Executive Summary
AVIATION DEMAND FORECASTS

Preface

Hillsboro Airport has an important role in the national system of airports which includes 3,332 public use airports. It is one of 259 reliever airports which have been identified by the FAA to accommodate general aviation activity up to and including the largest business jets that might otherwise use nearby major hub commercial service airports. It is further classified by the FAA as one of only 89 "National" general aviation airports, the highest classification available.

Aviation Trends and Forecast Inputs

The FAA publishes an annual aerospace forecast that tracks the history and provides a 25-year forecast of future aviation demand. Most aviation demand indicators were dramatically and negatively affected by the national recession of 2007-2009. Following the relatively slow economic recovery, the FAA is optimistic that aviation demand (both commercial service and general aviation) is once again on a growth trend. Overall, general aviation operations are forecast to grow 0.3 percent annually through 2037 and the general aviation fleet (actual aircraft in operation) is forecast to grow 0.9 percent annually.

In addition to the FAA's national forecasts, other data points are input into forecasting models. This includes recent local socioeconomic forecast data from the Portland area's regional government (Metro) including population, employment, and income. Historical trends in airport operations and based aircraft are considered, as is FAA aircraft registration information.

Introduction

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. For a general aviation reliever airport such as Hillsboro Airport, this includes forecasting of based aircraft and operations for a period of 20 years. The base year of the forecasts is 2016, and the specific forecast years are 2021 (short term), 2026 (intermediate term), and 2036 (long term).

The forecasts of aviation demand are developed in an unconstrained manner, meaning if facilities were available, the projected growth could be accommodated. Once a set of forecast data is approved by the FAA, the planning process continues to the next step which is to identify the facilities necessary to meet the forecast demand. The forecasts lead directly to facilities needed to meet demand such as more hangars to accommodate growth in based aircraft and pavement maintenance to meet operational growth. There are other airport improvements that will be recommended in the master plan that are not demand based, such as potential airfield geometry adjustments necessary to meet recent changes to FAA design standards.

Process

The FAA provides a process for development of the aviation demand forecasts. The forecasts should be:

- Realistic;
- Based on the latest available and reliable data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

The forecast process for an airport master plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the level of effort required. The seven step process is as follows:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts**: May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.

7) **Compare Forecast Results with FAA's *Terminal Area Forecast* (TAF)**: For airports such as Hillsboro Airport, forecasts for based aircraft and total operations are considered consistent with the TAF if they meet the following criteria:
   - Forecasts differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period, or
   - Forecasts do not affect the timing or scale of an airport project, or
   - Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, *Field Formulation of the National Plan of Integrated Airport Systems*.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

Approach and Methodology

The approach to forecasting is to develop multiple projections for each aviation demand indicator (based aircraft and operations) which defines a planning envelope that identifies the upper and lower limits of potential growth. One of these projections may be the selected forecast or an average may be used if there are no obvious outliers. A final determination requires both an analytical process and the judgment of the experienced forecaster.

FAA guidance instructs that the forecasting methods employed should be relatively simple unless there is a specific need to employ more complex statistical methods. Typical simple methods include trend line analysis, regression analysis, and market share analysis. With excellent historical data and active public engagement, these typical methods proved sufficient in the development of the forecasts for Hillsboro Airport.

Once developed, the forecasts were then presented to and considered by an appointed Planning Advisory Committee (PAC). The material and analysis is also available online at a dedicated project website and is used for public outreach efforts.

Findings

As of 2016, there were 354 aircraft based at the Hillsboro Airport with 228 single engine piston-powered aircraft, making up the majority of aircraft. There were 49 jet-powered aircraft, 35 helicopters, 17 turboprops and 25 multi-engine piston-powered aircraft. By 2036, a total of 445 based aircraft are projected. This total is an average of six different methods employed. The overall compound annual growth rate in based aircraft is projected to be 1.15 percent.

The on-airport control tower tracks operations when they are open between 6:00 a.m. and 10:00 p.m. In 2016, there were 197,763 operations. Multiple forecasts of each operational type (local general avi-

ation, itinerant general aviation, air taxi, and military) were developed. A single forecast for each operational type was selected, then combined to provide a total operations forecast. By 2036, total operations are forecast to grow to 247,700 for an annual growth rate of 1.13 percent.

The forecasts of based aircraft and operations developed for the master plan were then compared to the most recent FAA TAF for the airport. That comparison is shown in **Table ES1**. Total operations are within the FAA range for consistency. When utilizing the based aircraft count of 354, verified in August 2017, and applying the FAA TAF based aircraft growth rate (1.62%), the master plan forecast for based aircraft is also within the FAA range for consistency.

TABLE ES1
Forecast Comparison to the 2017 FAA Terminal Area Forecast (TAF)
Hillsboro Airport

	2016	2021	2026	2036	CAGR 2015-2036
Total Operations					
Master Plan Forecast	197,763	208,100	220,600	247,700	1.13%
FAA TAF (2017)	196,061	208,178	211,947	221,011	0.60%
% Difference	0.9%	0.0%	4.1%	12.1%	
Based Aircraft					
Master Plan Forecast	354	375	395	445	1.15%
FAA TAF (2017)	256	277	299	349	1.56%
% Difference	38.3%	35.4%	32.1%	27.5%	
FAA TAF HIO based aircraft growth rate with current based aircraft number	354	384	416	488	1.62%
% Difference	0.00%	-2.34%	-5.05%	-8.81%	

TAF: Terminal Area Forecast
CAGR: Compound annual growth rate

Critical Aircraft Determination

The critical aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, excluding touch-and-go operations. The determination of the critical aircraft is important because the dimensions of various safety-oriented airport design standards such as the runway safety area (RSA), runway object free area (ROFA), obstacle free zone (OFZ), and the runway protection zones (RPZ), are a function of the critical aircraft.

Hillsboro Airport is home to 49 business jets, of which 11 are the largest in production today. The combination of operations by these large business jets exceeds the threshold for determination of the critical aircraft. In FAA parlance, the critical aircraft is described as D-III-2, which is best represented by the Gulfstream 650 business jet. The letter 'D' represents the aircraft approach category and describes the approach speed of the aircraft in landing configuration. The roman numeral 'III' represents the airplane

design group and describes the wingspan of the aircraft. The number '2' represents the wheel-gear width which relates primarily to taxiway design standards.

Each runway is assigned a critical aircraft which is described in terms of the runway design code (RDC). The RDC has the same first two components as the critical aircraft but the third component is replaced with a number that represents the lowest visibility minimums that an aircraft can complete a landing. The overall airport critical aircraft (Gulfstream 650) is also the RDC of the primary runway. The lowest visibility minimum to primary Runway 13R-31L is ½-mile, therefore the RDC of this runway is D-III-2400 (where 2400 is approximately ½-mile in feet).

The RDC for Runway 2-20 is described as A-I(s)-VIS. The 'VIS' component indicates this is a visual approach runway. A representative aircraft is the single engine piston Cessna 172 airplane. The RDC for parallel Runway 13L-31R is B-I(s)-VIS, which is best represented by the Beech Baron 58.