2.0 INVENTORY

This chapter documents the type and general condition of the existing facilities at Harvey Field (S43 or the Airport). The inventory is a complete compilation of all facilities and systems of the Airport including airfield, terminal area, navigational aids, ground access, parking, pavement conditions, utilities, and other characteristics. **Chapter 5, Environmental Inventory** describes the baseline conditions at S43 in 2014.

Table 2-1 and **Table 2-2** summarize the major landside and airside components of S43. These key items will be discussed in greater detail throughout this chapter.

TABLE 2-1 – AIRFIELD PAVEMENT INVENTORY

Item	Description
Runway 15L/33R	– 2,671 feet by 36 feet – Consists of non-standard paved asphalt - good condition – Published Strength: 10,000 pounds Single Wheel Gear (SWG) – Basic markings (numbers only) – good condition; centerline stripe; displaced thresholds
Taxiways	– Partial parallel – good condition – Non-standard with two end connectors and two midfield connectors – good condition
Runway 15R/33L	– 2,430 feet by 100 feet – Turf runway

Source: Jviation

TABLE 2-2 – AIRPORT FACILITIES INVENTORY

Item	Description
Navigational Aids	– Area Navigation (RNAV/Global Positioning System (GPS))
Visual Aids	– Low Intensity Runway Lights (LIRL) – non-standard – Green runway threshold lights (360 degrees) – Runway & Taxiway Guidance Signs – Taxiway pavement reflectors (blue) – fair condition – Wind Cone/Wind Tee
Fixed Base Operator (FBO)	– Hangars (1) – 5,000 square feet – Apron – 56,577 square feet – Terminal – office in portion of terminal (1,800 square feet)
Parking	– Employee, Tenant, and Visitor – approximately 106 paved and 125 unpaved spaces

Source: Jviation

2.1 FAA Advisory Circular 150/5300-13A, *Airport Design*

On September 28, 2012, the FAA released the first comprehensive update since 1989 of Advisory Circular (AC) 150/5300-13A, *Airport Design*, which replaced the previous AC in its entirety. FAA issued amendments on February 26, 2014. The new airport design guidance was used when assessing the facilities at S43 in **Chapter 4, Facility Requirements**.

The most significant changes from the previous *Airport Design* AC include the new standards and technical requirements of the Runway Design Code (RDC) and Taxiway Design Group (TDG).

The AC still uses a design aircraft; however, in most cases the design aircraft is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and TDG. The FAA requires that critical design aircraft generate a minimum of 500 operations (takeoffs and landings) per year in order to be classified as the critical aircraft.

The AAC and ADG are combined to form the RDC. The TDG relates to the undercarriage dimension of the aircraft. Taxiway width and fillet standards, and in some instances runway to taxiway and taxiway/taxilane separation standards, are still determined by the ADG. AC 150/5300-13A requires selection of the RDC(s), the most demanding meteorological conditions for desired/planned levels of service for each runway, and then to apply the airport design criteria associated with the RDC and designated or planned approach visibility minimums. The associated taxiways are then designed accordingly to the designated TDG.

2.1.1 Runway Design Code

The FAA classifies airport runway facilities with a coding system known as the RDC. This classification helps apply design criteria appropriate to operational and physical characteristics of various aircraft types operating at an airport. As mentioned previously, the RDC of a runway is made up of three separate components: the AAC, the ADG, and approach visibility minimums.

The AAC is an *alphabetical* classification of an aircraft based upon 1.3 times the stall speed in a landing configuration at its maximum certified landing weight. The approach category for an airport is determined by the approach speed of the fastest aircraft that generates at least 500 operations annually, with Category A being the slowest approach speed and Category E the fastest. The categories are:

- **Category A**: Speed up to 90 knots
- **Category B**: Speed 91 knots to 120 knots
- **Category C**: Speed 121 knots to 140 knots
- **Category D**: Speed 141 knots to 165 knots
- **Category E**: Speed 166 knots or more

The ADG is a *numerical* classification of aircraft based on wingspan or tail height. If an airplane's wingspan and tail height are in two categories, the most demanding category is used. Similar to the approach category, the ADG for an airport is determined by the largest aircraft operating at least 500 times per year at the facility. Also, for airports with multiple runways, the published RDC is based on the most demanding aircraft for each runway specifically. ADG details are identified in **Table 2-3.** Examples of RDC aircraft types are shown in **Figure 2-1**.

TABLE 2-3 – AIRPLANE DESIGN GROUP

Group	Tail Height (feet)	Wingspan (feet)
I	<20	<49

Group	Tail Height (feet)	Wingspan (feet)
II	20 ≤ 30	49 ≤ 79
III	30 ≤ 45	79 ≤ 118
IV	45 ≤ 60	118 ≤ 171
V	60 ≤ 66	171 ≤ 214
VI	66 ≤ 80	214 ≤ 262

Source: FAA AC 150/5300-13A

FIGURE 2-1 – RDC AIRCRAFT TYPES

Source: Jviation

The RDC of a runway determines the runway width, shoulder width, runway separation distances from other runways and taxiways, runway safety area (RSA) dimensions, object-free area (OFA), obstacle-free zone (OFZ), and the widths and length of the runway protection zone (RPZ).

2.1.2 Taxiway Design Group

Previously, taxiway design was determined solely on the ADG of a runway complex. An ADG was based exclusively on the wingspan and tail height of the design aircraft, not the dimension of the aircraft undercarriage. With the release of AC 150/5300-13A, taxiway design standards are now based on the TDG and the ADG of a taxiway complex. The TDG of a taxiway complex is determined by the undercarriage dimensions, overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance, of the most demanding aircraft. Taxiway/taxilane width, shoulder width, and fillet standards, *and in some instances*, runway to taxiway and taxiway/taxilane separation requirements, are governed by the TDG. TDG improves the design of taxiways fillets and radii, enabling safe and efficient taxiing by airplanes while minimizing excess pavement. Harvey Field is a TDG-1A based upon the Cessna Grand Caravan 208B’s dimensions.

The ADG of a taxiway complex determines the taxiway separations from other taxiways/taxilanes, the taxiway safety area, the taxiway/taxilane object free area, and wingtip clearances.

2.2 Airfield Design Standards

The primary consideration for runway and taxiway design is the standards established by the FAA, which are based upon the critical aircraft. Runway dimensional design standards define the widths and clearances required to optimize safe operations in the landing and takeoff area. These dimensional standards vary depending upon the RDC for the runway and the type of approach that is provided. The most demanding, or critical aircraft currently using S43 are B-II. The current runway conditions for 15L/33R as well as B-II design standards are shown in **Table 2-4**.

TABLE 2-4 – RDC B-II (RW 15L/33R) FAA RUNWAY DESIGN STANDARDS

Standard	Runway 15L Current Conditions	Runway 33R Current Conditions	B-II Design Standards
Runway Width	36’	36’	75’
Runway Shoulder Width	NA	NA	10’
Runway Safety Area (RSA) Width	120’	120’	150’
RSA Beyond Runway Threshold	240’	240’	300’
Runway Object Free Area (ROFA) Width	250’	250’	500’
ROFA Beyond Runway End	240’	240’	300’
Runway Centerline to Parallel Taxiway Centerline/a/	85’	91’	240’
Runway Centerline to Aircraft Parking/b/	247’/b/ 589’/c/	247’/b/ 589/c/	250’
Runway Holding Position Markings/d/	<125’	<125’	200’

Sources: Airport Management and FAA AC 150/5300-13A
Notes: /a/Harvey Field has a partial parallel and separation distances vary
/b/Grass tie-downs in mid-field
/c/Main apron
/d/Vary but all less than standard for B-II of 200 feet.

2.3 Modification of Design Standards

Harvey Field currently has two FAA-approved modifications of design standards. These modifications were approved for the conditions at the time of approval, April 27, 1988. The modifications are as follows.

Displaced Thresholds

Runway 15/33[1] has displaced thresholds to accommodate existing obstructions to the approach ends of each runway. Runway 15 has a displaced threshold to clear railroad tracks (23 feet) on the north end of the airfield. This displacement is approximately 452 feet to the south of the runway pavement end. Runway 33 has a threshold displacement approximately 241 feet to the north of the existing pavement end to clear Airport Way (17 feet). This modification of standards is approved indefinitely, provided the use of Runway 15-33 does not change.

Building Restriction Line

The standard taxiway centerline to object free area (OFA) separation is 44.5 feet. Two buildings, a storage building and a residence, extend 24 feet within the OFA on the east side of Runway 15/33[2] at the south end. Approximately 210 feet of the south end of the existing runway will be abandoned, so the buildings will not be adjacent to any runway or taxiway. The runway safety area is not affected.

An acceptable level of safety is provided by abandoning the south 210 feet of Runway 15/33. This modification of standards is approved indefinitely, provided the use of Runway 15/33 does not change.

These modifications of standards will be reviewed in **Chapter 4, Facility Requirements**.

2.4 Airfield/Airspace

2.4.1 Runways

S43 airfield configuration consists of one paved active runway, Runway 15L/33R (2,671' x 36'), constructed to support a weight-bearing capacity of no greater than 10,000 pounds for single wheel gear (SWG) and a second unmarked parallel turf strip, Runway 15R/33L (2,430' x 100'). Runway 15L has a marked threshold displacement of 452 feet and Runway 33R has a marked threshold displacement of 241 feet for obstruction clearance. Runway 15R has a threshold displacement of 446 feet and Runway 33L has a threshold displacement of 245 feet for obstruction clearances.

Per the FAA Airport Master Record (FAA Form 5010-1), the current Airport Reference Point (ARP) is located at Latitude 47°54'29.35"N and Longitude 122°06'19.466"W. The ARP is the latitude and longitude of the approximate center of the runway(s) at an airport. The established airport

[1] Referencing existing Runway 15L/33R
[2] Ibid.

elevation, which is defined as the highest point along an airport's runway(s) is 22.35 feet above mean sea level (MSL).

Runway headings are designated using a two-digit number between 01 and 36. The number represents the direction the runway faces relative to magnetic north. The two-digit runway headings are rounded to the nearest 10 degrees (and the last 0 is typically left off). A runway numbered 22, for example, will be pointing towards southwest at 220° magnetic. Because runway numbers are rounded up or down to the nearest 10 degrees, actual runway headings vary within +/- 5 degrees either side of the painted runway number. For example, a runway aligned to 224° magnetic will be designated as Runway 22, and a runway pointing 216° will also be designated as Runway 22. On the opposite end of the runway designated 22 will be 04, or magnetic heading of 040°.

Runways are aligned in relation to true north. True north is a fixed geographical position based on the latitude and longitude intersection. Since true north is fixed, the true bearing of each runway end is also fixed (i.e. does not change over time). However, the location of true north and magnetic north are different; magnetic north is not fixed, but instead moves constantly. As a result, there is always a difference between the true bearing and the magnetic heading of each runway end, and the difference is constantly changing. When the difference exceeds the +/- 50 range, then the runway magnetic heading is changed.

The National Oceanic and Atmospheric Administration (NOAA) determines the difference between true north and magnetic north for every point in the U.S., as well as the magnetic declination for every latitude/longitude coordinate in the U.S. The lines of equal magnetic declination are referred to as isogonic lines. At S43, the magnetic declination is 160°11' E. NOAA also measures the annual rate of change of magnetic north, which indicates that the rate of change of magnetic north at S43 is 0°9' W per year.

Subtracting the magnetic declination (160°11' E) from the true bearing of the runway (165.040) results in a magnetic heading of 149⁰, rounded up to 150⁰. Given the relatively small rate of change anticipated in magnetic north, the runway's current magnetic heading (15/33) will remain valid through the end of the planning period. However, it is recommended that an airfield survey be conducted during the next major runway project at the end of the planning period to verify the true bearing and coordinates of each runway end at that time. The needle on a compass orients according to the earth's magnetic field, and compasses are used in aircraft as a way to provide directional guidance. Runway designations are determined by magnetic north and adjusted orientation. The earth's magnetic shifting is measured, recorded, and applied to an airport's runway numerals. Subsequently, different numbers are periodically painted on the runway to accurately represent the magnetic heading of the runway. The magnetic heading for the runway should be re-evaluated periodically.

Runway pavement condition and strength are discussed in **Section 2.4.4**.

2.4.2 Taxiways

The taxiway system at S43 consists of a curving 16-foot-wide, nonstandard, partial parallel taxiway that connects the runway ends to the terminal area and aircraft parking apron. **Table 2-5** and **Figure 2-2** provide an overview of the existing taxiway system's information and layout.

Taxiway pavement condition and strength are discussed in **Section 2.4.4**.

TABLE 2-5 – TAXIWAY SYSTEM

Taxiway	Description	Width (feet)
Partial Parallel	Partial parallel taxiway that connects the runway ends to the terminal area and aircraft parking apron	16
Runway 15L connector	Taxiway connector just south of Runway 15L threshold; connects to partial parallel leading to aircraft parking apron and terminal	16
Mid-field	Taxiway connector approximately 700' north of Runway 33R threshold; connects to partial parallel leading to aircraft parking apron and terminal	16

Source: Jviation

FIGURE 2-2 – AIRFIELD LAYOUT

Source: Jviation

2.4.3 Apron

S43 has a main aircraft parking apron that serves the Snohomish Flying Fleet, transient aircraft tie-downs, fueling operations, and access to and from hangar areas, as depicted in **Figure 2-2**. The apron is located west of the Runway 15L threshold. The total apron area is approximately 56,577 square feet. The apron pavement is asphalt and is in good condition.

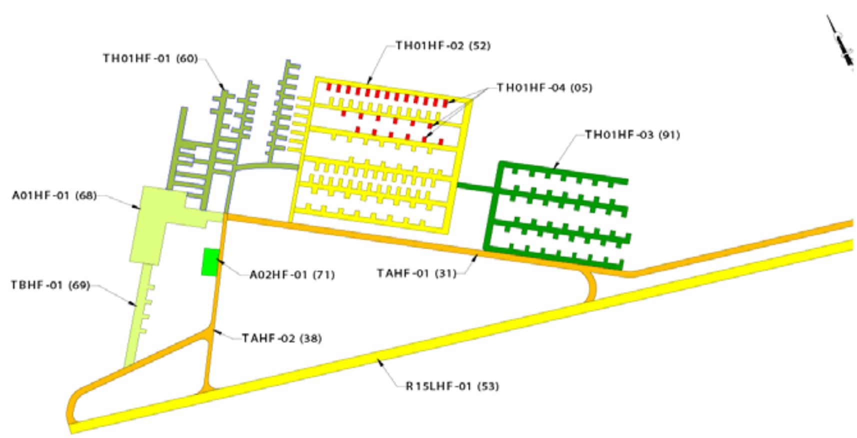
Apron pavement condition and strength are discussed in **Section 2.4.4**.

2.4.4 Pavement Condition and Strength

The FAA recommends in AC 150/5380-6b, *Guidelines and Procedures for Maintenance of Airport Pavements*, that a detailed pavement inspection be conducted that follows the American Society for Testing and Materials (ASTM) D 5340, Standard Test Method for Airport Pavement Condition Index Surveys. This method employs a visual rating system for pavement distress and is known as the Pavement Condition Index (PCI). The PCI scale ranges from a value of zero (representing a pavement in a failed condition) to a value of 100 (representing a pavement in excellent condition). Overall, the surfaces at S43 range from a PCI of 5 to 91, as shown on **Figure 2-3**, with an overall rating of 56.[3] The apron, southern taxilanes, and northern taxilanes are all in good condition. The midfield taxilanes are in fair condition while some of the pads are failing. The partial parallel, connectors, and runway, while noted to be in fair condition, were rehabilitated following the state report and are currently in good condition.

Runway 15L/33R is constructed to support a weight-bearing capacity of no greater than 10,000 pounds for a single wheel gear (SWG) as shown in **Figure 2-4**. The taxiway and apron weight-bearing capacities are not published.

FIGURE 2-3 – S43 PAVEMENT CONDITION INDEX

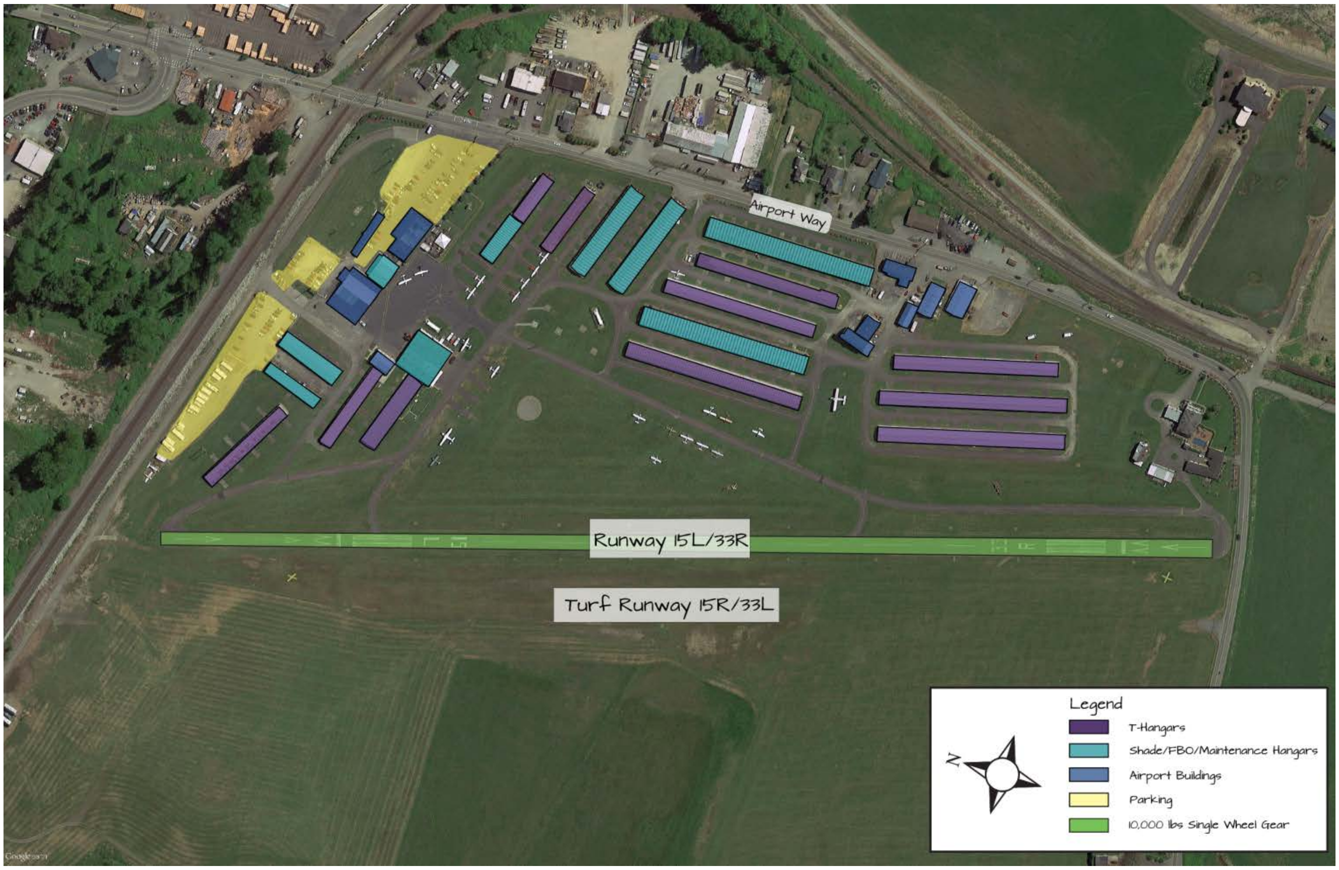


PCI Legend:	0-10	11-25	26-40	41-55	56-70	71-85	86-100

Source: 2013 Washington State Pavement Management Report
Note: Runway 15L/33R and main taxiway were rehabilitated following this report and are currently in good condition.

[3] Washington Statewide Airport Pavement Management Report, June 2013

FIGURE 2-4 - EXISTING PAVEMENT STRENGTH



Source: Jviation

2.4.5 Lighting, Markings, and Signage of Runways and Taxi

Runway 15L/33R has low-intensity runway lighting (LIRL) that are positioned in a non-standard manner from the pavement edge. The lights were installed in 1975, upgraded in 1995, and are in fair condition. The runway also has green threshold lights (360 degrees) that are in fair condition. The turf runway, 15R/33L is not lighted.

The partial parallel taxiway and two connectors are not equipped with a lighting system. All taxiway pavement edges are marked with blue reflectors that are in fair condition.

Airfield signage gives pilots visual guidance information for all phases of movement on the airfield. S43 is not currently equipped with FAA required signage.

2.4.6 Visual and Navigational Airport Aids

The Airport's visual and navigational aids (NAVAIDs) are summarized in **Table 2-6**.

TABLE 2-6 – S43 VISUAL AND NAVAIDS SUMMARY TABLE

General	Runway 15L/33R
Wind Cone and Tee	LIRL[a]
UNICOM	RNAV (GPS)[b]

Source: Jviation
/a/ Low Intensity Runway Lighting
/b/ Area Navigation

Harvey Field has a weather observation system on site in partnership with a local college. However, this is not an approved weather observation system. Pilots are able to obtain weather information from either the Arlington Municipal Airport's (16 nautical miles north; 135.625 MHz or 360-435-6192), or Paine Field/ Snohomish County Airport's (7 nautical miles west; 425-355-6192) Automated Weather Observation System (AWOS). An AWOS is an automated sensor suite which is voice synthesized to provide a weather report that can be transmitted via VHF radio, non-directional beacon (NDB), or VHF omni-directional radio range (VOR), ensuring that pilots on approach have up-to-date airport weather for safe and efficient aviation operations. Most AWOS observe and record temperature and dew point in degrees Celsius; wind speed and direction in knots; visibility, cloud coverage, and ceiling up to 12,000 feet; freezing rain; thunderstorm (lightning); and altimeter setting.

S43 has a wind cone and wind tee located at the mid-point of Runway 15L/33R which are in good condition.

2.4.7 Air Traffic Service Areas and Aviation Communications

FAA air traffic controllers, stationed in control towers and Air Route Traffic Control Center (ARTCC), provide air traffic control within defined geographic jurisdictions. There are 22 ARTCC geographic jurisdictions established within the continental United States. S43 is within the Seattle ARTCC geographic jurisdiction which includes the airspace in Washington, most of Oregon, and parts of Idaho, Montana, Nevada, and California, as well as the neighboring area into the Pacific Ocean. The Seattle ARTCC can be reached at frequency 128.5 MHz.

2.4.8 Instrument Approach Procedures

An instrument approach procedure is a sequence of maneuvers to guide aircraft operating under FAA's Instrument Flight Rules (IFR) from the beginning of the initial approach to a runway to landing. Currently, the FAA recognizes three instrument approach types: precision, approach with vertical guidance (APV), and non-precision. The FAA definitions of these approach types are as follows.

- **Precision Approach**: An instrument approach procedure providing course and vertical path guidance conforming to FAA Order 8260.3B, U.S. Standard for Terminal Instrument

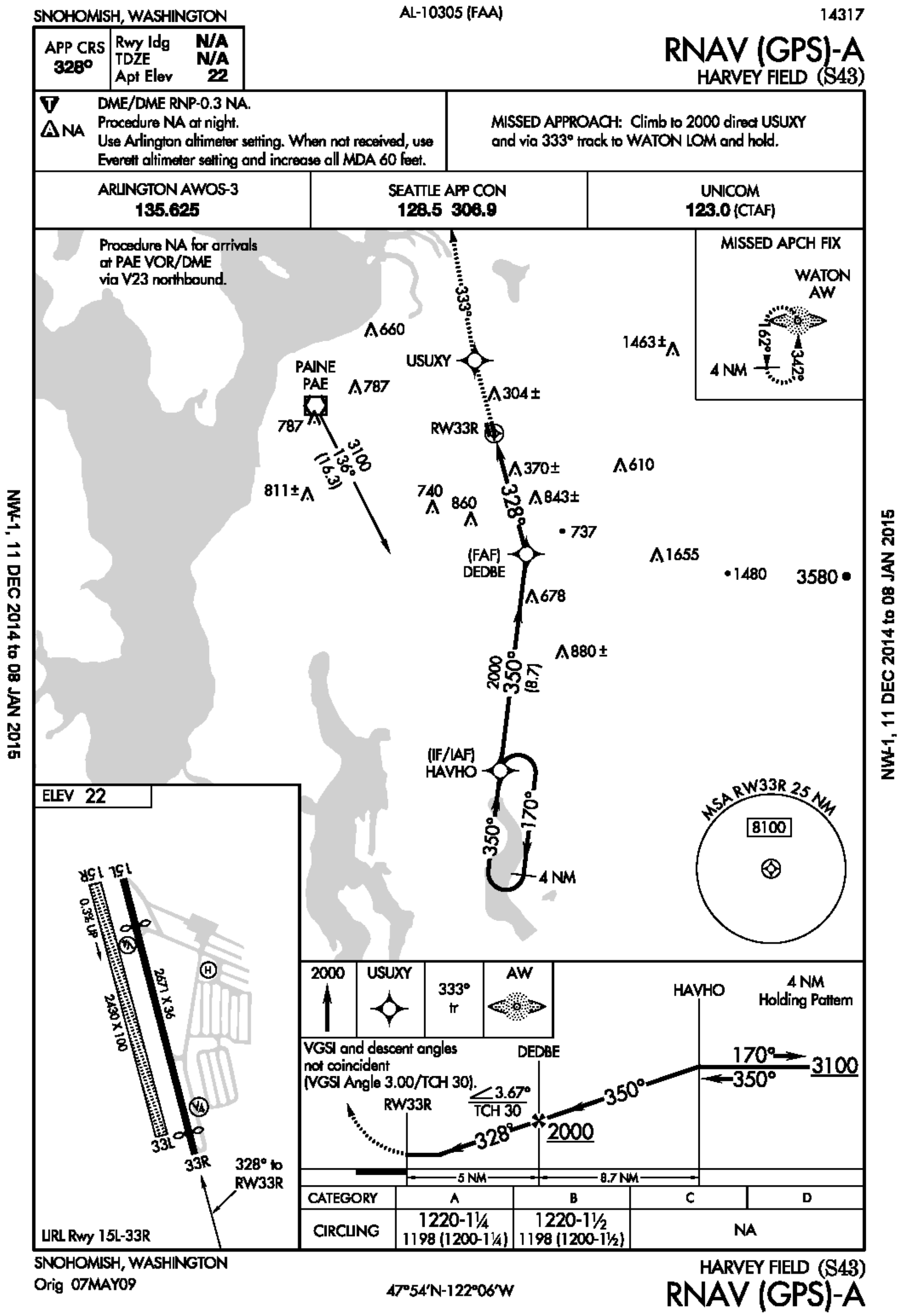
Procedures (TERPS), requirements. Instrument Landing System (ILS), Precision Approach Radar, and Microwave Landing System (MLS) are examples of precision approaches and are commonly referred to in the context of conventional approach technologies via the use of ground-based navigational aids. Harvey Field does not have a precision approach.

- **Approach Procedure with Vertical Guidance (APV)**: An instrument approach based on a navigation system that is not required to meet the precision approach standards of TERPS but provides course and glidepath deviation information. Localizer type directional aid (LDA) with glidepath, lateral navigation (LNAV)/vertical navigation (VNAV), and localizer performance with vertical guidance (LPV) are examples of APV approaches. Guidance provided for APV approaches via GPS do not require the use of ground-based navigational aids. There is no LPV or APV approach to Harvey Field.
- **Non-precision Approach**: An instrument approach based on a navigation system which provides course deviation (horizontal) information, but no glidepath deviation (vertical) information. VOR, non-directional beacon (NDB), LNAV, and circling minima are examples of non-precision approaches. Guidance provided for non-precision approaches via GPS do not require the use of ground-based navigational aids.

GPS satellite-based instrument approaches follow the same basic guidelines as ground-based systems, with the lowest possible minimums for approaches with horizontal only guidance being 300 feet above threshold and at least one mile of visibility (300-1). With the addition of vertical guidance through Wide Area Augmentation System (WAAS) or Ground Based Augmentation System (GBAS), the lowest minimums are generally 200-½ when an approach lighting system is installed.

As discussed previously, S43 has one published non-precision approach procedure, an RNAV/GPS-A (see **Figure 2-5**). The approach provides a circle-to-land procedure to either 15L or 33R at the pilot's discretion. This type of a procedure does not allow a straight-in approach to either runway, and as a result, the approach is visual instead of non-precision. The lowest minimums are 1,220 feet (MSL) and 1,198 feet (MSL) for military aircraft. Approach Category A aircraft (including military) have a 1¼ mile visibility while Category B aircraft have a 1½ mile visibility. Minimum descent altitude is associated with non-precision approaches and is the lowest altitude an aircraft can fly until the pilot sees the airport environment. If the pilot has not seen the airport environment by the designated Missed Approach Point (MAP), a missed approach is initiated.

FIGURE 2-5 – HARVEY FIELD RNAV/GPS-A APPROACH



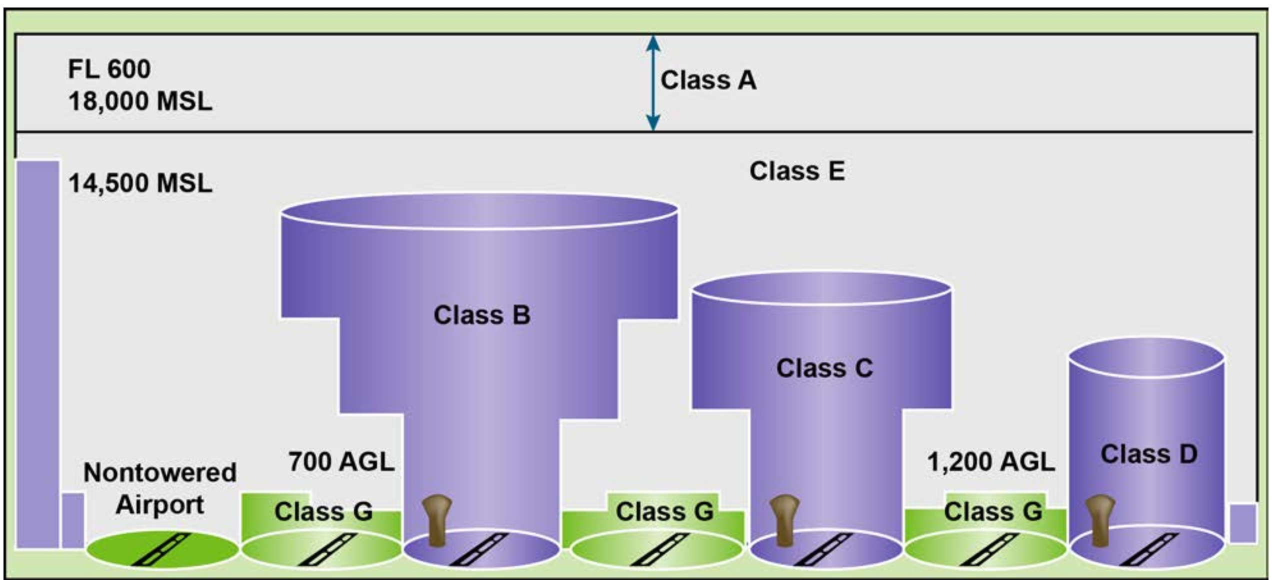
Source: SkyVector, https://skyvector.com/files/tpp/1413/pdf/10305RA.PDF, Accessed December 2014

2.4.9 Airport Airspace and Usage

FAA designates the airspace surrounding airports using a letter classification ranging from A to E, as depicted in **Figure 2-6**. The most restrictive of these airspaces is Class A airspace. It exists between 18,000 and 60,000 feet above mean sea level (MSL). Class A is controlled airspace applicable during the enroute portion of flight. Classifications are based on the level and type of aircraft operations for a specific airport. Airspace surrounding the nation's busiest airports, like Seattle-Tacoma International Airport, is designated as Class B, and is strictly controlled by air traffic control. Other towered airports are surrounded by Class C and D airspace. For airports such as S43 that have no tower, the surrounding airspace is designated as Class E. Airspace classified as Class E is subject to less restrictive air traffic control than that of Classes A through D. The primary restriction to this airspace is maintaining separation from other aircraft and minimum weather requirements of three statute mile visibilities and remaining clear of clouds by 1,000 feet above, 500 feet below, and 2,000 feet horizontally.

Airspace that has not been designated as Class A, B, C, D, or E airspace is classified as Class G (uncontrolled) airspace. This airspace extends from the surface to 1,200 above ground level (AGL), as described in FAA Order JO 7400.2K, Procedures for Handling Airspace Matters.

FIGURE 2-6 – AIRSPACE CLASSIFICATIONS

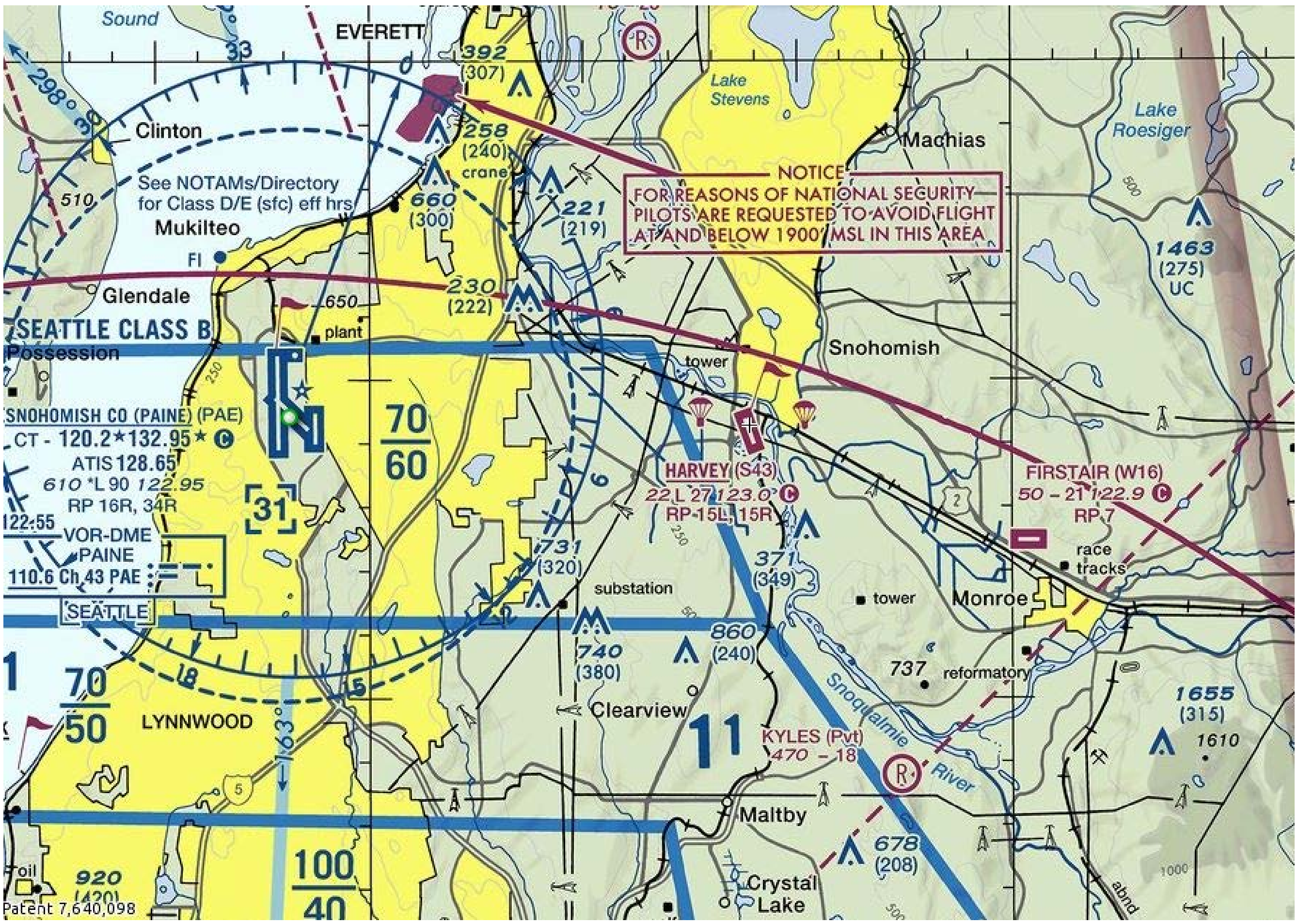


Source: Federal Aviation Administration

Figure 2-7 and **Figure 2-8** depict the airspace surrounding S43. As shown, Harvey Field is adjacent to Seattle's Class B airspace and just to the east of Paine Field's Class C airspace. The floor of Seattle's Class B airspace near Harvey Field is 6,000 feet, which allows aircraft to arrive at S43 and depart from S43 to the east, north, and south without flying into the Class B airspace. However, pilots must obtain air traffic control permission to operate inside Seattle's Class B airspace and Paine Field's Class C airspace.

Harvey Field is also inside the 30-mile Mode C veil[4] which requires all aircraft to have operable transponders[5] unless otherwise authorized by air traffic control. However, an aircraft that was not originally certificated with an engine-driven electrical system or which has not subsequently been certified with a system installed may conduct operations within a Mode C veil provided the aircraft remains outside Class A, B, or C airspace; and below the altitude of the ceiling of a Class B or Class C airspace area designated for an airport or 10,000 feet MSL, whichever is lower.[6]

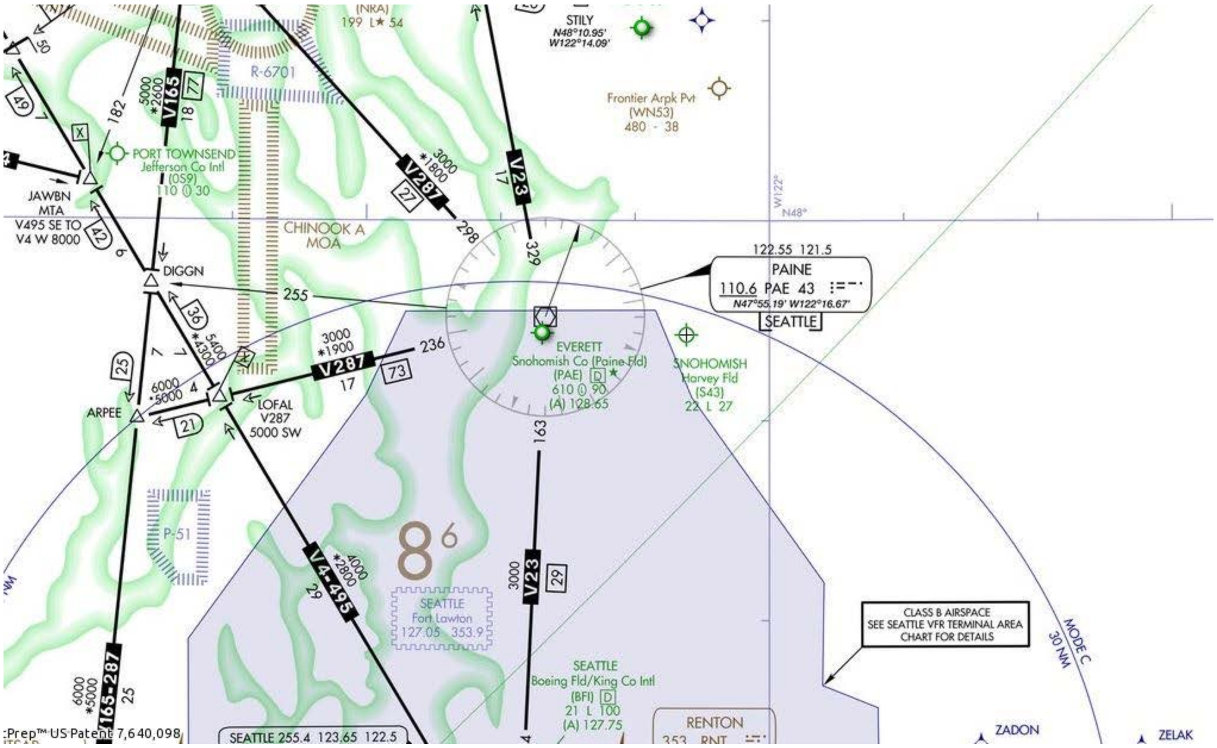
FIGURE 2-7 – VISUAL FLIGHT RULES AERONAUTICAL CHART



Source: Seattle Aeronautical Chart, 88th edition, December 11, 2014
Note: Not to scale

[4] Airspace within 30 nautical miles of an airport listed in Appendix D, Section 1 of 14 CFR Part 91 (generally primary airports within Class B airspace areas), from the surface upward to 10,000 feet mean sea level.
[5] Aircraft must be equipped with automatic pressure altitude reporting equipment having Mode C capability.
[6] Federal Aviation Administration Aeronautical Information Manual (AIM): Official Guide to Basic Flight Information and ATC Procedures

FIGURE 2-8 – INSTRUMENT FLIGHT RULES AERONAUTICAL CHART



Note: Not to scale

Source: United States Government Flight Information Publication, IFR Enroute Low Altitude –U.S., November 13, 2014

2.4.10 Obstructions to Air Navigation

Obstructions are defined as any object of natural growth, terrain, permanent or temporary construction equipment, or permanent or temporary manmade structures that penetrate a 14 Code of Federal Regulations (CFR) Part 77 imaginary surface.

Obstructions exist on the approaches to each runway end; consequently Runway 15L/33R has displaced thresholds. Runway 15L's threshold is displaced by 452 feet to the south in order to clear railroad tracks on the north end of the airfield while Runway 33R's threshold is displaced 241 feet to the north to clear Airport Way (displacement due to runway safety area and vehicle height). Trees are also obstructions off the Runway 15L end and power lines are off the departure end of Runway 33R, see **Table 2-7**.

TABLE 2-7 – S43 EXISTING OBSTRUCTIONS

Obstruction	14 CFR Part 77 Surface	Distance from Departure End	
		Runway 15L	Runway 33R
Trees	Approach	81' – 685'	-
Airport Way	Approach	44'	-
Fence	Approach	37'	-
Power line	Approach	-	32'

Obstruction	14 CFR Part 77 Surface	Distance from Departure End	
		Runway 15L	Runway 33R
Power Line	Approach	-	131’
Tower	Approach	-	5,708
Railroad tracks	Approach		-
Tower	Approach	-	6,076’

Source: Takeoff Minimums, (Obstacle) Departure Procedures and Diverse Vector Area (Radar Vectors), http://155.178.201.160/d-tpp/1413/NW1TO.PDF, accessed December 2014

2.4.11 Airport Noise Abatement Procedures[7]

The management of Harvey Field is committed to aircraft operating procedures which minimize noise impact on airport neighbors. Voluntary noise abatement procedures have been established for use and pilots are asked to cooperate to the extent possible. It is understood that air traffic control instructions and safety considerations may at times require deviation from the suggested procedures. While following the noise abatement procedure for Runways 33L/R over-flight of the city and residential area on Avenues I and J should be avoided when safe operation permits. Pilots, when departing Runways 33L/R, should climb straight ahead, tracking the extended runway centerline, and turn to a heading of 290 degrees “after” crossing the railroad tracks and “before” the river as safe operation permits. When departing the airport traffic area on the left “45” off runway 33L/R, pilots are to remain north of the river/railroad. Arrival traffic inbound on the “45” for runway 33L/R should remain south of the railroad tracks to avoid departing traffic. Northerly turns are not recommended until west of the power lines and above 1,000 feet. While departing to the south, pilots are expected to climb along the runway centerline to the traffic pattern altitude (1,000 feet above airfield elevation) before turning to a course heading when departing the pattern.

2.5 General Aviation Facilities

General Aviation (GA) facilities provide services to GA operators at an airport. GA facilities include the Fixed Base Operator (FBO), hangars, and apron/tie-down space.

2.5.1 Fixed Base Operator (FBO)

An FBO is an aviation-related business that provides services for general aviation pilots, aircraft, and passengers. However, some FBOs fuel air carrier aircraft, and provide deicing and light maintenance. FBO services range from GA aircraft fueling, ground servicing, aircraft maintenance and repair, in-flight catering, flight training, and aircraft rental. FBOs may also serve as a terminal for passengers boarding GA aircraft and may include a lobby, restrooms, vending, and rental car services. Pilot lounges, flight planning rooms, weather computers, and pilot shops are also typical in FBOs.

[7] Noise Abatement Procedure, www.harveyfield.com/Noise.aspx, accessed November 2014.

Currently, S43 is served by one FBO, Snohomish Flying Service, see **Figure 2-9**. The FBO is located on the GA apron at the northeast side of Runway 15L. The FBO is open from 7:30am-9pm in the summer and 8am-6pm in the winter and provides the following services:

- FAA-approved flight training (airplane and helicopter)
- FAR Part 133 Rotorcraft Long Line Training
- Fuel/Line service (AvGas and Jet A fuel) – self-serve and full service
- Aircraft Ferry and Aircraft Maintenance services (Major and Minor)
- Pilot supplies
- U.S. and Canadian charters
- Flight planning room, conference room, showers and dorms
- Courtesy vehicles

FIGURE 2-9 – SNOHOMISH FLYING SERVICE

Sources: Jviation and Harvey Field

2.5.2 Airport Hangars

Hangars are enclosed structures for the parking, servicing, and maintenance of aircraft, and are designed to protect aircraft from environmental elements such as wind, snow, hail, ice, and rain. The majority of hangar structures are either box-style or T-style designs. Box-style hangars, also known as conventional hangars, have a box-shaped or rectangular footprint and range in size to hold one or two single-engine aircraft up to accommodating several corporate jet aircraft. T-style hangars are known as T-hangars which are a series interconnected aircraft hangars with footprints in the shape of a "T." T-hangars generally store one single- or multi-engine aircraft each, while box-style hangars can range in size from those that accommodate one small plane to those that accommodate many aircraft of various sizes. A third type of hangar is an open or shade hangar which provides a roof but is not enclosed.

S43 has box/conventional hangars, T-hangars, and shade hangars for aircraft storage (**Figure 2-10**, **Figure 2-11**, and **Figure 2-12**).

Figure 2-13 depicts the hangar and structure locations. **Table 2-8** details hangar size, number of units, condition, and utilities for each as well as other airport structures.

FIGURE 2-10 – S43 BOX/CONVENTIONAL HANGARS

Sources: Jviation and Harvey Field

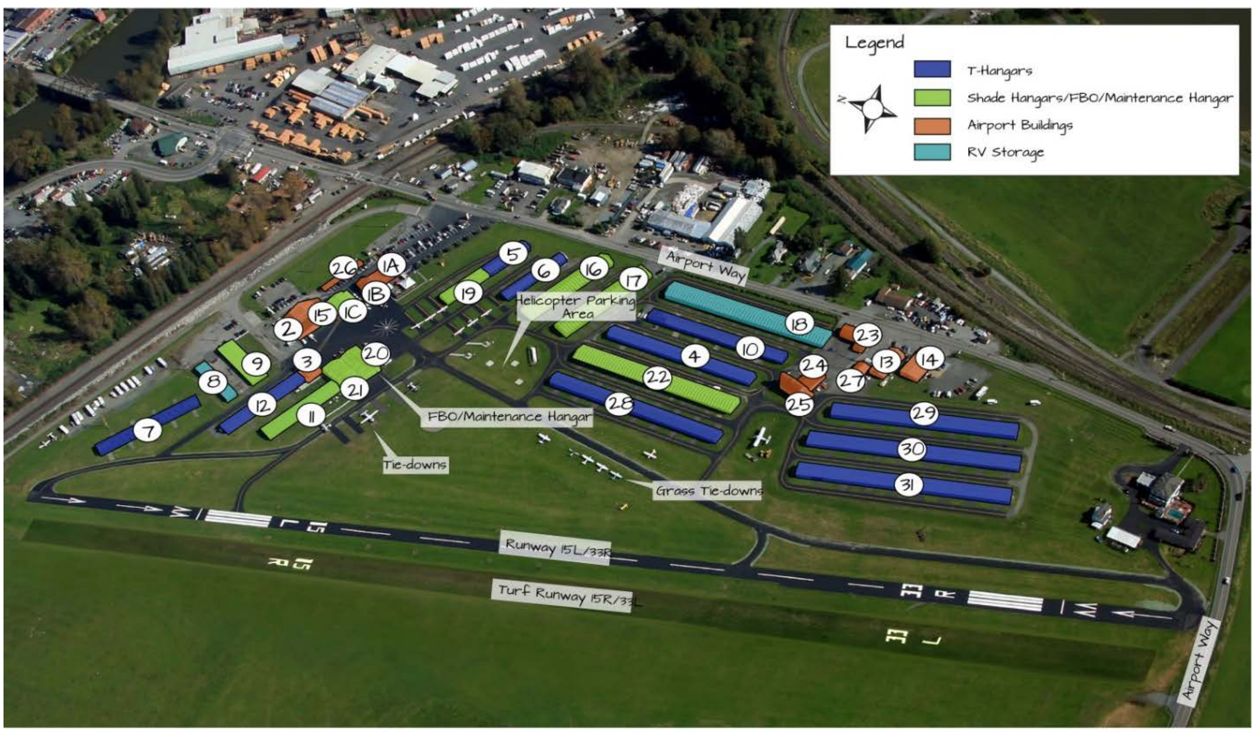
FIGURE 2-11 – S43 T-HANGARS

Sources: Jviation and Harvey Field

FIGURE 2-12 – S43 SHADE HANGARS

Sources: Jviation and Harvey Field

FIGURE 2-13 – AIRPORT BUILDINGS AND HANGARS



Sources: Airport Administration and Jviation
Note: Not to scale

TABLE 2-8 – EXISTING HANGARS & AIRPORT BUILDINGS

Legend #	Description	Units	Area (sf)	Condition
1A	Airport Restaurant	-	4,356	Fair
1B	Airport Administrative Office	-	1,800	Good
1C	Snohomish Flying Service	-	1,800	Good
2, STE A	Harvey Development, LLC/ LHT&E	-	700	Good
2, STE B	Student Dorms	-	800	Good

Legend #	Description	Units	Area (sf)	Condition
2, STE C	Community Conventional Hangar – Dream Barns Inc.	6	5,000	Good
2, STE D	Parachute Rigging Center	-	500	Good
2, STE E	Ground Maintenance	-	690	Good
3	Skydive Snohomish	-	2,355	Good
4	T-Hangar	14	12,480	Good
5	T-Hangar	4	3,720	Good
6	T-Hangar	6	5,430	Good
7	T-Hangar	9	7,920	Fair
8	RV Storage	-	4,650	Fair
9	Shade Hangar	12	7,480	Fair
10	T-Hangar	12	11,040	Fair
11	Shade Hangar	13	8,820	Good
12	T-Hangar	7	6,900	Fair
13	Superior Machine Manufacturing / SNS Industries / Badgett Aircraft Restoration	-	3,200	Fair
14	Airport Welding Helicarc Welding	-	4,032	Good
15	Community Event/Rental Facility	-	3,000	Good
16	Shade Hangar	15	11,264	Good
17	Shade Hangar	15	12,374	Good
18	RV Storage	-	19,872	Good
19	Shade Hangar	6	5,070	Good
20	Maintenance Shop (Snohomish Flying Service)	4/a/	5,000	Good
21	Common Hangar	5	5,000	Good
22	Shade Hangar	25	18,000	Excellent
23	TechMob & DGI Investments & Residential Rental Unit	-	2,545	Good
24	Airport Equipment Barn	-	1,920	Poor
25	Airport Equipment Barn Annex	-	1,800	Poor
26	Student Apartment/Dorms	-	1,938	Good
27	Airport Grounds Maintenance Shop	-	1,680	Fair
28	T-Hangar	16	14,240	Excellent
29	T-Hangar	14	13,056	Excellent
30	T-Hangar	16	14,816	Excellent
31	T-Hangar	16	14,816	Excellent

Source: Airport Administration, 2015
Note: /a/Units are not included in total storage as aircraft are only temporarily stored for maintenance

2.5.3 Based Aircraft

The Airport had a total of 249 based aircraft in 2014; 211 are stored in hangars and 38 on tie-downs. **Table 2-9** lists a breakdown of based aircraft by type.

TABLE 2-9 – 2014 BASED AIRCRAFT

Aircraft Type	Amount
Single Engine	231
Multi Engine	6
Turbine	3
Glider	1
Helicopters	6
Ultralight	2
TOTAL	249

Source: FAA, Airport Master Record, 2014

2.5.4 Based & Transient Aircraft Parking Aprons & Tie-downs

Aircraft parking aprons, also known as ramps, are paved surfaces designed for parking and servicing aircraft. Aprons provide access to terminals, hangars, and FBO facilities, locations to transfer cargo from aircraft, and areas for aircraft fueling and maintenance. An apron's size and pavement strength varies greatly at different airports and even on the same airport. Factors contributing to size and strength include: aircraft type, available space, special aircraft needs, and the configuration of terminals, hangars, and FBOs. In addition, whether aircraft power-in/power-out to parking positions, or if tugs are used to pull-in and/or push-out the aircraft, can greatly impact an apron's parking capacity.

Harvey Field's aircraft parking apron is used for the tie-down, fueling, maneuvering of vehicles and aircraft, and consists of the following areas (see **Figure 2-2**):

Main Aircraft Parking Apron/Tie-Down: The main airport apron is paved and used for the Snohomish Flying Fleet, transient aircraft tie-down, fueling operations, and access to and from the hangar areas.

Paved Tie-Down Area: There is a paved tie-down area located south and east of the main aircraft apron, south side of the east-west taxiway, and south side of Building 20/21.

These paved tie-down areas accommodate 21 based aircraft. Seven of the tie-downs accommodate larger aircraft.

Grass Tie-Down Area: Harvey Field has several grass tie-down areas. One is located in the center of the airfield terminal area; a second is on the west side of the center north-south taxiway; and a third is east of the restaurant outdoor dining area. The grass tie-downs can accommodate 24 aircraft with expansion availability. Nine of the 24 are reserved for transient aircraft and the remaining 15 are used for based aircraft.

Paved Helipad Parking: There is a designated helipad parking area located north of the Jet A fueling operation. The helipads accommodate based and transient helicopters; two pads are designated for based helicopters and two for transient to accommodate a total of four helicopters.

Pavement type and condition is discussed in Section 2.4.4.

2.6 Airport Equipment

The Airport owns and operates several pieces of large equipment to perform maintenance and snow removal. Snow Removal Equipment (SRE) is eligible for FAA funding.

2.6.1 Snow Removal Equipment (SRE)

Snow removal equipment (SRE) is used to clear the runway, taxiways, and apron at the Airport. Two Kubota Tractors, a Ford 5000 tractor, loader, D-4 Cat and sweeper are owned by the Airport and are in good condition.

2.6.2 Other Equipment

The Airport has other equipment that is used for mowing, aircraft fueling, courtesy cars, and airport maintenance. **Table 2-10** includes a list of this equipment as well as its current condition.

TABLE 2-10 – AIRPORT EQUIPMENT

Make/Model	Use	Condition
Ford	Fuel truck (100 LL)	Good
GMC	Fuel truck (Jet A)	Good
Ford	Passenger bus	Good
Ford	Passenger bus	Good
Ford/F150	Flatbed utility truck	Good
Chevrolet/C2500	Utility dump truck	Good
Ford/F150	Utility with dump bed	Good
Ford/F150	Service pick-up (red)	Good
Ford/F150	Service pick-up (white)	Excellent
Ford/F150	Service pick-up (burgundy)	Excellent
Ford/Expedition	Courtesy SUV (black)	Excellent
Ford/Fusion	Courtesy car (burgundy)	Excellent
EZ-Go	Golf cart w/cover	Good
Ford	Ladder truck	Poor
Tank	Trailer w/spray tank (500 gallons)	Good
Hyster	Fork lift	Good
Lektro	Aircraft tug	Good
Lektro	Aircraft tug	Good
FOD Boss	Runway/Taxiway sweeper	Excellent
John Deere/JD1435	Riding mower	Excellent
John Deere/JD1435	Riding mower	Excellent
Caterpillar/D4C	Dozer/Crawler	Good

Make/Model	Use	Condition
Kubota	Backhoe	Good
Kubota	Front loader	Good
Kubota	Sweeper	Good
Kubota	Post hole digger	Good
Kubota	Auger	Good
Kubota	Tractor – open cab	Excellent
Kubota	Tractor – closed cab	Excellent
Land Pride	3-deck mower	Good
Land Pride	3-deck mower	Good
Landa	Commercial pressure washer	Good

Source: Airport Administration Records, 2015

2.7 Support Facilities

2.7.1 Snow Removal Equipment (SRE) Storage Buildings and Maintenance

The Airport has three equipment maintenance and storage facilities, Buildings 25, 27, and 2D. Building 27 is primarily used for equipment maintenance, and Buildings 25 and 2D are utilized primarily for storage.

2.7.2 Aircraft Fuel Storage and Use

Aircraft typically use two fuel types: AvGas and Jet A. AvGas, or Aviation Gasoline, is used by aircraft with reciprocating piston engines. The most common grade of AvGas is 100 low lead (LL). Jet A is a kerosene type fuel, which contains no lead, and is used for powering jet and turbo-prop engine aircraft. Aviation fuel is currently stored in separate areas at Harvey Field. The AvGas tank is adjacent to the Snohomish Flying Service FBO/maintenance hangar and the Jet A tank is located in the helicopter parking area, east of shade hangars #16 and #17. Each tank is a double–walled, 12,000-gallon above-ground storage tank (AST) with fuel containment. The tanks are owned by Harvey Field and are in excellent condition. **Figure 2-14** and **Figure 2-15** depict the fuel truck delivery system and fuel tanks.

FIGURE 2-14 – S43 FUEL TRUCK DELIVERY SYSTEM

Sources: Jviation and Harvey Field

FIGURE 2-15 – S43 AVGAS (LEFT) AND JET A (RIGHT) SELF-SERVE 24-HOUR CARD LOCK

Sources: Jviation and Harvey Field

Table 2-11 details the fuel pumped by type from 2000 through 2014. The majority of Jet A fuel is used locally by the skydiving operator for their Cessna 208 Caravans; transient turbine aircraft operations at Harvey Field are minimal.

TABLE 2-11 – FUEL FLOWAGE

Year	100 LL (gallons)	Jet A (gallons)
2000	109,494	20,918
2001	97,674	9,768
2002	105,726	18,695
2003	101,441	13,294
2004	76,885	10,917
2005	92,480	11,137
2006	95,846	19,925
2007	83,531	22,140
2008	83,544	18,646
2009	78,178	31,204

Year	100 LL (gallons)	Jet A (gallons)
2010	69,052	32,264
2011	72,423	28,699
2012	58,961	36,110
2013	62,864	28,305
2014	63,071	29,111

Source: Airport Administration Records, 2000 to 2014

2.7.3 Airport Equipment Maintenance Shop and Storage

There are three buildings (2D, 25, and 27) dedicated to equipment maintenance and storage at Harvey Field. Buildings 25 and 27 are located between the two groups of T-hangars, east of the runway mid-point and Building 2D on the north ramp west of Hangar 15 on the main ramp. The maintenance and storage buildings are in fair condition and are currently used to store snow removal equipment and grounds maintenance/mowing equipment.

2.8 Access, Circulation, and Parking

Adequate vehicular access to the Airport, as well as parking facilities, are necessary for effective operation. The following summarizes existing road and parking conditions at the Airport.

2.8.1 Airport Access Road & Circulation Network

The main access road to Harvey Field is Airport Way, a two-lane rural major collector in Snohomish County. Airport Way bounds Harvey Field to the east and the south and provides access to the Airport from State Route 9 (SR9), Lowell Snohomish River Road, and Springhetti Road. The 2008 Snohomish County Transportation Element analyzed the level of service (LOS) for Airport Way and noted it was in arrears.[8] The LOS for Airport Way, which is located inside the urban growth area, is LOS E (unstable traffic flow with significant delays). Delay occurs at the SR9 signal and is compounded by southbound traffic at the stop-controlled intersection of Springhetti Road and Airport Way. A traffic study of Airport Way was completed in 2007 as part of the prior Master Plan. This study and further analysis will be discussed in Chapter 4, Facility Requirements and Chapter 5, Alternatives Analysis.

2.8.2 Auto Parking

Paved parking at S43 is available at the Airport entrance and can accommodate 105 vehicles. An unpaved area is available along the north access road and can accommodate 95 vehicles. Gravel parking is available at the gate entry to Hangar 10/18 for six vehicles, and employee parking is behind Building 2 and accommodates 30 vehicles. Paved and gravel parking lots that can accommodate 100 vehicles are located off Airport Way in the southeast corner of the Airport around

[8] Defined as "any arterial units operating, or forecast to operate within six years, below the adopted level-of-service standard contained in SCC 30.66B.100, unless a financial commitment is in place to complete improvements or implement strategies that are forecast to remedy the deficiency within six years."

Buildings 13, 14, 23, and 24. The parking lots are free of charge for airport users, employees, and tenants.

2.9 Utilities

Harvey Field has a variety of public utilities. Public utilities include electrical, garbage, propane, city water, various septic systems, Nibbler onsite sewage treatment facility for the restaurant, and fiber optics and communications. Waste water is treated on-site.

2.9.1 Electricity

Electricity is provided by Snohomish County Public Utility District.

2.9.2 Water Supply

Potable water is provided through the City of Snohomish water system. The current line and pressure is adequate to serve existing service to the south Snohomish UGA.

2.9.3 Waste Water

Waste water for Harvey Field is handled by an on-field, septic Nibbler Treatment System[9] and is adequate for the existing development.

2.9.4 Fiber Optics and Communications

Direct TV, Dish, Comcast, and Frontier Communications provide phone, TV, and internet service to Harvey Field.

2.9.5 Waste Management & Recycling

Waste is collected by Waste Management at Harvey Field. Currently cardboard is the only collected recycled waste at the Airport; it is collected by Rubatino.

2.9.6 Propane Gas

Propane gas is supplied to Harvey Field by Northern Energy.

2.10 Meteorological Data

Environmental elements play a significant role in an airport's layout and design. Temperatures impact runway length, and prevailing winds are one of the most important environmental elements as it dictates runway orientation.

[9] The Nibbler Treatment System is a system of pods inserted into a septic tank. The pods push air into the wastewater, creating a turbulent aerobic environment that digests organic material naturally.

2.10.1 Wind Coverage

Wind conditions are particularly important for runway use at an airport. Each aircraft has an acceptable crosswind component for landing and takeoff. The crosswind component is a calculation of the speed of wind at a right angle to the runway centerline. When the acceptable crosswind component of an aircraft is exceeded the aircraft must divert to another runway or a completely different airport.

Per FAA AC 150/5300-13A, Airport Design, when the current runway(s) provides less than 95 percent wind coverage for any aircraft that use the airport on a regular basis, a crosswind(s) runway should be considered. The crosswind components of 10.5, 13, 16, and 20 knots were used for this analysis to look at the allowable crosswind component of different sizes of aircraft. A 10.5-knot crosswind component is used for small aircraft weighing 12,500 pounds or less, and a 20-knot crosswind component is used for an aircraft the size of a Boeing 767.

The weather observations were obtained from the National Climatic Data Center (NCDC) for Snohomish County Airport (Paine Field), and were taken from 2000 to 2009. According to the FAA, the desirable wind coverage for an airport is 95 percent during all weather conditions, which means that runways should be oriented so that the maximum crosswind component does not exceed more than five percent of the time.

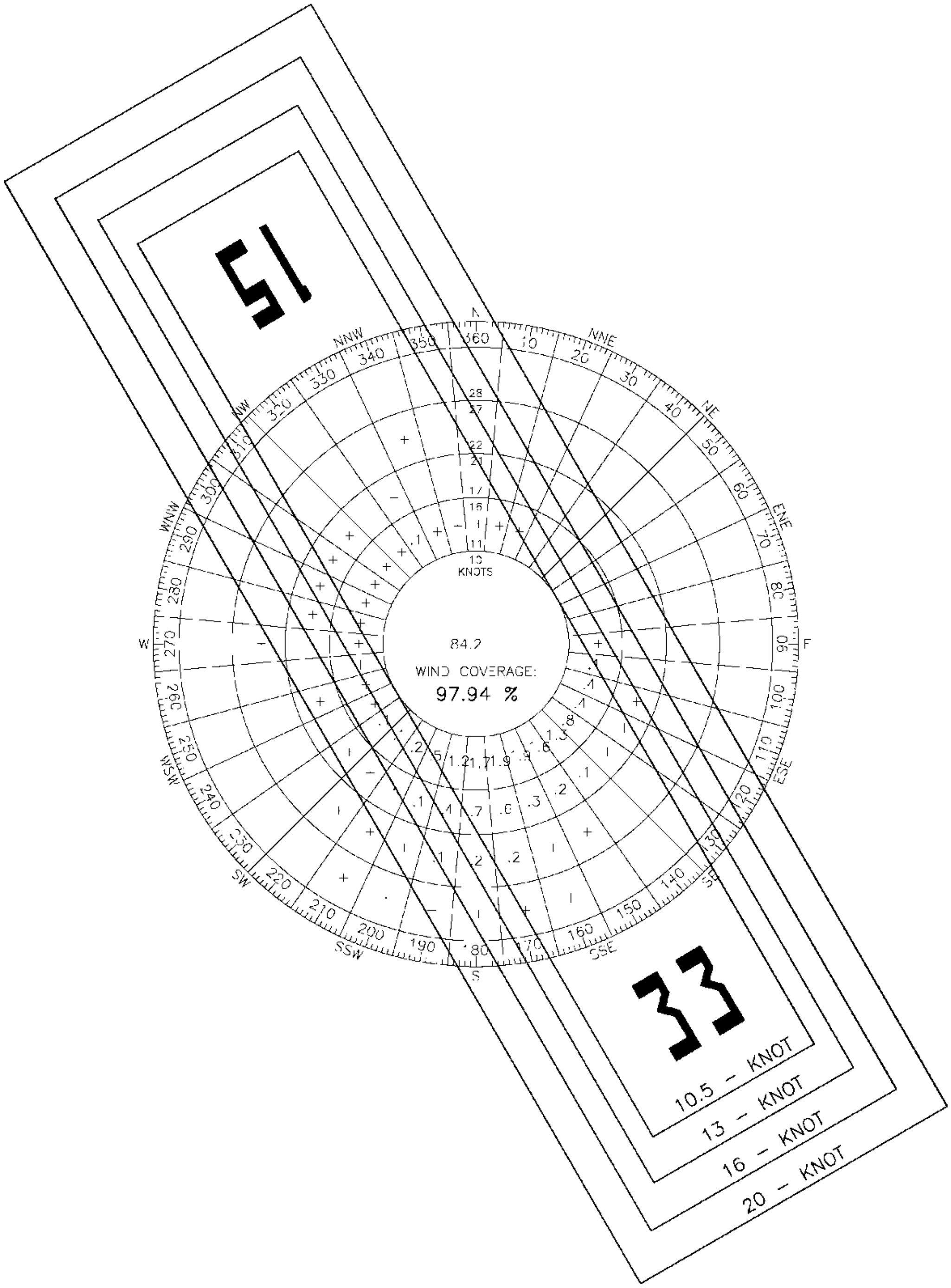
As shown in **Table 2-12**, the runway orientation of Runway 15L/33R provides 97.94 percent coverage for a 10.5-knot crosswind, which is over the FAA crosswind component requirement of 95 percent. "All Weather" includes data on the winds observed for all types of weather conditions during the observation period. The data collected indicates that during IFR conditions, the existing combined runway orientations provide 97.84 percent coverage for a 10.5-knot crosswind, which exceeds the FAA recommendation. The FAA All Weather and IFR weather wind roses are depicted in **Figure 2-16** and **Figure 2-17**.

TABLE 2-12 – S43 WIND COVERAGE

All Weather	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15L	86.09%	87.33%	87.92%	88.09%
Runway 33R	63.88%	63.99%	64.10%	64.11%
Runway 15L/33R	97.94%	99.20%	99.80%	99.97%
IFR	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15L	89.37%	90.72%	91.29%	91.49%
Runway 33R	53.12%	53.19%	53.24%	53.25%
Runway 15L/33R	97.84%	99.20%	99.77%	99.98%

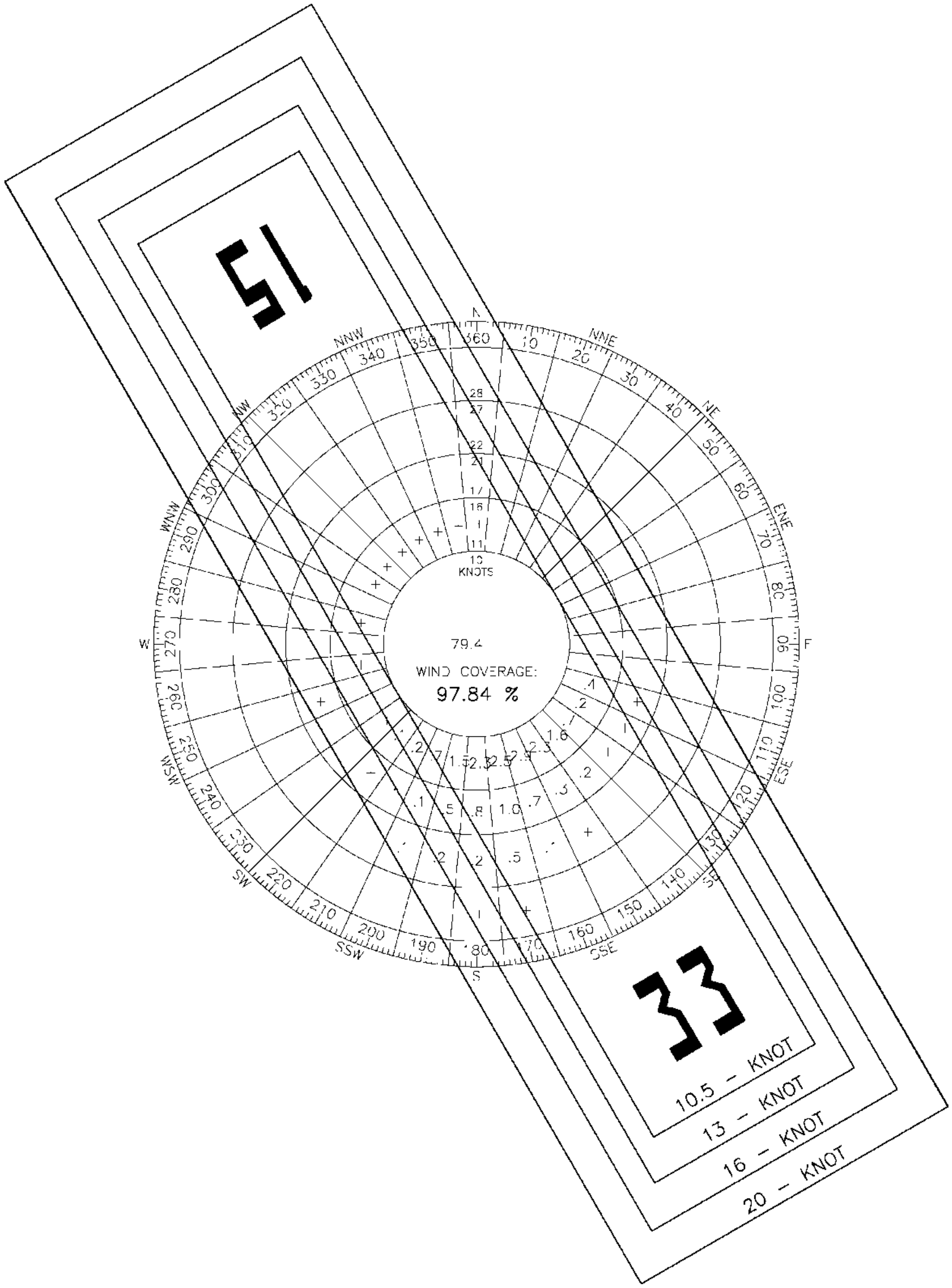
Source: NCDC, Station 72793 Snohomish County Airport (Paine Field), WA Annual Period of Record: 2000-2009

FIGURE 2-16 – ALL-WEATHER WIND ROSE



Source: NCDC, Station 72793 Snohomish County Airport (Paine Field), WA Annual Period of Record: 2000-2009

FIGURE 2-17 – IFR WIND ROSE



Source: NCDC, Station 72793 Snohomish County Airport (Paine Field), WA Annual Period of Record: 2000-2009

2.10.2 Temperature

The mean maximum temperature of the hottest month, also known as the airport reference temperature, occurs in August with a temperature of 73.9°F.

2.10.3 Precipitation

November and December are typically the rainiest months in Snohomish, with total precipitation averaging 47.8 inches per year. The average snowfall averages 8.4 inches per year, with most of the snow fall occurring December through February.[10]

2.11 Regional Setting and Land Use

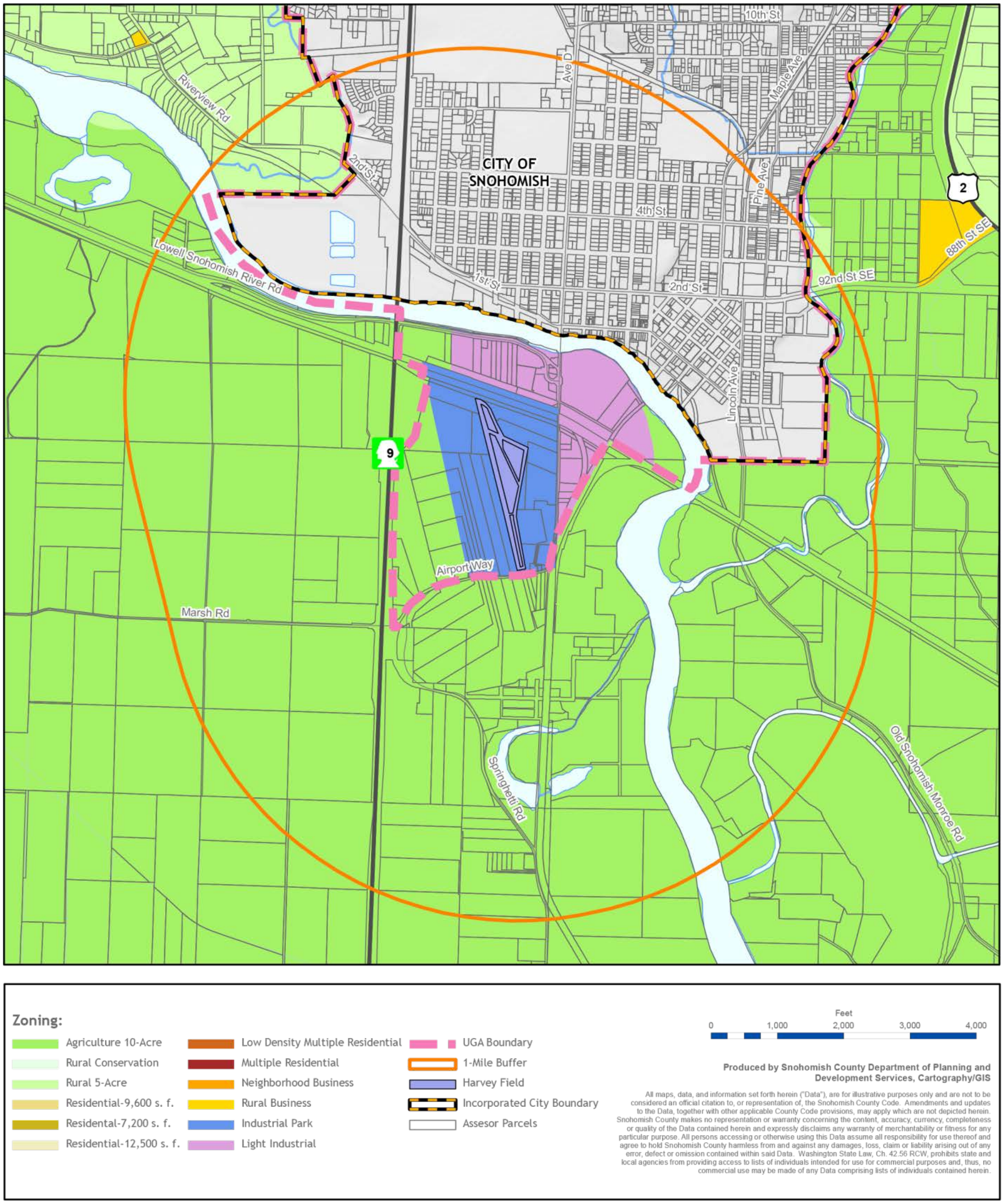
Harvey Field is located in the Snohomish County urban growth area (UGA). The primary goal of land use planning in and around Harvey Field is to provide safe airport operations and to promote compatible land uses and implement land use actions that allow for the orderly expansion and development of the Airport as an essential public facility (EPF).

The airfield is zoned industrial park according to Snohomish County zoning. Existing zoned land uses adjacent to Harvey Field and the Industrial Park consist of light industrial to the north and east, agriculture to the south and west as well as State Route 9 to the west, see **Figure 2-18**.

An Airport and Land Use Compatibility Project is currently underway by Snohomish County Planning and Development Services. The project is a state-mandated project to discourage incompatible land uses around the county's general aviation airports. The County issued a preliminary draft on their recommendations and the County Commissioners were briefed in early 2015. The County Planning Commission voted to approve the code changes at a public hearing on February 24, 2015 with a recommendation that the council/planning department consider permitting projects currently underway, but may not yet be permitted when code revisions are expected to be implemented in June 2015. To date, Harvey Field has been a stakeholder in the County's process and will continue to review any proposals and comment.

[10] Western Region Climate Center, Monroe, Washington station. http://www.wrcc.dri.edu/summary/Climsmwa.html, accessed December 2014

FIGURE 2-18 – SNOHOMISH COUNTY ZONING: ONE-MILE RADIUS AROUND HARVEY FIELD



Source: Snohomish County Planning and Development Services, December 2014
Note: Not to Scale

2.12 Airport User Surveys

To assess the adequacy of the airport facility and desired improvements, surveys were distributed to tenants and owners/operators of aircraft at Harvey Field.

Examples of the surveys are located in **Appendix B, User Surveys**.