is a premier professional rodeo event that began in 1923 and has grown to become one of America's top 10 professional rodeos.

Kittitas Valley Healthcare (KVH) provides hospital and a variety of clinic services in Ellensburg, and urgent care and clinic services in Cle Elum. The Emergency Department at KVH Hospital is designated as a Level IV trauma center by the Washington Department of Health Services. In 2014, KVH Hospital was recognized by the National Rural Healthcare Association as a "Top 20" critical access hospital (ranked among 1,300 critical access hospitals in the nation).[9]

Physical Geography

Kittitas County has a land area of 2,135 square miles (1.48 million acres) and is located at the geographic center of Washington State. The land area comprises varied terrain sloping to the east and south from the high Cascades to the Columbia River. More than half the county is covered by coniferous forests and approximately thirty percent (30%) is in pasture or unimproved grazing land. Less than two percent (2%) of the County is urbanized. [10] Elevations within the county range from just under 500 feet above mean sea level (MSL) (Columbia River) to 7,960 feet (Mt. Daniel).

[7] Kittitas County Chamber of Commerce, Employment Resources, 2016.

[8] Central Washington University Website

[9] kvhhealthcare.org

[10] City of Ellensburg History, http://www.ci.ellensburg.wa.us/index.aspx?nid=180, December 30, 2015.

The Kittitas Valley is located on a fertile plateau in the Columbia Basin. The Ellensburg Plateau is composed of agricultural land, including areas within 100-year floodplains of the Yakima River and several smaller drainages.

The origin of the Columbia Basin dates back tens of millions of years. The basin was transformed through a series of major geologic events, including the Great Missoula Floods, which occurred 14,000 to 18,000 years ago. The wide basalt plateau cut by the Columbia River stretches across portions of Washington, Oregon, and Idaho.

The topography in Kittitas County includes snow-capped mountains, irrigated valley land, desert terrain, and two major rivers, the Yakima and the Columbia. The Yakima River flows through the Kittitas Valley, originating in the Cascade Mountains at Keechelus Lake and ending at the Columbia River in Richland, Washington.

Climate

Ellensburg has a semi-arid climate that has strong winters and summers with four distinct seasons. Historic climatic data for Bowers field is available from 1940 through 2015.[11] The data indicate that July and August are typically the warmest months; December and January are the coldest. On a monthly basis, the average maximum temperature is 84.0 degrees Fahrenheit (July) with the average minimum temperature of 32.2 degrees (January). Ellensburg averages 9.12 inches of precipitation and 35.2 inches of snowfall annually. Available wind data indicate that prevailing winds predominate from the northwest, favoring Runway 11/29.

Historical Aviation Activity

Bowers Field accommodates a wide variety of aeronautical activity, including small single- and multi-engine aircraft, business class turbine aircraft (business jets and turboprops), and helicopters. Existing tenants include the Central Washington University (CWU) flight training program, the Washington Department of Natural Resources (seasonal helicopter fire response), two privately owned business jets, local and CWU fixed base operators (FBO), and private aircraft owners.

The 2012 Kittitas County – Bowers Field ALP Update – Airfield Needs Assessment provides the most recent detailed estimate of airport activity. Other recent estimates include the FAA Airport Master Record Form (5010-1) and the FAA's Terminal Area Forecast (TAF), which may not reflect the most recent airport-specific activity analysis. The estimates of airport activity are summarized in **Table 2-1**. Updated estimates of airport activity will be prepared as part of the Aviation Activity Forecasts, to be presented in Chapter Three.

[11] Western Regional Climatic Center, Observation Station 452508 (1940-2015)

TABLE 2-1: BASED AIRCRAFT AND OPERATIONS – BOWERS FIELD

ACTIVITY TYPE		ACTIVITY LEVEL	
Based Aircraft Count	2012 Airfield Needs Assessment	FAA Airport Master Record Form *(12 months ending 12/30/14)*	FAA TAF Most Recent Historic Year (2014)
Single-Engine Piston	59	42	not listed
Multi-Engine Piston	3	4	not listed
Turboprop	1	0	not listed
Turbojet	2	0	not listed
Rotorcraft	0	0	not listed
Ultralight/Experimental	0	0	not listed
Glider	0	1	not listed
Military	0	0	not listed
Total Based Aircraft	**65**	**47**	**48**
Annual Aircraft Operations	**48,660**	**60,445**	**51,865**

Airfield Facilities

Bowers Field has two intersecting runways (11/29 and 7/25) with a taxiway system that provides access to all developed areas of the airfield. The primary runway is lighted; the secondary runway is not lighted.

Note: Runway 7/25 was closed in 2018. Pre-2018 information related to the runway presented in draft chapters is maintained for reference.

The airfield is equipped with onsite weather observation and supports instrument approaches with both ground-based navigational aids (located off site) and satellite-based systems (GPS). All landside facilities (aircraft parking, hangars, etc.) are located south of the runway-taxiway system. In addition to its aeronautical activities, the airport also accommodates a fully serviced industrial park and agricultural leases. **Table 2-2** summarizes airport data. **Figures 2-2** and **2-3** provide views of the existing airfield facilities and an enlarged view of south landside area and the airport industrial park.

TABLE 2-2: AIRPORT DATA

AIRPORT NAME/DESIGNATION	BOWERS FIELD (ELN)
Airport Owner	Kittitas County
Date Established	Pre-1938
Airport Category	• **National Plan of Integrated Airport Systems (NPIAS):** Nonprime Local Service, General Aviation Airport • **FAA Airport Reference Code:** B-II (as depicted on 2012 ALP) • **Washington State Aviation System Plan, Long-Term Air Transportation Study (2009):** Regional Service
Airport Acreage	Approximately 1301.03 Acres See updated Exhibit "A" Airport Property Map in Chapter 7
Airport Reference Point (ARP) Coordinates	N 47° 01' 58.9"W 120° 31' 50.5"
Airport Elevation	1,763.3 feet MSL[12]
Airport Traffic Pattern Configuration/Altitude	Left Traffic 2,673 feet MSL / 1,000 feet above ground level (AGL)
Airport Communication	Common Traffic Advisory Frequency 123.0 MHz
Airport Weather	Automated Surface Observation System (ASOS) 118.375 MHz and (509)925-2040

[12] AGIS Survey (2016)

EXISTING AIRFIELD CONDITIONS
FIGURE 2-2

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

TENANTS/BUILDINGS/FACILITIES							
1	MIDSTATE AVIATION (LOT H-21)	10	WEST TIEDOWN APRON (LOT H-10/11)	19	HANGAR (LOT H-41)	28	ELMVIEW (LOT C-30)
2	MIDSTATE AVIATION (LOT H-21)	11	WA DEPT OF NATURAL RESOURCES (LOT H-1)	20	HANGAR (LOT H-42)	29	CITY WATER WELL (LOT C-28)
3	MIDSTATE AVIATION (LOT H-21)	12	HANGAR (LOT H-32)	21	EBDA (LOT C-1)	30	MILLER REFRIGERATION (LOT C-24)
4	MIDSTATE AVIATION (LOT H-21)	13	HANGAR (LOT H-33)	22	CWU (LOT C-2)	31	AIRPORT SAFE STORAGE (LOT C-34)
5	HANGAR (LOT H-17)	14	HANGAR (LOT H-36)	23	EMERY LLC (LOT C-3)	32	ELLENSBURG PALLET (LOT C-38, C-39)
6	HANGAR (LOT H-18)	15	HANGAR (LOT H-37)	24	COUNTY STORAGE (LOT C-8)	33	CITY OF ELLENSBURG WATER TOWER
7	12-UNIT T-HANGAR (LOT H-20)	16	HANGAR (LOT H-38)	25	AIRFIELD ELECTRICAL VAULT	34	EAST TIEDOWN APRON
8	HANGAR	17	HANGAR (LOT H-39)	26	KITTCOM (911 CENTER) (LOT C-33)	35	CITY WATER WELL
9	21 UNIT HANGAR (CARERRA) (LOT H-19)	18	HANGAR (LOT H-40)	27	PRECISION AG (LOT C-31)	36	HELICOPTER PARKING (LOT H-1)

LEGEND	
PRIVATE/TENANT OWNED	
COUNTY OWNED	
CITY OWNED	

RUNWAY 7/25

Taxiway C

Taxiway B

Aviation Fuel Storage

Bowers Road

Airport Road

Beech Road

Cessna Road

Elmview Road

Falcon Road

EXISTING AIRFIELD FACILITIES
FIGURE 2-3

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

Runways

Note: Runway 7/25 was temporarily closed by NOTAM in August 2017 due to its significantly deteriorated pavement. The runway was permanently closed through submittal of FAA Form 7480 in 2018. The eastern section of runway pavement (intersection with Runway 11/29) is scheduled for removal in 2018. Maintaining a shorter and narrower version of the runway was recommended in the previous master plan and a modified version of that recommendation was maintained in the airfield development alternatives analysis in the current plan (see Chapter 6). Pre-2018 information related to the runway presented in draft chapters is maintained for reference.

Bowers Field has two intersecting runways. The primary runway (11/29) is oriented in a northwest-southeast direction (117-297 degree magnetic heading) and the secondary runway (7/25) is oriented in an east-west direction (72-252 degree magnetic heading). Runway 7/25 intersects Runway 11/29 approximately 458 feet from the Runway 29 end. **Table 2-3** summarizes the characteristics of the current runways at the airport.

TABLE 2-3: RUNWAY DATA – BOWERS FIELD

RUNWAY 7/25 (CLOSED)	*Data provided for reference (now obsolete)*
Dimensions	5,590' x 150'
Bearing	N 87.94°
Effective Gradient	0.82%
Surface/Condition	Asphalt / Very Poor and Failed
Pavement Strength	28,000 lbs. Single Wheel
Markings	Basic - Runway 7 (Poor Condition) Basic - Runway 25 (Poor Condition)
Lighting	None
Signage	Runway Hold Position Signs, Directional, Location Signs (unlighted)
RUNWAY 11/29	
Dimensions	4,301' x 150'
Bearing	N 132.98°
Effective Gradient	0.38%
Surface/Condition	Concrete – center 75' / Very Good Asphalt - Outer 37.5 feet each side / Poor
Pavement Strength	35,000 lbs. Single Wheel 57,000 lbs. Dual Wheel 100,000 lbs. Dual Tandem
Markings	Basic - Runway 11 (Fair Condition) Basic - Runway 29 (Fair Condition)
Lighting	Medium Intensity Runway Edge Lighting (MIRL); Threshold Lighting Visual Guidance Indicators • Precision Approach Slope Indicator (PAPI-4) – Runway 29 • Runway End Identifier Lights (REIL) – Runway 29 Condition: Poor (wiring and control systems)
Signage	Runway Hold Position Signs, Directional, Location Signs (unlighted)

The runway system was originally constructed in 1942 and the configuration has changed little over time. It is noted that the airport's primary runway is 1,289 feet shorter than the secondary runway. The current operational limitations for the primary and secondary runways were documented in the 2012 Airfield Needs Assessment, which defined the need to provide a 5,500-foot runway length for the design aircraft. The master plan update will reexamine the runway system to evaluate options for meeting the needs of current and future design aircraft.

As noted in the 2001 Airport Master Plan, Runway 7/25 has not been eligible for FAA funding for decades due to the wind coverage provided by the primary runway (11/29). The inability of airport sponsors to maintain WWII-era airfield pavements without FAA funding is a common problem that often results in runway closure. Kittitas County recognizes the importance of Runway 7/25 to its operations, including flight training. The County has indicated its desire to keep Runway 7/25 in service if an effective rehabilitation and funding strategy can be identified. The 2012 Airport Layout Plan recommended reducing the length and width of the runway to serve small general aviation aircraft. This recommendation will be reviewed in the alternatives evaluation in Chapter 6.

RUNWAY 11/29

Runway Designation

The 2012 Airfield Needs Assessment identified a recent change in magnetic declination that requires a change in designation for Runway 11/29. Based on the current magnetic declination and runway bearing (relative to true north), Runway 11/29 will be re-designated "12/30." The change in magnetic declination does not affect Runway 7/25. The existing runway end number markings and associated runway signage for Runway 11/29 will need to be replaced to reflect the new numbers as part of a future project. Published airport facility data, including instrument approach and departure procedures will also need to be updated.

Runway Description

Runway 11/29 is 4,301 feet long and 150 feet wide. The runway has an effective gradient of 0.38 percent, with the high point (1,763.3 feet MSL) located at the Runway 11 threshold. The runway is equipped with edge lights; Runway 29 is equipped with a visual guidance indicator (VGI) and runway end identifier lights (REIL).

The center 75 feet of Runway 11/29 has a Portland cement concrete (PCC) surface that was added in 1997 as a reconstruction/overlay of the original 1942 runway section which consisted of 3.5 inches of asphalt (AC) over 6 inches of crushed aggregate. The outer 37.5 feet on each side on the runway has the original asphalt surface, which is now more than 75 years old. The runway pavement condition ranges from very good (PCC section) to poor (AC sections).

The published[13] weight bearing capacity for Runway 11/29 is:

- 35,000 pounds for aircraft with single wheel (SW) landing gear;
- 57,000 pounds for aircraft with dual wheel (DW) landing gear; and
- 100,000 pounds for aircraft with dual tandem (DT) landing gear.

The runway is equipped with unlighted runway hold position signs and distance remaining signs (non-standard green background/white numbers). Two runway hold position signs located on the Runway 11 turnaround are internally illuminated; however, airport staff indicate that these have never been operational.

Runway 11/29 is not served by a parallel taxiway. The runway is served by two access taxiways (Taxiway F and Taxiway E). Taxiway F connects to the runway approximately 2,750 feet beyond the Runway 29 threshold and connects to Taxiway B near the main apron. Taxiway E connects the Runway 29 threshold with Taxiway B, the parallel taxiway for Runway 7/25.

An aircraft turnaround is located adjacent to the Runway 11 threshold (north side) to facilitate aircraft movement in the absence of a parallel taxiway. The turnaround was intended to be used by aircraft back-taxiing on the runway (for takeoff on Runway 11) or by aircraft rolling out after landing on Runway 29 that are unable to exit the runway via the last available exit taxiway (Taxiway F). However, local pilots and airport management indicate that the area is rarely used, which may be in part due to the 150-foot width of the runway.

Runway Markings

Runway 11/29 has basic/visual markings, which are not fully consistent with the current non-precision instrument approach capabilities. The runway markings (white paint) include runway designation numbers, centerline stripe, threshold bar and aiming bars (located 1,000 feet from each threshold). The Runway 29 end has four yellow arrowheads prior to the threshold bar denoting the relocated threshold. A section of pavement previously identified as a stopway is located beyond the end of Runway 11 and is marked with yellow chevrons. See Stopway section below.

Aircraft hold lines (yellow paint) are located on all entrance taxiways. Aircraft hold lines provide clear visual information to pilots and airport ground vehicles required to hold short of an active runway. Yellow taxiway lead-in lines are painted at the connections to Taxiway B and F. The markings were observed to be in fair condition during a recent site visit.

Per FAA standards, the markings for the primary runway take precedence over the secondary runway in areas where the runways intersect.

[13] FAA Chart Supplement

Stopway (Rwy 11 end)

The FAA Airport Record Form (5010-1) for Bowers Field lists a 1,460-foot stopway at the northwest end of Runway 11/29 (beyond the Runway 11 end). The pilot website www.airnav.com, which relies on FAA 5010 data, also lists the stopway for Runway 11/29 but makes no distinction in pavement condition between the runway (good) and the stopway (failed).

A visual inspection of the stopway area conducted as part of 2012 Airfield Needs Assessment confirmed that the pavement has failed and could not function as originally configured without risk of serious damage to an aircraft. The yellow chevrons marking the original stopway are clearly visible from the air, although the poor condition of the pavement is not necessarily obvious. This creates the potential for confusion by pilots unfamiliar with the airport about the use of the stopway. There are no records of maintenance being performed on the stopway pavement in recent history and the pavement was not included in the 1997 runway rehabilitation.

FAA Advisory Circular (AC) 150/5300-13A provides the following definition for stopways:

> *"A stopway is an area beyond the takeoff runway, centered on the extended runway centerline, and designated by the airport owner for use in decelerating an airplane during an aborted takeoff. It must be at least as wide as the runway and able to support an aircraft during an aborted takeoff without causing structural damage to the airplane."*

The recommendation made in 2012 was to publish a Notice to Airmen (NOTAM) indicating that the stopway was not available for use until it could be physically altered to eliminate any potential confusion by pilots unfamiliar with the airfield and all published references were eliminated. In addition, the following note was placed on the 2012 Airport Layout Plan (ALP):

> *"2. STOPWAY AT NW END OF RUNWAY 11/29 NOT IN SERVICE. STOPWAY MARKINGS TO BE REMOVED."*

Airport management should update published airfield data to remove all references to the stopway. Airport management should also issue a NOTAM stating the stopway at the NW end of Runway 11/29 is not available for use until it is physically removed and airport data records can be updated.

RUNWAY 7/25 (CLOSED)

Note: Runway 7/25 is officially closed and is scheduled for removal of the eastern section of the runway pavement (intersection with Runway 11/29) in 2018.

Runway 7/25 is 5,590 feet long and 150 feet wide with an asphalt surface. The runway has an effective gradient of 0.82 percent, with the high point (1,755.2 feet MSL) located at its east end (Runway 25 threshold). The published weight bearing capacity for Runway 7/25 is 28,000 pounds for aircraft with

single wheel (SW) landing gear. The 75 year old pavement has become brittle and is easily penetrated, shedding pieces of asphalt and loose aggregate on the surface when damaged. This pavement rating is not considered to be an accurate reflection of the runway's actual pavement strength.

Runway 7/25 has significant cracking and is in very poor to failing condition. The runway has been closed during the winter months (December 15 through February 28) since at least the 1990s due to concerns over its surface condition. As with the original sections of Runway 11/29, Runway 7/25 was constructed in 1942 (2.5 inches of asphalt (AC) over 6 inches of crushed aggregate) and has not been rehabilitated or reconstructed. The extensive cracking on the runway has allowed significant weed growth that has created a significant, ongoing maintenance need.

The runway has basic/visual markings on both the Runway 7 and 25 ends. The runway markings (white paint) include runway designation numbers, centerline stripe, and threshold bar. Runway 25 and 7 have four yellow arrowheads prior to the threshold bar denoting their relocated thresholds.

Runway 7/25 is unlighted and has no visual guidance indicators (VGI). The runway is equipped unlighted runway hold position signs and runway distance remaining signs (non-standard green background with white letters).

The runway is served by a full-length south parallel taxiway (Taxiway B) and a series of access taxiways connecting the runway/parallel taxiways to the main apron area and other developed landside areas. The runway has three 90-degree exit taxiway connections and one angled exit taxiway (Taxiway D) connection. Aircraft hold lines and taxiway lead-in lines (yellow paint) are located at each taxiway connection (Taxiways A, C, D, and E). The markings were observed to be in fair-to-poor condition during a recent site visit and scheduled for repainting.

Runway Approach Capabilities

Runways 29 and 25 have straight-in non-precision instrument (NPI) approaches, but have visual markings that are not consistent with current approach capabilities. Based on current approach capabilities, NPI markings are required for these runway ends including runway numbers, threshold markings, threshold demarcation bars (where required), and aiming point markings.

The airport's newest instrument approach procedure aligns aircraft directly with the end of Runway 11, which is typical of a "straight-in" approach. However, the RNAV GPS-C approach is classified as a "circling" procedure, in part based visual markings in place on Runway 11. The FAA flight procedures office has indicated that the approach would be upgraded to include a straight-in designation if NPI markings were added and all obstruction clearance criteria is met.

Runway Wind Coverage

It is generally preferable for aircraft to land and takeoff directly into the wind, although varying wind conditions often require crosswind operations. When wind conditions exceed the capabilities of a specific aircraft, use of a crosswind runway (when available) may be preferable. At airports with single runways, occasional periods of strong crosswinds can limit operations until conditions improve.

The FAA recommended planning standard is that primary runways should be capable of accommodating at least 95 percent of wind conditions within the prescribed crosswind component. This crosswind component is based on a direct crosswind (90 degrees to the direction of flight) of varying speeds depending on the aircraft type: 10.5 knots (12 miles per hour) for small aircraft; and 13 knots (15 miles per hour) for general aviation aircraft in Airplane Design Group II. Aircraft are able to tolerate increasingly higher wind speeds as the crosswind angle is reduced and aligns directly opposing the direction of flight.

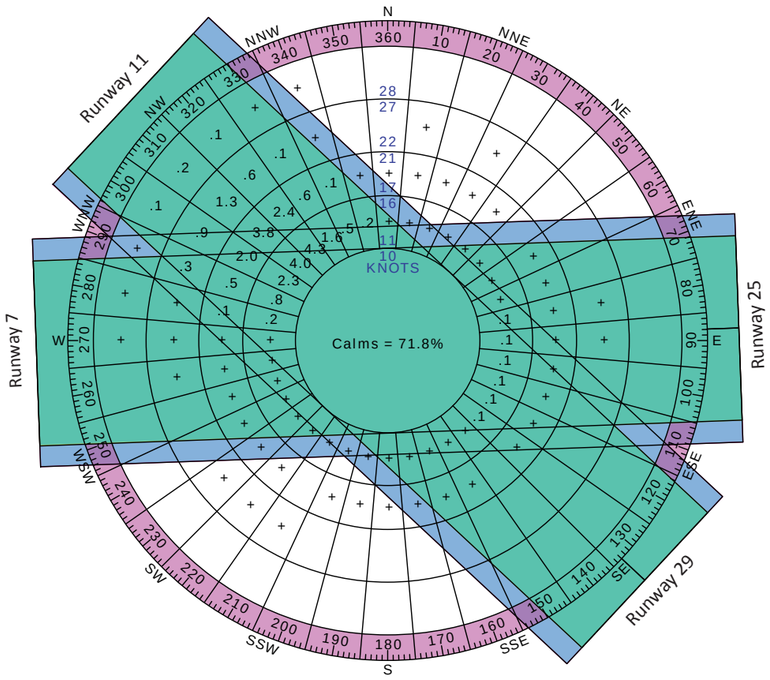
Wind data for Bowers Field was compiled for the period 2006 through 2015 for all-weather (All-WX), visual (VFR), and instrument (IFR) conditions from the automated on-site weather observation system.[14] The updated historic data are virtually identical to data presented on the ALP drawings prepared in the last master plan update and the Airfield Needs Assessment. Prevailing winds are generally from the northwest and are closely aligned with Runway 11/29. **Table 2-4** summarizes the crosswind coverage for Runway 7/25 and Runway 11/29 for large and small aircraft.

[14] NOAA National Climatic Data Center (NCDC) data for Bowers Field (79,236 observations, 2000-2009) http://arp-govcloud.jvs.aero:8080/windRose/.

TABLE 2-4: RUNWAY WIND COVERAGE – BOWERS FIELD

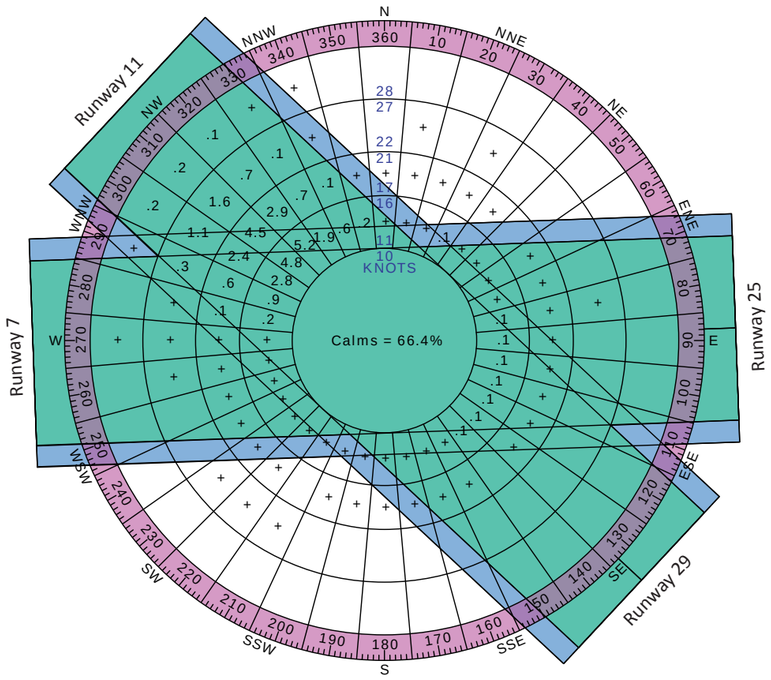
Weather Conditions	Wind Speed	Runway 7-25	Runway 11-29	Runway 7-25 & 11-29 Combined
All WX				
	12 MPH (13 Knots)	83.60%	99.27%	99.73%
	15 MPH (13 Knots)	91.18%	99.69%	99.90%
VFR				
	12 MPH (13 Knots)	80.39%	99.18%	99.68%
	15 MPH (13 Knots)	89.47%	99.66%	99.88%
IFR				
	12 MPH (13 Knots)	99.14%	99.73%	99.95%
	15 MPH (13 Knots)	99.47%	99.87%	99.99%
Runway 7-25 Bearing = 87.94 Degrees True Runway 11-29 Bearing = 132.98 Degrees True Source: NCDC; 2000-2009				

The wind roses depicted on **Figure 2-4** graphically illustrate the relationship between the runway alignments and local wind conditions.



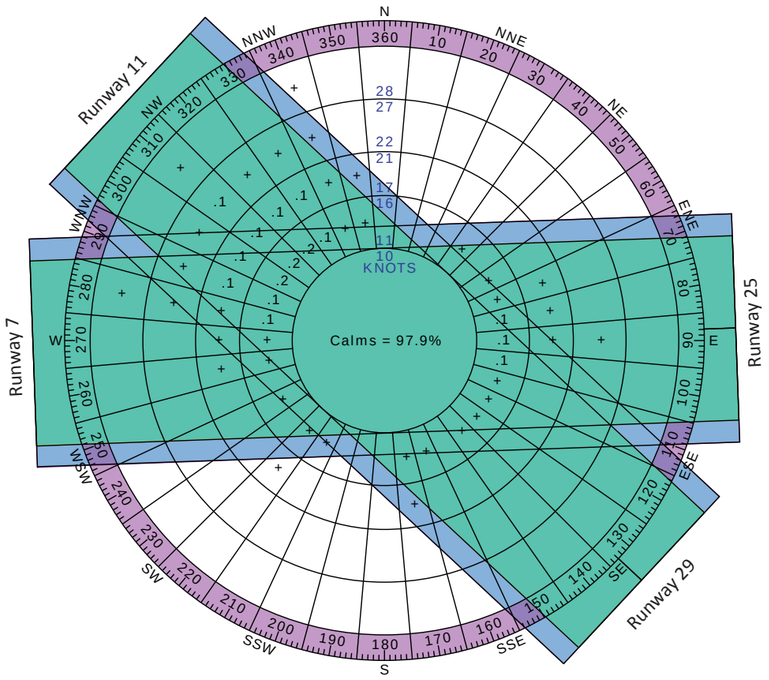
ALL WX WIND ROSE

Period: 2006-2015
99.73% @10.5 Knots
99.90% @ 13 Knots
Source: National Climatic Data Center



VFR WIND ROSE

Period: 2006-2015
99.68% @10.5 Knots
99.88% @ 13 Knots
Source: National Climatic Data Center



IFR WINDROSE

Period: 2006-2015
99.95% @10.5 Knots
99.99% @ 13 Knots
Source: National Climatic Data Center

WIND ROSES
FIGURE 2-4

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

Airfield Pavement Condition

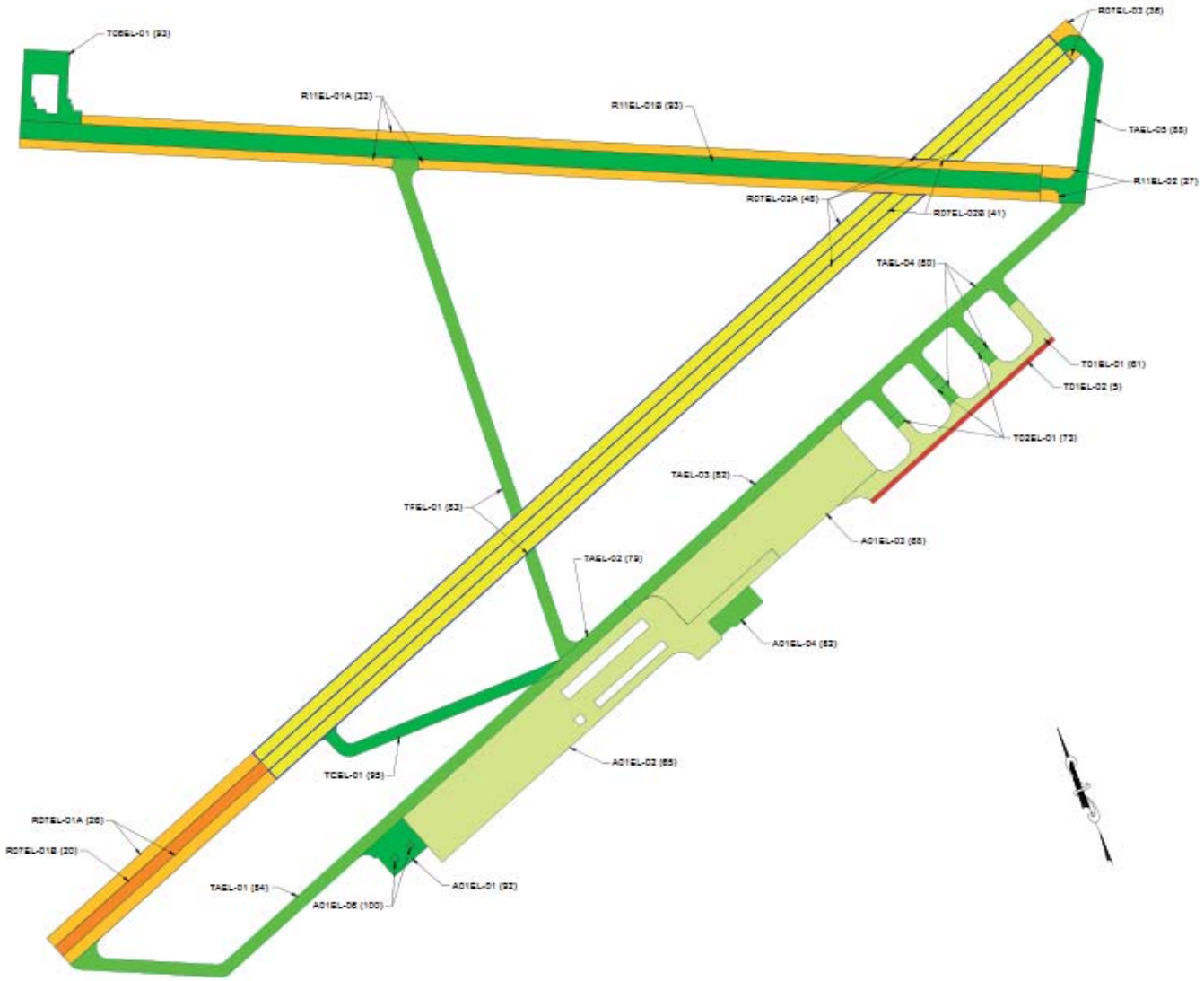
The Washington Department of Transportation (WSDOT) - Aviation Division manages the Pavement Maintenance Program (PMP), a program of pavement evaluation and maintenance for Washington's general aviation airports. The most recent PMP airfield pavement inspection for Bowers Field was conducted in 2012.[15] The rehabilitation of the eastern section of the main apron was completed after the PMP inspection was conducted and that pavement is currently in excellent condition. **Table 2-5** summarizes airfield pavement conditions for Bowers Field based on the 2012 PMP inspection. **Figure 2-5** graphically illustrates the airfield pavement conditions identified in the 2012 PMP.

TABLE 2-5: DETAILED SUMMARY OF AIRFIELD PAVEMENT CONDITION

PAVEMENT	SECTION DESIGN/AGE	2012 PCI RATING/ CONDITION[1,2]
Runway 7/25 (Closed in 2018)	2.5" AC; 6" Aggregate Base (1942) Note: the west 125' of runway has 3" Aggregate Base and 6" Aggregate Subbase	Eastern Section – 41– 48 / Poor Western Section 20– 26 / Failing
Runway 11/29	Center 75' section: 6" PCC overlay & 4" AC (1997); 3.5" AC; 6" Aggregate Base (1942) Outer 37.5' sections: 3.5" AC; 6" Aggregate Base (1942)	Center 50'– 93 / Excellent Outer Edges (50') 33– 27 / Poor
Runway 11 Hold Area	6" PCC & 4" AC (1997); 3.5" AC; 6" Aggregate Base (1942)	93/ Excellent
Runway 7/25 Parallel Taxiway (Txy A, B, and E)	2-2.5" AC (2002); 2.5" AC, 3" Aggregate Base, 5" Aggregate Subbase (1942-43)	79-88 – Excellent
Taxiway C	2-2.5" AC (2002); 2.5" AC, 2.5" Aggregate Base, 6" Aggregate Subbase (1942)	95 – Excellent
Taxiway D and F	2-2.5" AC (2002); 2" AC (1976); 2.5" AC, 2.5" Aggregate Base, 6" Aggregate Subbase (1942)	83 – Good
Terminal Apron	1.5" AC (1995); 2.5" AC (1942); 6" Aggregate Base (1942)	68 – Good
West Apron	6-9" PCC (1943); 6" Aggregate Base (1943)	65 – Good
DNR Apron	2.5" AC (1943); 3" Aggregate Base, 5" Aggregate Subbase (1943)	92 – Excellent
East Hangar Taxilanes	2-2.5" AC (2002 - some sections); 2" AC, 6" Aggregate Base (1942)	5/61 – Failing- Good

Notes:
1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "excellent." For additional details, see Pavement Management Report for Bowers Field.
2. The condition ratings are from the 2012 pavement inspection. The ratings do not necessarily correspond to current pavement conditions and do not reflect construction, repair, maintenance or rehabilitation work completed since 2012.

[15] WSDOT Aviation Airport Pavement Database (IDEA); Bowers Field (2012)



PCI Legend:	0-10	11-25	26-40	41-55	56-70	71-85	86-100

Note: Conditions Per 2012 Inspection

Source: WSDOT Aviation
Pavement Maintenance Program Database

EXISTING PAVEMENT CONDITIONS
FIGURE 2-5

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

The primary distresses observed during the inspection were longitudinal and transverse cracking, alligator cracking, weathering/raveling, swelling, joint spalling, and corner spalling.

An emergency repair project was required several years ago near the threshold of Runway 25 after an aircraft induced pavement failure occurred. Runway 7/25 continues to deteriorate and presents a significant maintenance and safety concern for airport management. The current FAA Chart Supplement notes that Runway 7/25 is closed between December 15 and February 28 each year and there are weeds growing through the pavement cracks. Additional engineering evaluations are recommended to determine if/when additional operational restrictions are needed due to the pavement condition. Airport management has indicated plans to improve weed control on the runway surface.

Note: Pavement evaluations on Runway 7/25 were conducted in summer 2017 to assess runway surface conditions and identify rehabilitation options. The airport management decision to effect an emergency closure of the runway through a published NOTAM due to its deteriorated condition was based on the professional engineering assessments and the airport sponsor obligation to protect public safety and to operate the airport in a responsible manner.

Taxiways

The taxiway system at Bowers Field is depicted on **Figures 2-2** and **2-3**, presented earlier in this chapter. The taxiway system provides access to both runways and landside facilities located south of the runways.

The airport's primary runway (11/29) is not served by a parallel taxiway and has two access taxiway connections (Taxiways E and F). Aircraft operations occurring north of the mid-runway connection (Taxiway F) require back taxiing on the runway.

The secondary runway (7/25) is served by a full length parallel taxiway with four exit taxiway connections. The southern section of Runway 11/29 that intersects with Runway 7/25 also connects to the parallel taxiway. The parallel taxiway for Runway 7/25 provides access to the full length of the south landside area. The parallel taxiway and the four connecting taxiways located on the south side of Runway 7/25 have a total of five different designations (A-E). Taxiway F is a diagonal cross-field taxiway that provides access to Runway 11/29, just north of its midpoint. All of the taxiways connecting to Runway 7/25 and 11/29 have aircraft hold lines located 200 feet from the adjacent runway centerlines, which coincide with the outer edge of the runway obstacle free zone (OFZ).

All taxiways are 50 feet wide and constructed of asphalt. The taxiways have standard markings including centerline stripe and runway holding position markings. The striping and markings are generally in good condition. All taxiways connecting to a runway are equipped with unlighted mandatory hold position signs.

TAXIWAY A

Taxiway A is a diagonal exit taxiway that connects the Runway 7 end to the parallel taxiway (Taxiway B). A 155-foot section of inline taxiway is located west of the Runway 7 threshold and connects to Taxiway A. The inline taxiway does not have a taxiway designation, although it could be considered an extension of Taxiway A. Taxiway A is equipped with blue retro-reflective edge markers. The asphalt surface had a PCI rating of 84 in the 2012 PMP.

TAXIWAY B

Taxiway B is the full length south parallel taxiway for Runway 7/25, which also provides taxiway access to the end of Runway 29. The runway-parallel taxiway separation is 525 feet. Taxiway B directly abuts all of the aircraft aprons that extend from the west end of the flight line (DNR facilities) to the east aircraft tiedowns. The east aircraft hangar area has four access taxilane connections to Taxiway B. The taxiway is equipped with blue retro-reflective edge markers. The asphalt surface had PCI ratings ranging from 79 to 84 in the 2012 PMP.

TAXIWAY C

Taxiway C is a diagonal exit taxiway located approximately 1,300 feet east of the Runway 25 threshold that connects Runway 7/25 to the parallel taxiway (Taxiway B). Taxiway C is equipped with blue retro-reflective edge markers. The asphalt surface had a PCI rating of 95 in the 2012 PMP.

TAXIWAY D

Taxiway D is a diagonal exit taxiway located approximately 2,500 feet east of the Runway 25 threshold that connects Runway 7/25 to the parallel taxiway (Taxiway B) at the intersection of Taxiways B and C. Taxiway C is equipped with blue retro-reflective edge markers. The asphalt surface had a PCI rating of 83 in the 2012 PMP.

TAXIWAY E

Taxiway E is a diagonal exit taxiway that extends from the east end of Taxiway B (at the Runway 29 threshold) to the Runway 25 end. Taxiway E is equipped with blue retro-reflective edge markers. The asphalt surface had a PCI rating of 83 in the 2012 PMP.

TAXIWAY F

Taxiway F is a 1,569-foot taxiway that extends from the north side of Runway 7/25 to Runway 11/29, near its midpoint. Taxiway F provides the only useable exit for aircraft landing on Runway 29 and the primary taxi route for aircraft traveling to the airport's south landside area. Taxiway F is directly aligned with Taxiway D on opposite sides of Runway 7/25, which creates the common taxiing route via Taxiway F, D, and B. Taxiway F is equipped with blue retro-reflective edge markers. The asphalt surface had a PCI rating of 83 in the 2012 PMP.

TAXILANES

Bowers Field has several taxilanes serving landside facilities including the main tiedown apron, the west apron, west hangar area, and the east hangar area. The main taxilanes on the east apron are marked with centerline stripes (excellent condition). The other taxilanes have worn centerline stripes or no pavement markings.

Aircraft Apron

MAIN APRON

The main apron is located north of the FBO building. This apron is marked with fifteen (15) small airplane parking positions, facing northwest. The main apron has the aircraft fuel storage and dispensing area.

EAST GENERAL AVIATION APRON

The east general aviation apron includes parking for both large and small aircraft. The apron was expanded (new pavement), rehabilitated (sealcoat existing pavement), and reconfigured with new tiedowns and drive-through parking in 2012. The western section of the apron has a single 250-foot long parking row for business aircraft that directly abuts Taxiway B. The parking row is configured with lead-in lines marked for three (3) drive-through parking positions. This section of apron also has five (5) north-facing small airplane tiedowns configured in one east-west row at the south edge. The eastern section of the apron has twenty-three (23) north-facing small airplane tiedowns configured in three east-west rows.

The construction of a new hangar near the southeast corner of the apron in 2017 will require some changes in existing taxilanes and the elimination of several tiedowns to provide standard wingtip clearances since the hangar is capable of accommodating larger aircraft (ADG II). The existing taxilanes on this section of the apron are designed based on ADG I standards. The apron's conformance with FAA standards will be addressed in the evaluation of landside alternatives.

WEST GENERAL AVIATION APRON

The west general aviation apron is largely unchanged since its original construction in 1942. The Portland cement concrete (PCC) surface was designed to accommodate a large number of military aircraft and apron has a large quantify of steel tiedown anchors imbedded in the surface. A portion of the apron is currently being used to accommodate several aircraft operated by CWU's flight training contractor. Approximately six (6) tiedown anchors are currently being used, configured in two rows with northwest-facing aircraft parking. As noted earlier, the existing taxilanes do not meet ADG I design standards for object free area clearance.

Table 2-6 summarizes the existing public use apron facilities at the airport.

TABLE 2-6: AIRCRAFT APRONS – BOWERS FIELD

APRON	ESTIMATED AREA (SQUARE YARDS)	COMPOSITION	AIRCRAFT PARKING/TIEDOWNS
East General Aviation Apron	25,808	Asphalt	28 – small 3 – large
Main Apron (FBO)	16,625	Asphalt	15 – small
West General Aviation Apron	23,055	Concrete	6 – small (Est.)

Airport Lighting and Signage

The airport accommodates day and night operations in both visual and instrument meteorological conditions (IMC). Runway 11/29 is equipped with lighting that is consistent with its non-precision instrument requirements and runway use. None of the major taxiways are equipped with edge lighting However, there are blue taxiway light fixtures at the intersection of Taxiway F and Runway 11/29.

The runway-taxiway system has extensive non-illuminated signage that conveys directional, location, and runway clearance information to pilots. **Table 2-7** summarizes existing airport lighting and signage.

TABLE 2-7: EXISTING AIRPORT LIGHTING & SIGNAGE

CATEGORY	TYPE	CONDITION
Airport Lighting	Airport Rotating Beacon (white/green dual lens) Lighted Wind Cones (1)	Good
Runway Lighting	Rwy 7/25 – None Rwy 11/29 – Medium Intensity Runway Lighting (MIRL) (white/amber lenses); Threshold Lighting (red/green lenses)	Fair/Poor
Visual Guidance Indicators	4-Light PAPI (red/white lenses) • Rwy 29: (P4L) 3 degree glide path	Fair
Taxiway Lighting	Blue edge lights at connection of Rwy 11/29 and Taxiway F. Blue retro-reflective markers on all taxiways	Fair
Airfield Signage	Non-illuminated Mandatory, Location, Directional, and Destination Signs; Distance Remaining Signs	Fair
Other Lighting	Obstruction lights, lighted wind cones (1)/lighted segmented circle and wind T, flood lighting in hangar, fuel areas.	Good/Fair

AIRPORT LIGHTING

The airport rotating beacon is mounted on top of a water tower across Bowers Road and immediately south of the east apron and airport electrical vault. Rotating beacons are used to indicate the location of an airport to pilots at night or during reduced visibility. The beacon provides sequenced white and green flashing lights (representing a lighted land airport) and rotates in a 360-degree circle to allow pilots to identify the airport from all directions and from several miles away.

A single lighted wind cone is located within the segmented circle. The segmented circle is located in the center of the airport between the two runways - west of the runway intersection and east of Taxiway F.

The rotating beacon and lighted wind cone operate dusk-dawn. The runway lighting and visual guidance indicators are pilot-activated using the common traffic advisory frequency (CTAF) 123.0 MHz. Airport management reports ongoing reliability issues with airfield lighting control systems.

APPROACH LIGHTING

Runway 29 has a non-standard omnidirectional approach lighting system (ODALS) that is no longer operational.

RUNWAY LIGHTING

Runway 11/29 has medium intensity runway edge lighting (MIRL); Runway 29 is equipped with a visual guidance indicator (VGI) and Runway End Identifier Lights (REIL). Runway 7/25 is unlighted.

- **MIRL:** The MIRL system includes white edge lights (with amber lights located near the runway ends to indicate runway remaining) and runway threshold lights. The threshold lights consist of two sets of four fixtures near each corner of the runway ends. The fixtures have split lenses (green/red) indicating the beginning and end of the runway.
- **Visual Guidance Indicators (VGI)**: Runway 29 is equipped with a 4-box Precision Approach Path Indicator (PAPI) that is calibrated to provide a 3-degree visual glide path. PAPIs project light along a standard glide path from a runway end, with red and white colored lights indicating the aircraft's vertical position above, below, or on the defined glide path.
- **REIL:** Runway 29 is equipped with runway end identifier lights (REIL), which consists of two high intensity sequenced strobe lights that mark the approach end of the runway to assist pilots in establishing visual contact with the runway environment during periods of darkness or reduced visibility. The operating condition of the REILs has not been determined.

Airport management reports significant, ongoing reliability issues with the runway lighting systems due to rodent damage to the buried wiring and lighting control units. Based on these issues and the age of the systems, replacement of all existing lighting systems is anticipated to be conducted as part of the runway rehabilitation project.

TAXIWAY LIGHTING

All of the major taxiways at Bowers Field are equipped with stake mounted blue retro-reflective edge markers. The intersection of Taxiway F and Runway 11/29 is marked with a limited number of blue taxiway edge lights.

AIRFIELD SIGNAGE

The runway-taxiway system has unlighted runway hold position signs (red background with white letters/numbers for runways) at the aircraft holding positions for each taxiway connection with a runway. The runways are equipped with unlighted runway distance remaining signs (non-standard green background with white letters). Other signage includes taxiway directional signs [A, B, D, → etc.] (yellow background and black numbers/letters) and taxiway location signs (black background and yellow numbers/letters).

OTHER LIGHTING

Overhead flood-lighting is located along the south side of the main apron area and in the aircraft fueling area. Hangars also have exterior wall-mounted floodlights. Red obstruction lights are mounted on the top of several structures or built items (antennas, windsocks, etc.) on the airfield.

Landside Facilities

HANGARS AND AVIATION RELATED BUILDINGS

Bowers Field accommodates a variety of aviation-related buildings including aircraft storage hangars, commercial hangars, and buildings used to support tenant operations. The south side of the airport currently accommodates all landside facilities and based aircraft. The airport also includes the Kittitas County Airport Industrial Park on the south side of Bowers Road that includes numerous non-aeronautical buildings and tenants. **Figure 2-3**, presented earlier in this chapter, depicts the existing buildings on the airport. **Table 2-8** summarizes existing aviation use buildings located at the airport.

The primary fixed base operator (FBO) facilities at Bowers Field are located near the middle and east end of the south landside area. Facilities include a large county owned aircraft storage hangar with office space. The hangar is approximately 100 by 200 feet and includes the ground floor and second floor office space. The hangar is owned by the county and leased to CWU. CWU also owns a maintenance hangar located adjacent to the large hangar. The aviation fuel storage and dispensing facilities are located east of the large hangar, adjacent to the east aircraft parking apron. The fuel facilities are managed by Midstate Aviation, one of the airport's FBOs. Midstate Aviation's operations are located in a private hangar located near the east end of the main apron.

TABLE 2-8: AVIATION RELATED BUILDINGS AT BOWERS FIELD

	BUILDING	USE
1.	Large Conventional Hangar (FBO)	FBO, 2 hangar bays; pilot facilities including lounge space, restroom, and kitchen.
2.	Small Buildings (east of large hangar)	Classrooms
3.	Conventional Hangar (NW of large hangar)	Aircraft maintenance
4.	Storage Building (west of large hangar)	Equipment storage
5.	Conventional Hangar (south of County T-hangar)	Aircraft storage (tenant owned)
6.	Conventional Hangar (south of County T-hangar)	Aircraft storage (tenant owned)
7.	Conventional Hangar (west of County T-hangar)	Aircraft storage (tenant owned)
8.	T-hangar (12 unit double-sided)	Aircraft storage (county owned)
9.	T-hangar (21 unit double-sided, with end unit*) *2016 fire destroyed three units; 18 units currently available	Aircraft storage (Carrera – tenant owned)
10.	Department of Natural Resources (3 main structures with additional smaller storage buildings)	Agency wildfire operations/helicopter dispatch
11.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
12.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
13.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
14.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
15.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
16.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
17.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
18.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
19.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned)
20.	Conventional Hangar (east of tiedown apron)	Aircraft storage (tenant owned) New in 2017

The airport current has two T-hangars (30 units); 12 small conventional hangars (aircraft storage); 2 medium conventional hangars (FBO); and 1 large hangar (FBO). The hangars are divided between the east and west ends of the south landside area.

Airspace and Navigational Aids

AIRSPACE CLASSIFICATIONS

Airspace within the United States is classified by the FAA as "controlled" or "uncontrolled" with altitudes extending from the surface upward to 60,000 feet above mean sea level (MSL). Controlled airspace classifications include Class A, B, C, D, and E. Class G airspace is uncontrolled. **Figure 2-6** illustrates and describes the characteristics of the airspace classifications defined by the FAA.

Aircraft operating within controlled airspace are subject to varying levels of positive air traffic control that are unique to each airspace classification. Requirements to operate within controlled airspace vary, with the most stringent requirements associated with very large commercial service airports in high traffic areas. Uncontrolled airspace is typically found in remote areas or is limited to a 700 or 1,200-foot AGL layer above the surface and below controlled airspace.

LOCAL AREA AIRSPACE STRUCTURE

Figure 2-7 depicts nearby airports, notable obstructions, special airspace designations and instrument flight rules (IFR) routes in the vicinity of Bowers Field, as identified on the Seattle Sectional Chart.

Bowers Field is located in an area of Class E airspace that begins at 700 feet above ground and extends upward to 18,000 feet above mean sea level (MSL). The local Class E airspace consists of a 3-nautical mile radius surrounding the airport with east quadrants that extend approximately 20 nautical miles. Radio communication is not required for VFR operations in Class E airspace, although pilots are encouraged to use the common traffic advisory frequency (CTAF) when operating at the airport. Aircraft are required to obtain an ATC clearance prior to operating in Class E airspace during IFR conditions.

Several Low Altitude Enroute Instrument Airways connect to the nearby Ellensburg VORTAC,[16] located 3 nautical miles east of the airport:

- Victor 2 (V2) west to the Seattle VORTAC and east-northeast to Moses Lake VOR/DME;
- Victor 25 (V25) north-northeast to Wenatchee VOR/DME and south to Yakima VORTAC;
- Victor 336 (V336) northeast to the Ephrata VORTAC; and
- Victor 486 (V486) south to the Selah intersection with the Yakima VORTAC.

The instrument airways are designed to provide defined paths (fixed courses and minimum altitudes) for enroute aircraft that are clear of terrain and other potential hazards for aircraft operating without the benefit of visual contact. Aircraft transition between enroute and terminal airspace through the use of defined instrument approach and departure procedures.

[16] VORTAC = Very High Frequency Omni Directional Radio Range (VOR), with Tactical Air Navigation (TACAN).

The minimum enroute altitudes for the nearby instrument airways are well above the local airport traffic pattern altitude and do not conflict with VFR airport operations. The local fixed-wing traffic pattern altitude at Bowers Field is 1,000 feet above ground level (AGL) (approximately 2,763' MSL) with standard left traffic on both runways. The typical traffic patterns for Runway 7/25 and Runway 11/29 are depicted in **Figure 2-8.**

SPECIAL USE AIRSPACE

The nearest Military Restricted Areas are R-6714A/B/C/F/G and H located to the south and east. Restricted areas are designated to segregate VFR and IFR traffic. When a Restricted Area is active, all traffic must reroute around the Restricted Area. Prior to entering a Restricted Area, pilots must contact the controlling agency shown on the frequency tab of the sectional chart to ask if the Restricted Area is active (hot) or not (cold). Clearance is not required for VFR operations through a Restricted Area when the controlling agency has made a determination that the Restricted Area is inactive (cold).

NAVIGATIONAL AIDS AND WEATHER

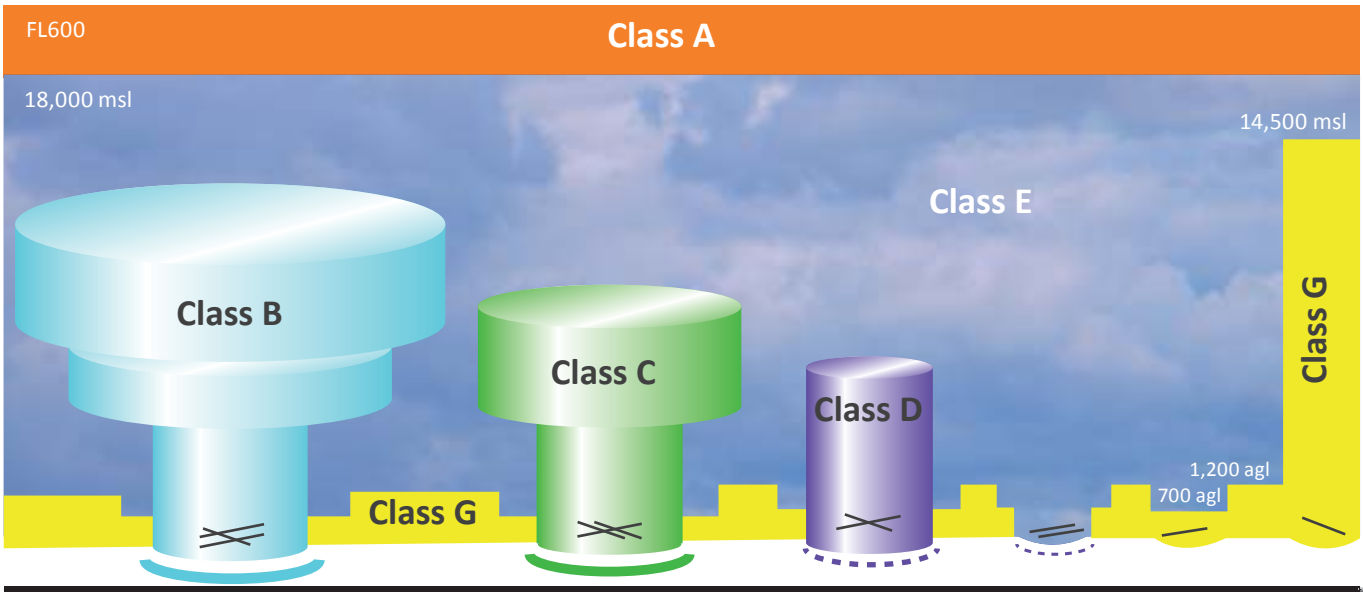
There are no ground based navigational aids located on Bowers Field.

The Ellensburg VORTAC[17] is located off the airport, approximately three nautical miles east-southeast, east of Naneum Road and north of Lyons Road. The VORTAC supports instrument approaches to Runway 25, in addition to its enroute air navigation function. The VORTAC is FAA-owned and maintained.

Bowers Field has an on-site automated surface observing system (ASOS) that provides 24-hour weather information. The ASOS is located north of Runway 7/25, east of Taxiway F. The ASOS provides altimeter setting, wind data, density altitude, visibility, cloud/ceiling data, temperature, dew point, icing, lightning, sea level pressure, and precipitation. The ASOS is owned and maintained by the National Weather Service (NWS).

The airport has a hazardous inflight weather advisory service (HIWAS), which is a continuous broadcast of hazardous weather information transmitted through the VORTAC. This includes Airmen's Meteorological Information (AIRMETs), significant meteorological information (SIGMETs), convective SIGMETs, and urgent pilot reports (PIREPs).

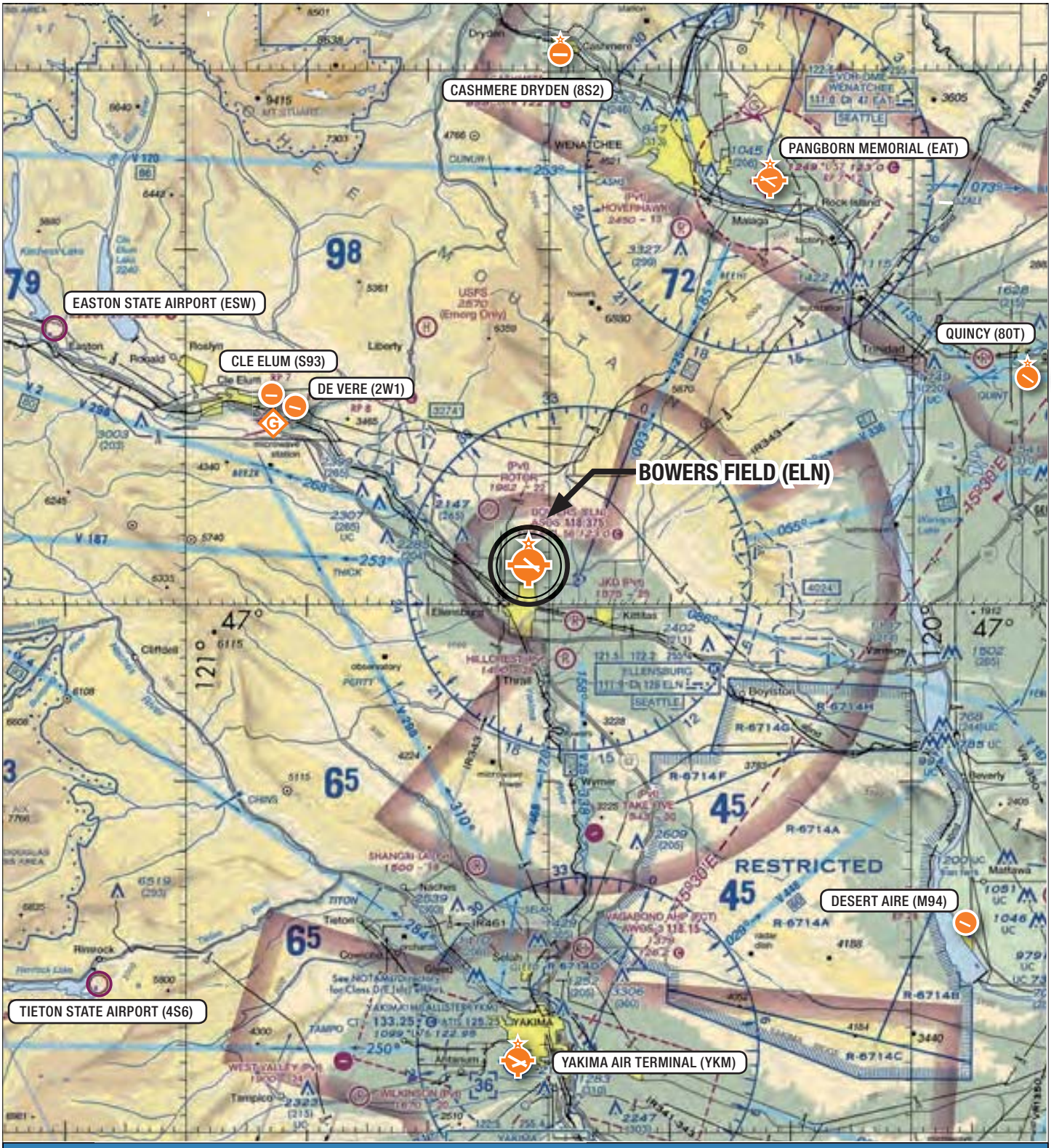
[17] **V**ery high frequency **O**mnidirectional **R**adio range (VOR) combined with UHF frequencies (**Tac**tical Air Navigation – TACAN)



COMMUNICATION REQUIREMENTS AND WEATHER MINIMUMS

	Class A	Class B	Class C	Class D	Class E	Class G
Airspace Class Definition	Generally airspace above 18,000 feet MSL up to and including FL 600.	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports	Generally controlled airspace that is not Class A, Class B, Class C, or Class D	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E
Minimum Pilot Qualifications	Instrument Rating	Student*	Student*	Student*	Student*	Student*
Entry Requirements	IFR: ATC Clearance VFR: Operations Prohibited	ATC Clearance	IFR: ATC Clearance VFR: Two-Way Communication w/ ATC	IFR: ATC Clearance VFR: Two-Way Communication w/ ATC	IFR: ATC Clearance VFR: None	None
VFR Visibility Below 10,000 msl**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	3 Statute Miles	Day: 1 Statute Mile Night: 3 Statute Miles
VFR Cloud Clearance Below 10,000 msl***	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal***
VFR Visibility 10,000 msl and Above**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	5 Statute Miles	5 Statute Miles
VFR Cloud Clearance 10,000 msl and Above	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal

*Prior to operating within Class B, C or D airspace (or Class E airspace with an operating control tower), student, sport, and recreational pilots must meet the applicable FAR Part 61 training and endorsement requirements. Solo student, sport, and recreational pilot operations are prohibited at those airports listed in FAR Part 91, appendix D, section 4.
**Student pilot operations require at least 3 statute miles visibility during the day and 5 statute miles visibility at night.
***Class G VFR cloud clearance at 1,200 agl and below (day); clear of clouds.



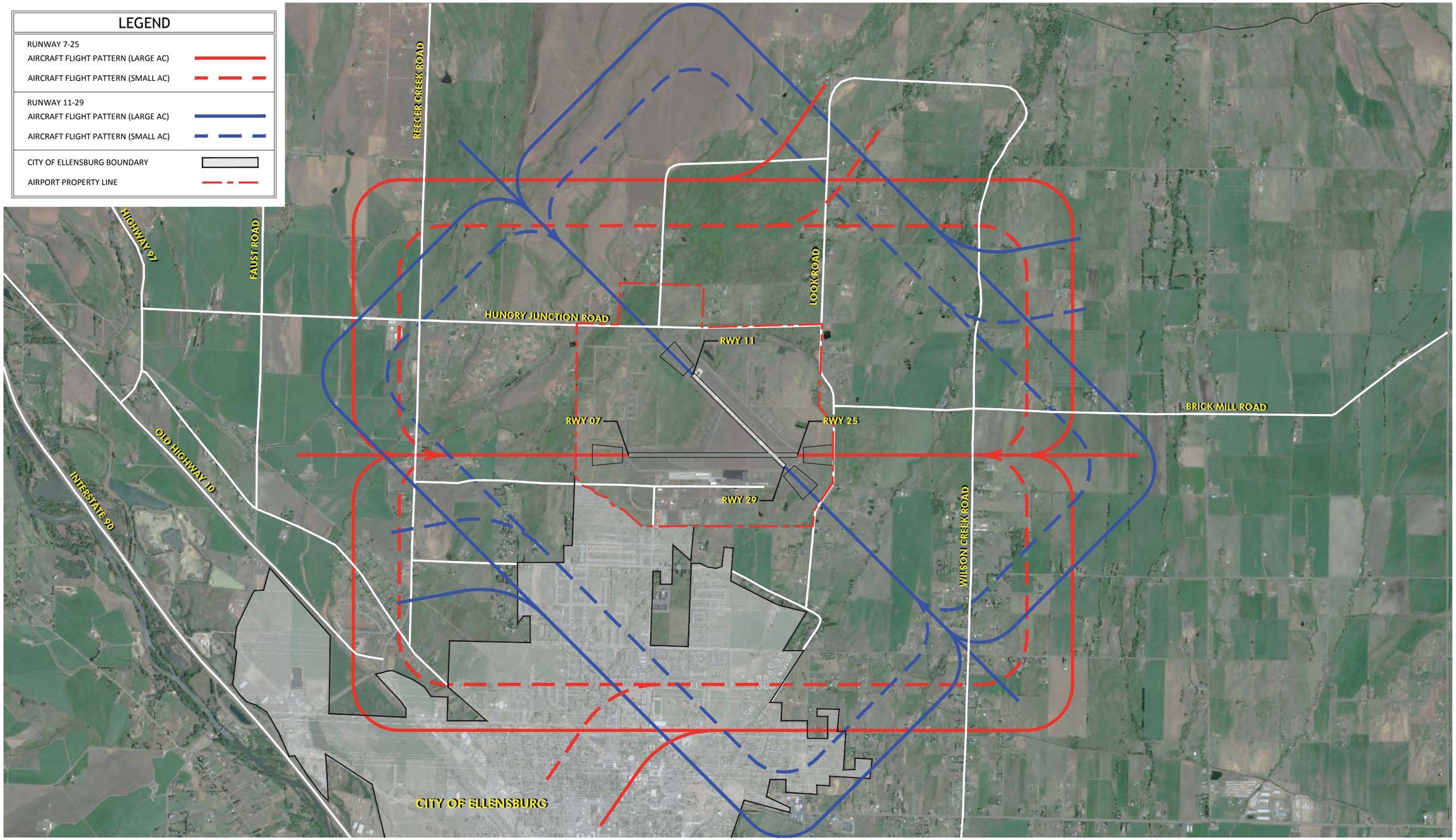
LEGEND

○	Airports with other than hard-surface runways	⊕	Public-use airports with hard-surfaced runways 1,500ft. to 8,069ft.
Ⓖ	Glider Operations	▬	Class E Airspace with floor 700' above surface
⌒	Compass Rose (VOR/DME or VORTAC)	- - -	Class D Airspace (surface)
▬	VOR or RNAV Airways	- - -	Class E Airspace (surface)

AREA AIRSPACE
FIGURE 2-7

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING



TRAFFIC PATTERNS
FIGURE 2-8

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

Instrument Procedures

Instrument approach and departure procedures are developed by the FAA using ground based electronic navigational aids and satellite navigation (SATNAV) to guide aircraft through a series of prescribed maneuvers in and out of an airport's terminal airspace. The procedures are designed to enable continued airport operation during instrument meteorological conditions (IMC), but are also used during visual conditions, particularly in conjunction with an instrument flight plan. The capabilities of each instrument approach are defined by the technical performance of the procedure platform and the presence of nearby obstructions, which may affect the cloud ceiling and visibility minimums for the approach, and the routing for both the approach and missed approach procedure segments. The aircraft approach speed and corresponding descent rate may also affect approach minimums for different types of aircraft.

Bowers Field currently has five published non-precision instrument approaches, including three global positioning system (GPS) procedures and two VOR-based procedures that use the Ellensburg VORTAC. Bowers Field also has special takeoff minimums/departure procedures and special alternate minimums. The existing instrument approach capabilities for Bowers Field are summarized in **Table 2-9**. Copies of the instrument approach and departure procedure charts are included in **Appendix A**.

TABLE 2-9: INSTRUMENT APPROACH PROCEDURES – BOWERS FIELD

APPROACH	APPROACH CATEGORY A		APPROACH CATEGORY B		APPROACH CATEGORY C		APPROACH CATEGORY D	
	Ceiling	Vis.	Ceiling	Vis.	Ceiling	Vis.	Ceiling	Vis.
RNAV/GPS - RWY 29								
LNAV MDA	801	1	801	1.25	N/A	N/A	N/A	N/A
Circling	796	1	796	1.25	N/A	N/A	N/A	N/A
RNAV/GPS - RWY 25								
LNAV MDA	605	1	605	1	605	1.75	605	2
Circling	596	1	596	1	596	1.75	736	2
RNAV/GPS - C								
Circling	896	1.25	896	1 .25	896	2.75	896	3
VOR/DME - A								
Circling	517	1	577	1	N/A	N/A	N/A	N/A
VOR - B								
Circling	1,496	1.25	N/A	N/A	N/A	N/A	N/A	N/A

Approach Categories are based on the approach speed of an aircraft in the landing configuration (typically 1.3 times the stall speed Vso).
Approach Categories:
Category A: 0-90 knots (Cessna 172, Beechcraft Bonanza, Piper Seneca)
Category B: 91-120 knots (Beechcraft King Air, Cessna Citation)
Category C: 121-140 knots (Learjet 45, Canadair Challenger)
Category D: 141-165 knots (Gulfstream 550)

Ceiling: Lowest permitted height of clouds in feet above ground level (AGL)
Vis: Minimum visibility required in statute miles
Source: National Ocean Service Instrument Approach Plates

Airport Support Facilities/Services

AIRCRAFT FUEL

Bowers Field has 100-octane low lead (100LL) aviation gasoline (AVGAS) and jet fuel (Jet-A) available for sale through a local fixed base operator (FBO), Midstate Aviation. DNR maintains jet fuel storage tanks for their own use. **Table 2-10** summarizes existing aviation fueling facilities on the airport.

TABLE 2-10: AVIATION FUEL STORAGE – BOWERS FIELD

STORAGE TYPE	LOCATION/FACILITIES
Fixed Point Fuel Tanks and Dispensing Facilities	County Owned 1 - 12,000 gallon above-ground storage tank (100LL) – On Airport 1 – 12,000 gallon above-ground storage tank (Jet-A) – On Airport 24-hour credit card access for self-fueling (100LL and Jet A)
Mobile Fuel Trucks and Portable Tanks	FBO Owned 1 - mobile truck (Jet-A) DNR Owned 8 - mobile trucks (Jet-A) (truck capacity varies 750-2,500 gallons)

FIXED BASE OPERATORS (FBO)

Bowers Field currently has two entities authorized to provide aeronautical/fixed base operator (FBO) services: Midstate Aviation and Central Washington University (CWU).

CWU entered into an FBO agreement in late 2017 as an extension of its recently established in-house aircraft flight training operations at the airport. CWU currently leases the county-owned main hangar and associated facilities and purchased an adjacent privately-owned hangar. The FBO model is similar to the arrangement the county had with Midstate Aviation during its extended tenure as the flight training contractor for CWU. Based on a regular presence at the airport, CWU staff are able to provide basic FBO services associated with the public use of the main hangar and the adjacent parking apron. Contracted FBO functions include providing public access to restroom and pilot facilities in the main hangar, managing the tiedown apron and main hangar use, and performing basic airport management tasks such as issuing Notices to Airmen (NOTAM).

Midstate Aviation provides FBO services including managing the county-owned aircraft fueling system. Midstate also offers mobile fueling (jet fuel) with their own fuel truck. Midstate relocated its operations to a new hangar constructed near the east end of the main apron in 2017. The company website indicates services include aircraft maintenance, hangaring, and fueling needs.

PUBLIC RESTROOMS

Public restrooms are located in the main hangar/FBO building.

FENCING

Bowers Field has 6-foot chain link fencing and controlled-access gates along the majority of the south landside area, directly adjacent to Bowers Road. The majority of the airport operations area is fenced with a combination of field fencing and 4-strand barbed-wire fencing. **Figure 2-9** illustrates the existing fencing and gates on the airport.

LEGEND

- GATE - VEHICLE ELECTRONIC (#)
- GATE - VEHICLE MANUAL (#)
- GATE - PEDESTRIAN (#)
- EXISTING FENCE

1

2

8

11

18

AIRPORT FENCING AND GATE PLAN
FIGURE 2-9

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

AIRPORT EQUIPMENT

Kittitas County Public Works, Airport Department maintains one tow-behind airfield mower. The airport's snow removal equipment and other maintenance equipment are provided by the Kittitas County Public Works, Roads Department.

Vehicle Access and Parking

Surface access to Bowers Field is provided from Interstate 90 via West University Way north to Reecer Creek Road then continuing north to Bowers Road then east on Bowers Road to the airport entrance. An alternative route is provided by North Walnut Street and Airport Road, which extend approximately 1.5 miles north from Dean Nicholson Blvd (East 14th Avenue) on the north side of the CWU campus to Bowers Road. The airport is located approximately 2 miles north of downtown Ellensburg. Existing surface access in the vicinity of Bowers Field road is depicted on **Figure 2-10.**

The FBO parking lot is located on the east side of the hangar, with overflow parking south of Bowers Road in an unpaved lot. Additional vehicle parking is available adjacent to individual hangars and airport buildings.

Public Protection

POLICE

The airport (airfield and industrial park) is located outside the city limits in Kittitas County, but within the City of Ellensburg Urban Growth Boundary. The Kittitas County Sheriff's Department provides local law enforcement with additional support provided by the City of Ellensburg Police Department and Washington State Patrol (WSP) as needed.

FIRE

Kittitas Valley Fire Rescue (KVFR) provides fire protection service to the airport and industrial park. KVFR's main fire station in Ellensburg is located on East Mountain View Drive. The station is staffed 24/7 with a mix of full-time and volunteer firefighters.

The main fire station is located approximately 4.1 miles from the airport via North Main Street, A Street, East Helena Avenue, and Airport Road. KVFR also operates a station on the Vantage highway, approximately ¼-mile east of North Pfenning Road. The Vantage Highway station is approximately 3.5 miles from the airport via Pfenning Road, Brick Road, Sanders Road, and Airport Road.

LEGEND

VEHICLE ROAD

AIRPORT PROPERTY LINE

SPEED LIMIT SIGN — SPEED LIMIT 25

ADT - AVERAGE DAILY TRAFFIC COUNT

TAXIWAY C

TAXIWAY D

TAXIWAY B

TAXIWAY B

BOWERS FIELD

SPEED LIMIT 25

ADT 225

BOWERS ROAD

BOWERS BUSINESS LOOP

SPEED LIMIT 35

AIRPORT ROAD

BEECH ROAD

SPEED LIMIT 25

ELMVIEW ROAD

CESSNA ROAD

PIPER ROAD

SPEED LIMIT 25

FALCON ROAD

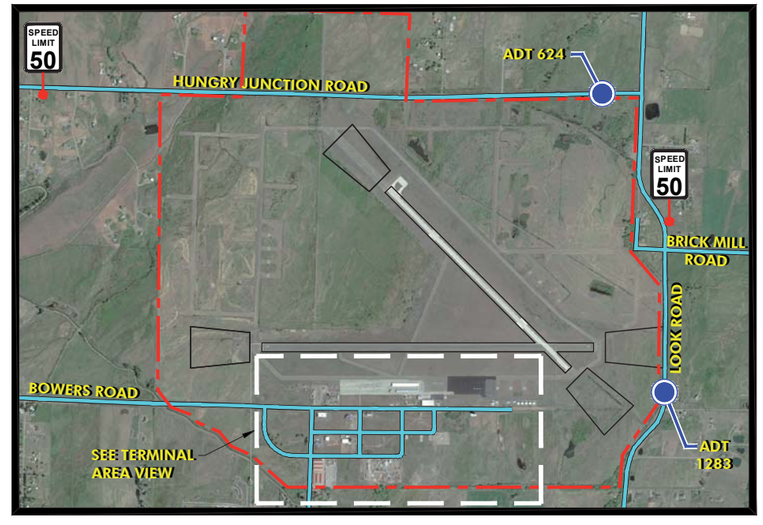
SPEED LIMIT 35

AIRPORT ROAD

N

0 150 300

SCALE OF FEET
SCALE: 1"=150'



SURFACE ACCESS (EXISTING)
FIGURE 2-10

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

Utilities

In 2013, Kittitas County completed an Airport Utility Master Plan[18] that addressed a number of constraints regarding utility service to the airport and industrial park that were identified in a 1994 Economic Development and Strategic Plan. The utility master plan focused on installation of water lines, water storages facilities, sewer and gas lines, and fiber optic cable to the airport and industrial park. Based on the significant investment in facilities, the developed areas of Bowers Field now have water, natural gas, sanitary sewer, electrical, telephone/internet service, and fiber optical cable service. **Figure 2-11** depicts the utilities available throughout the airport and the industrial park.

Bowers Field is not connected to the City of Ellensburg storm sewer system. Airfield drainage is managed through a system of open ditches and culverts, including several dating to the airfield construction conducted in the early 1940s. Airport management has identified significant seasonal flooding issues that are related to drainages entering the north end of the airport.

[18] 2010 Bowers Field Airport Utility Master Plan. USKH. Completed in 2013.

LEGEND

- NATURAL GAS
- SEWER
- WATER
- POWER
- STORM WATER
- PROPERTY LINE
- HYDRANT
- VALVE

TAXIWAY C

TAXIWAY D

TAXIWAY B

TAXIWAY B

BOWERS FIELD

BOWERS ROAD

AIRPORT ROAD

BEECH ROAD

CESSNA ROAD

PIPER ROAD

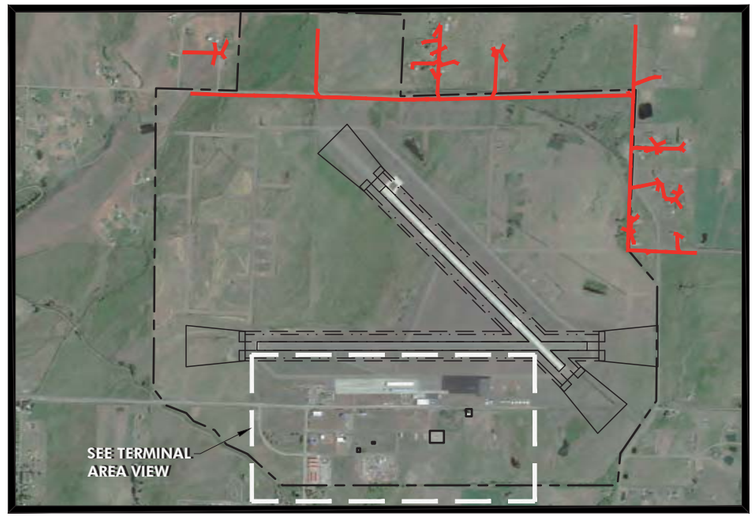
ELMVIEW ROAD

FALCON ROAD

N

0 150 300

SCALE OF FEET
SCALE: 1"=150'



UTILITIES PLAN
FIGURE 2-11

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

WATER

The City of Ellensburg provides water service to the airport via a 16-inch water line that runs along Airport Road and most of Bowers Road (reduced to a 12-inch line on the east end of Bowers Road). In addition, an 8-inch line was installed along Falcon Road. A one-million gallon water storage tank was also constructed across Bowers Road in the Airport Industrial Park. The City also maintains a domestic water well on the airport.

SANITARY

An 8-inch sanitary sewer line runs along Airport Road, Bowers Road, and Falcon Road to serve the airport and industrial park.

POWER

The City of Ellensburg, Kittitas County PUD, and Puget Sound Energy (PSE) all provide electrical service to areas of the Airport and Industrial Park. Electrical lines extend along Bowers Road south of the airfield and supply power to airport hangars, and businesses. Power is also provided within the Airport Industrial Park. Electrical lines extend across Bowers Road providing power to the airport electrical vault, which serves all the power needs on the airfield (lighting, etc.).

GAS

The City of Ellensburg provides natural gas to the airport by underground gas pipelines. Existing pipelines are buried along the south side of Bowers Road and run from Airport Road on the west to along Bowers Road with extensions under Bowers Road to airport buildings on the north side of Bowers Road. Smaller sections of buried pipelines extend under Bowers Road and run for short distances along the north edge of the road, serving airport tenants.

TELEPHONE/INTERNET

Charter Communications and Fair Point Communications provide telephone and high-speed internet service to the airport and industrial park area.

Airport Industrial Park

The Airport Industrial Park is located within airport property and totals approximately 143 acres, approximately 80 of which are considered useable for industrial park purposes. The industrial park is fully serviced with utilities and offers convenient and redundant access. A list of business and industrial park tenants is provided in **Table 2-11**.

TABLE 2-11: KITTITAS COUNTY AIRPORT INDUSTRIAL PARK TENANTS (2018)

- Ellensburg Business Development Authority (EBDA) Incubator Facility
- Kittitas County Emergency Communications Facility (KITCOM 911 center)
- Central Washington University Flight Technology Building
- Precision Ag
- Elmview Industries
- Valley Fence
- Miller Refrigeration
- Ellensburg Pallet

Land Use Planning and Zoning

Kittitas County has land use authority for the airport and its immediate surroundings. Title 19 of the Kittitas County Code establishes the zoning guidelines for airport land. A detailed description of current zoning, airport overlay zoning, and land use will be developed and is presented in the Airport Land Use (Chapter 8).

ZONING

The airport is zoned Light Industrial[19]. The Light Industrial zone "is established to preserve areas for industrial and related uses of such a nature that they do not create serious problems of compatibility with other kinds of land uses and to protect such zones from encroachment by conflicting land uses."

The airport is surrounded by predominantly agricultural-related zoning with areas of rural residential zoning located in nearby unincorporated areas. Areas within the city limits south of the airport include conventional residential zoning.

AIRPORT OVERLAY ZONING

Kittitas County developed the Airport Zone,[20] which was jointly adopted by the City of Ellensburg (Ellensburg Land Development Code, Chapter 15.350) in 2001. The Airport Zone establishes "an airport overlay zoning district on properties located on, adjacent to, and in the vicinity of public-use airports including Easton State, Cle Elum Municipal, DeVere Field, and Kittitas County Airport (Bowers Field), in order to protect the health, welfare, safety, and quality of life on the general public, property owners,

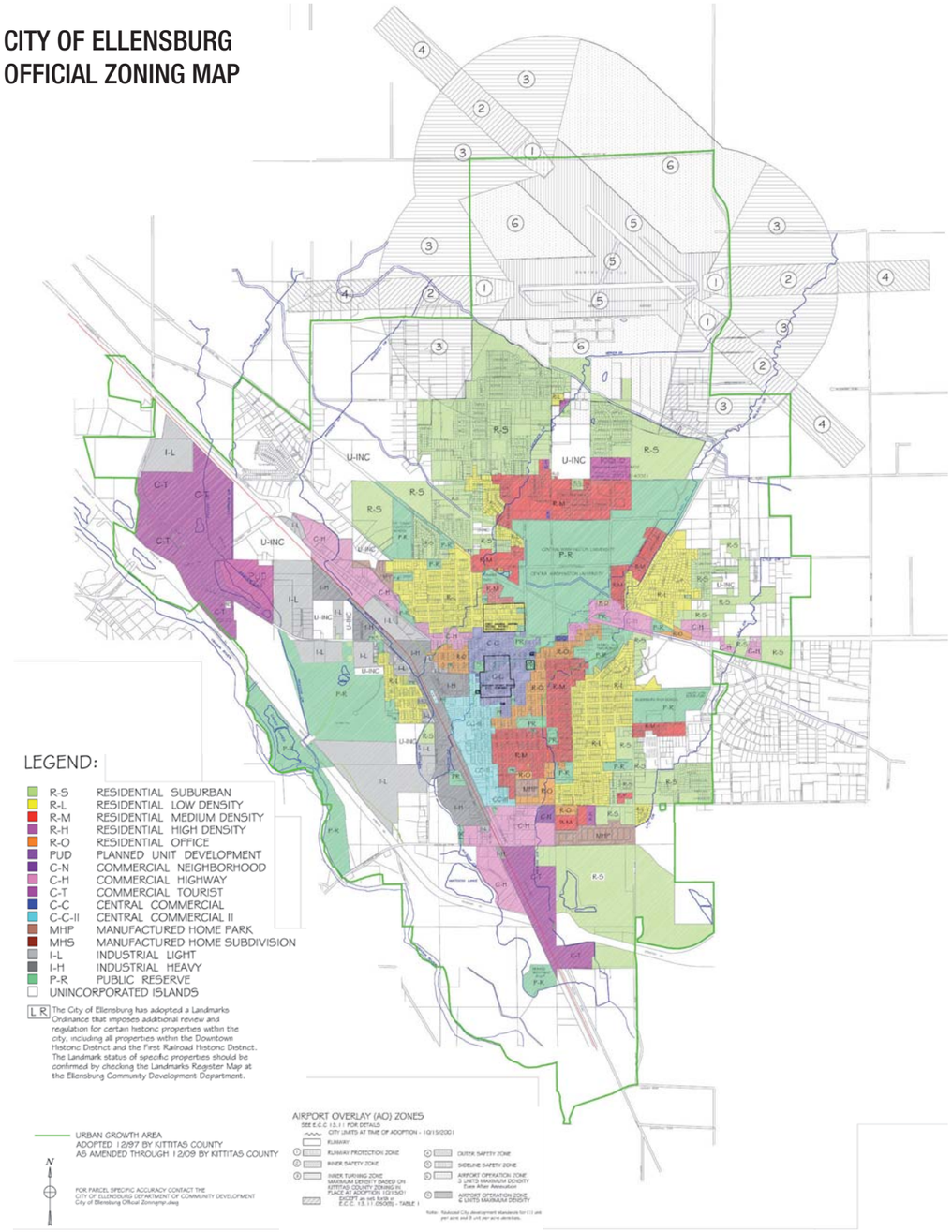
[19] Kittitas County Code, Title 17, Chapter 17.48 I-L Light Industrial Zone.

[20] Kittitas County Code, Title 17, Chapter 17.58 Airport Zone.

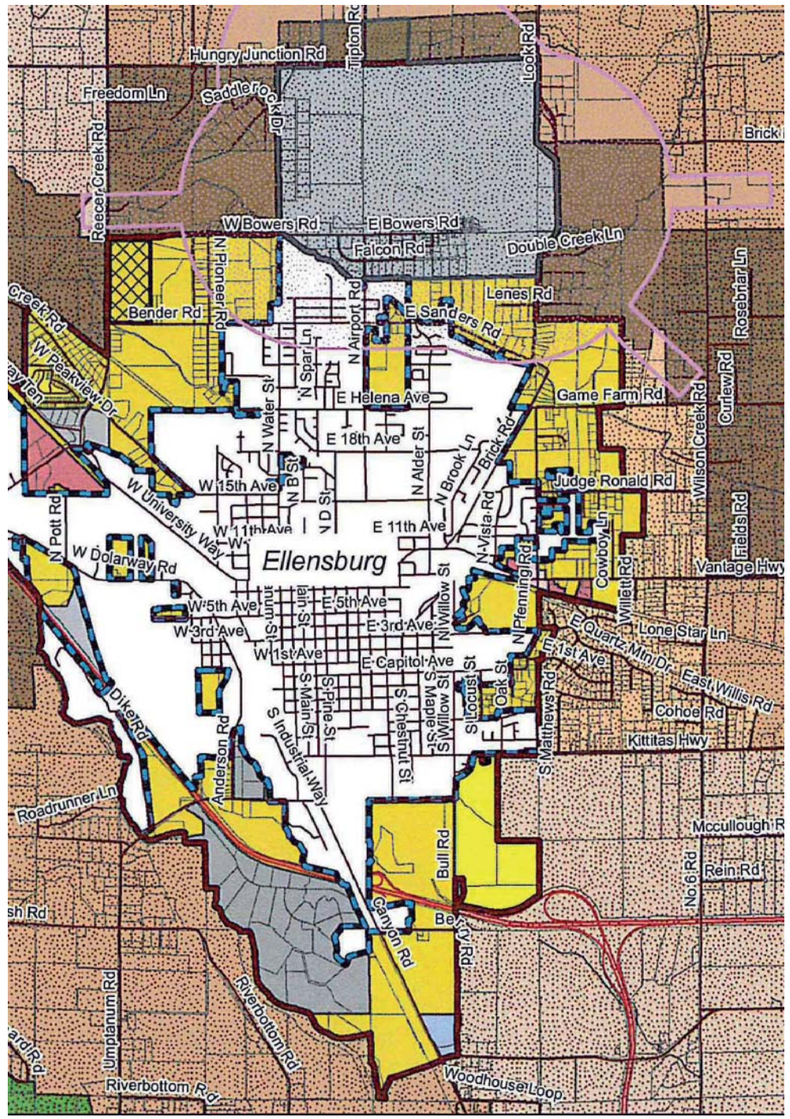
airport operators, and aviation community; and also to ensure compatible land uses in the vicinity of the affected environments of the airport overlay zoning district."

The airport overlay zoning incorporates the airport safety zones defined in WSDOT Aviation Division airport land use compatibility guidelines with modified land use density standards for areas located within the Ellensburg urban growth area (UGA) and outside the UGA. The overlay zone also provides height and hazard protection for the FAR Part 77 airspace defined for the airport. **Figure 2-12** depicts the Airport Zoning.

CITY OF ELLENSBURG
OFFICIAL ZONING MAP



KITTITAS COUNTY ZONING MAP



Legend

- Interstate Highways
- All Roads
- Cities
- Urban Growth Area
- LAMIRDs
- PUDs

Zoning Classification

- Agriculture 3
- Agriculture 5
- Agriculture 20
- Commercial Agriculture
- Rural Recreation
- Forest and Range
- Commercial Forest
- General Commercial
- Highway Commercial
- Limited Commercial
- General Industrial
- Light Industrial
- Planned Unit Development
- Master Planned Resort
- Urban Residential
- Residential
- Residential 2
- Rural Residential
- Rural 3
- Rural 5
- Historic Trailer Court

Overlay Zones

- Wind Farm
- Bowers Field
- Airport
- Agriculture Study
- Ag Production District
- Historic Liberty District

AIRPORT ZONING
FIGURE 2-12

KITTITAS COUNTY - BOWERS FIELD
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING