



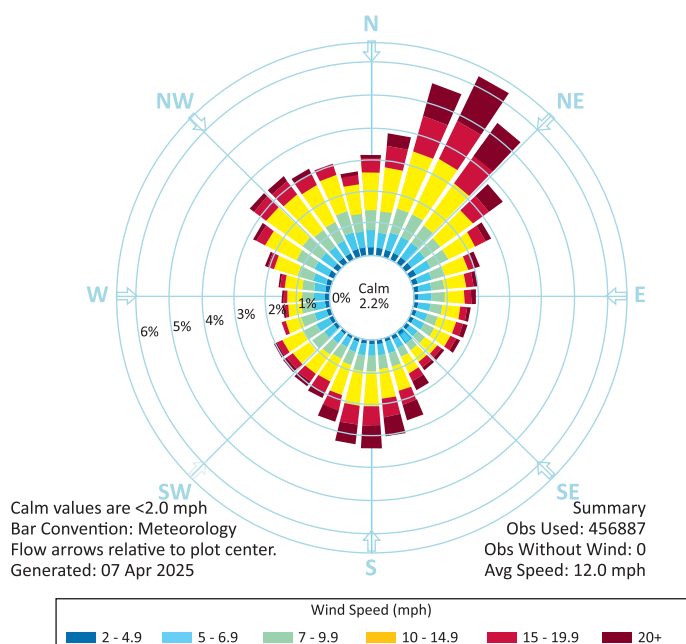
## FACT SHEET

January 2026

# The Role of Wind Roses in Airport Planning

A wind rose is a circular diagram that shows where the wind comes from and how fast it blows. Wind data collection and analysis dates back to ancient civilizations, long before the advent of aviation, when explorers relied on wind patterns to navigate the seas. Fast forward to today – beyond its historical role in sea navigation, wind data has become a critical element in airport planning and design.

Each “spoke” (or 10-degree quadrant) on a wind rose indicates the direction the wind blows, while the length of the spoke represents the amount of time the wind blows from that direction. Some wind roses, (see below) use colors to highlight the portion of time the wind blows at different speeds. For the Alaska Department of Transportation and Public Facilities (DOT&PF), wind roses are primarily shown on Airport Layout Plans (ALP) and appear more like navigational charts than a colorful rose, as shown on the next page.



Windrose Plot for (PABE) Bethel Airport (ASOS)

Obs Between: 31 Dec 1969 09:00 PM - 07 Apr 2025 12:53 AM America/Anchorage

Understanding the typical wind speed and direction requires extensive data and is critical to planning and designing functional airports.

## Wind Rose Development

Wind roses are generated as part of a wind study or by using historical wind data collected from a variety of sources, including Automated Weather Observing Systems (AWOS), Automated Surface Observing Systems (ASOS), and National Weather Service stations. In ideal conditions, data is compiled over a 10- or 30-year period to ensure statistical reliability. This data is used to create a wind rose depicting typical wind conditions; the wind rose does not show the potential for extreme wind events. For example, while Hooper Bay experienced gusts up to 67 miles per hour during Typhoon Merbok, the wind rose in the airport’s ALP only provides information about average wind patterns, such as that wind speeds greater than 32 mph occur 6.3% of the time and are most likely to be blowing from an east-southeast direction.

For airports in Alaska, wind roses are typically developed as part of an airport planning process that involves siting a new runway or in the design process for airport improvements. Wind studies are performed in accordance with the Federal Aviation Administration’s (FAA) Advisory Circulars [150/5300-13B](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC-150-5300-13B-Airport-Design-Chg1-w-errata.pdf)<sup>1</sup>, [150/5070-6B](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5070-6B_with_chg_1&2.pdf)<sup>2</sup>, or by using specialized software, such as the FAA’s Wind Generator tool, located on the FAA’s Airport Data and Information Portal (ADIP). In Alaska, many airports do not have long-term weather observation systems. In such cases, if an existing airport is considered for major upgrades or relocation, pilot interviews are often conducted to determine if the runway’s orientation is an issue. If so, equipment may need to be installed, and generally, a minimum of 2 years’ worth of data is collected for evaluation.

<sup>1</sup>[https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC-150-5300-13B-Airport-Design-Chg1-w-errata.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC-150-5300-13B-Airport-Design-Chg1-w-errata.pdf)

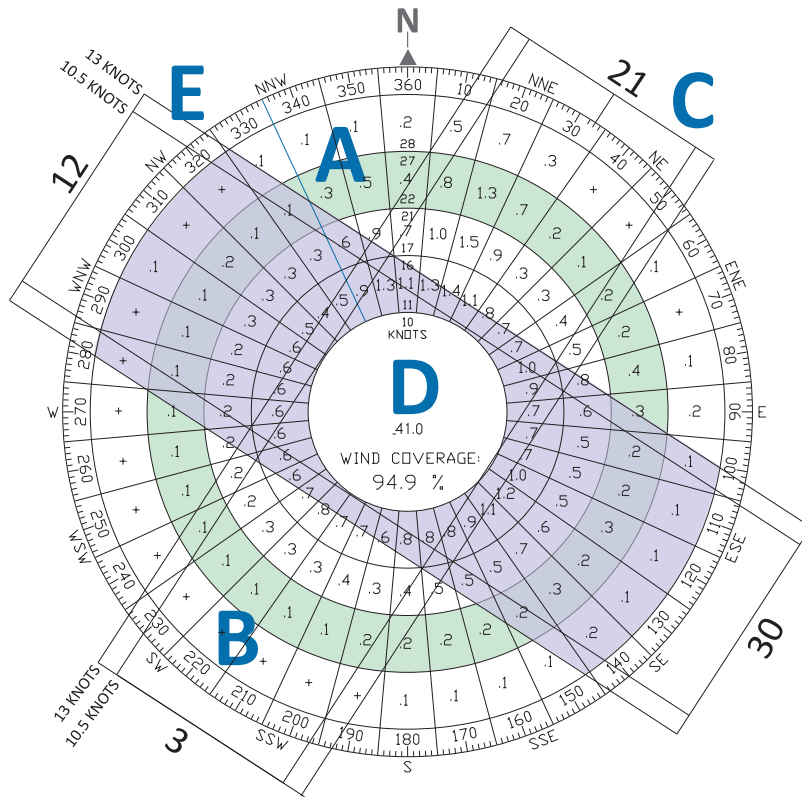
<sup>2</sup>[https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_150\\_5070-6B\\_with\\_chg\\_1&2.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5070-6B_with_chg_1&2.pdf)

Runway orientation is primarily determined by prevailing wind patterns to ensure safe takeoffs and landings. Crosswinds—winds that blow perpendicular to a runway—can impact the pilot's control of an airplane's movement, leading to unsafe situations. The wind rose provides the necessary information for determining the ideal runway orientation in relation

If the primary runway does not provide 95% coverage, a “crosswind runway” will be evaluated to bring the combined wind coverage of the two runways to at least 95%. A crosswind runway may be needed because of frequent variation in wind direction or because a runway

## Types Of Wind Roses

Wind roses may be ancient in origin, but their ability to translate decades of wind data into clear visual guidance continues to be an essential navigational tool, and their modern iterations are critical to the safe planning, design, and operations of airports.



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