April 5, 2022

By electronic mail

Sarah Lucas, Aviation Planner
Oregon Department of Aviation
(971) 304-5467
Sarah.LUCAS@odav.oregon.gov

Benjamin Mello
Federal Aviation Administration
Seattle Airports District Office
FAA Northwest Mountain Region Airports Division
(206) 231-4134
Benjamin.j.mello@faa.gov

Brandy Steffen
JLA Public Involvement
Brandy.steffen@jla.us.com

Re: Aurora State Airport Master Plan, Preliminary Aviation Activity Forecasts and Selection of critical aircraft or design aircraft for ARC and runway length.

On behalf of 1000 Friends of Oregon, please accept the following statement for the record in the proceedings for the draft airport master plan and the FAA's forecast review for the Aurora State Airport master planning process.

Introduction

The Oregon Department of Aviation is in the process of preparing a new airport master plan for the Aurora State Airport in Marion County, Oregon. To that end the ODA has prepared draft chapters for the new airport master plan (draft AMP), and is expected to send its forecast and selection of design aircraft to the FAA for review and approval. In the draft AMP, the ODA discusses a prior 2019 constrained operations runway justification study (hereinafter 2019 Study) and appears to use the 2019 Study as the basis for its current selection of the design aircraft for Airport Reference Code and the group of critical design airplanes for runway length. The analysis provided in the 2019 Study and the draft AMP are flawed, and the draft AMP lacks any of the explanation and analysis required to select the existing or forecast group of critical design airplanes used to determine runway length.

The draft AMP chapter 3 and the 2019 Study fail to follow the appropriate methodology for identifying the critical aircraft or design aircraft for runway length. Draft AMP 2-18. As discussed in more detail below, the draft AMP attempts to use the Aircraft Approach Category component of the Airport Reference Code for the purpose of determining the critical design aircraft for runway length. Notably, the Airport Reference Code (ARC) and Runway Design Code (RDC) are not used to determine runway length. The 2019 study incorrectly states that "critical aircraft operations are used to establish the corresponding [ARC] and [RDC] designations for Runway 17/35 *that define the applicable FAA design standards and length requirements*." 2019 Study at 2-1 (emphasis added). The draft AMP appears to duplicate that error, stating "runway length requirements will be derived from the composite of Approach Category C and D jet aircraft reflected in the FAA runway length planning tables." Draft AMP at 3-24. As explained in various Advisory Circulars, the ARC and RDC refer to characteristics of aircraft used to determine taxiway and runway separation distances. However, they are not used to determine runway length.

The following comments briefly discuss the method for determining the critical design aircraft for runway length. Next, the comments discuss the flaws and errors of the 2019 Study. Finally the comments explain the failure of the draft AMP to comply with the requirements for determining the design aircraft for ARC and the critical design aircraft for runway length.

Method of Selecting the Critical Design Aircraft for Runway Length

The RDC contains three components, the Aircraft Approach Category (AAC), which refers to aircraft approach speed listed in groups A to E; the Airplane Design Group (ADG), which groups aircraft by tail height and wingspan in groups I to VI; and aircraft approach visibility minimums or Runway Visual Range (RVR) listed in feet. AC 150/5300-13A at 105.c (Airport Design). The ARC contains the first two components of the RDC, the AAC and ADG. *Id.* at 102.i. Together, the RDC, ARC, and a third designation, the Taxiway Design Group (TDG), determine separation standards for taxiways and runways. *Id.* at 105.c., 105.d. None of these design categories are used to design runway length.

The Advisory Circular for Airport Design refers the reader to a different Advisory Circular to determine runway length, AC 150/5325-4 (Runway Length). AC 150/5300-13A at 302.a, 304.a. The Airport Design Advisory Circular explains that "[t]akeoff distances are often longer than landing distances." *Id.* at 302.a. The ARC and RDC are design standards related to landing requirements of the design aircraft.

For aircraft weighing between 12,500 pounds and 60,000 pounds, the Runway Length Advisory Circular relies on maximum certified takeoff weight (MTOW) to determine runway

length. “MTOW is used because of the significant role played by airplane operating weights in determining runway lengths.” AC 150/5325-4B at 102.b.3. The design and funding standards for runway length require the designer to identify the “critical design airplanes” that have at least 500 or more annual itinerant operations at the airport. *Id.* at 102.a.2, 102.a.8. Note that landings and takeoffs are considered separate operations. *Id.* at 102.a.8. The critical design airplane or airplanes are a list of airplanes that result in the longest recommended runway length. *Id.* at 102.a.2. The circular explains that “listed airplanes will be evaluated either individually or as a single family grouping to obtain a recommended runway length.” *Id.* For airplanes that weigh between 12,000 and 60,000 pounds, “the recommended runway length is determined according to a *family grouping of airplanes* having similar performance characteristics and operating weights.” *Id.* at 102.b.2. The only exception is for regional jets that weigh less than 60,000 pounds. Regional jets are subject to a different methodology that relies on the characteristics of the individual airplane. *Id.* at 102.b.2.

Flaws in the 2019 Constrained Operations Runway Justification Study

In this case, the 2019 Study fails to use a “family grouping of airplanes” that have “similar performance characteristics and operating weights” to identify the critical design airplanes for runway length that meet the “substantial use” or “regular use” threshold of 500 annual itinerant operations. Instead of grouping airplanes by their performance characteristics and operating weights, the 2019 Study groups airplanes by whether or not their MTOW exceeds the current runway length of 5,003 feet. Using this methodology, the 2019 Study groups dissimilar airplanes that do *not* share similar performance characteristics and operating weights. It appears that only by grouping dissimilar airplanes can the 2019 Study achieve a 500 annual itinerant operations threshold that justifies a longer runway length. The 2019 Study fails to use the methodology required by the FAA’s Runway Length Advisory Circular. AC 150/5325-4B.

For example, the 2019 Study groups planes with vastly different operating weights. The Study includes the Astra 1125 (ASTR) which has a 24,650 MTOW in the same list as the Falcon 900 (F900) which has a 45,503 MTOW. *See* 2019 Study at 1-16. These aircraft do not share similar “operating weights.” Moreover, the 2019 Study also groups planes with dissimilar “performance characteristics.” The Study lists the Falcon 900 (FA90) which has a minimum takeoff distance at MTOW of 5,215 feet with a Challenger 600 (CL60) which has a minimum takeoff distance at MTOW of 6,544 feet. *Id.* Note that the table listing MTOW and takeoff distances at MTOW contains takeoff distances for a number of planes that do not match the distances published by the manufacturer. The table lists the takeoff distance for the Falcon 900 at MTOW as 5,723 feet. Aircraft that require more than 500 feet (or 1,000 feet in this case) of runway distance at MTOW do not share “similar performance characteristics.” The 2019 Study’s analysis groups itinerant operations of planes that require vastly different takeoff distances at

MTOW. For that reason, the 2019 Study fails to comply with the methodology required in Advisory Circular 150/5325-4B.

The 2019 Study also fails to adequately identify the "existing" group of critical design airplanes. This methodological shortcoming applies to the critical design aircraft for runway length as well as the critical design aircraft for other design categories such as AAC and ADG. The Study averages the itinerant operations for each type of airplane over a span of multiple years. However, to determine the "existing" critical design aircraft for a particular design category, the guidelines require "an operations count by aircraft make and model… for the most recent 12-month period of activity that is available." AC 15/5000-17 (Critical Aircraft and Regular Use) at 2.1.1. The 2019 Study only presents data up to 2018, and it averages the operations counts over multiple years. For that reason, the Oregon Department of Aviation cannot rely on the 2019 Study to determine the *existing* critical design aircraft for any design criteria for a 2022 airport master plan.

Finally, the analysis conducted in the 2019 Study fails to correctly determine the "percentage of fleet and useful load factor" used for runway length determinations. AC 150/5325-4B at 303. The design guidelines require the selection of "the critical design airplanes under evaluation with their respective useful loads." *Id.* at 301. "Once obtained," the guidelines explain, the airport must "apply either figure 3-1 or figure 3-2 to obtain a single runway length for the entire group of airplanes under evaluation." *Id.* "To determine which of the two figures apply, first use tables 3-1 and 3-2 to determine which one of the two 'percentage of fleet' categories represents the critical design airplanes under evaluation." *Id.* at 302.

The 2019 Study makes a number of methodological errors in its selection and application of figures 3-1 and 3-2. The 2019 Study appears to select a different group of critical design airplanes as a way of arriving at a predetermined outcome. For example, the table on page 1-16 appears to show one grouping of 28 airplanes with an average of 1,954 annual itinerant operations. The table on page 3-2 contains a larger group of more than 28 airplanes with an average of 2,491 annual itinerant operations. The table on page 3-2 of the Study does not list the takeoff distance at MTOW or other performance characteristics for the listed airplanes.

Assuming the 2019 Study correctly selected a family grouping of airplanes, the Study uses the wrong table and load curves. The Study fails to demonstrate that its family grouping of airplanes with 500 itinerant operations actually includes the type of airplanes listed in table 3-2. It is not clear that the Study correctly selects the 25 percent of fleet curve based on Table 3-2 as opposed to the 75 percent of fleet curve based on Table 3-1. *See* AC 150/5325-4B at 303.a.2. (requiring use of "figure 3-1 when the airplanes *under evaluation* are not listed in table 3-2.")

Given the airplanes listed in the Study, the two tables in the Advisory Circular appear to have overlapping airplane types. For example, both tables 3-1 and 3-2 list the Falcon 900, the Learjet 45, and the Cessna 650. Based on the information provided in the Study, it is not clear under which table the itinerant operations for the aircraft listed in the Study should be grouped. For example, the Study's listing of itinerant operations for a Falcon 900 does not distinguish between the Falcon 900 and 900B listed in Table 3-1 and the Falcon 900C and 900EX listed in table 3-2. Removing the overlapping aircraft types from the 25 percent calculations reduces that category below 500 itinerant operations.

Ultimately, the 2019 Study fails to justify its selection of the 90 percent useful load curve over the 60 percent useful load curve. Selection between the 60 percent and 90 percent useful load curves depends on "the haul lengths and service needs of the critical design airplanes." AC 150/5325-4B at 302. The "useful load factor" "is considered to be the difference between the maximum allowable structural gross weight and the operating empty weight," and in practical terms the useful load "consists of passengers, cargo, and usable fuel." *Id.* at 303.b.1. In this case, the 2019 Study fails to describe or evaluate the actual haul lengths and service needs of the "family grouping of airplanes" selected for runway length. The Study fails to demonstrate that the airport receives 500 itinerant operations that meet the 90 percent useful load threshold for the critical design aircraft that would determine runway length.

The Study admits that TFMSC data only "identifies 197 verified annual operations to/from airports beyond 1,000 nm." The Study does not, however, provide the aircraft types responsible for those operations. The Study also fails to demonstrate that 1,000 nm represents a 90 percent useful load threshold for the critical design aircraft, many of which are capable of ranges significantly longer than 1,000 nm. For instance, the study fails to identify how many of those 197 annual operations met the 90 percent threshold of the aircraft's useful load.

The 2019 Study attempts to add itinerant operations to the existing 197 annual operations by determining the number of operations that it considers to be constrained by existing runway length. 2019 Study 3-4. The Advisory Circular does not define or otherwise rely on "constrained operations" to determine the group of existing critical design aircraft for runway length. Even if the 2019 Study's methodology were allowed, the Study fails to include the actual survey data used to determine the number of constrained operations that it concludes would have traveled longer than 1,000 nm from the airport if the runway were longer. By failing to include the actual survey information and flight plans, the Study fails to demonstrate that the extent to which the constrained operations met or would have met the 90 percent useful load threshold. Notably, the number of constrained operations listed for some of the aircraft exceed the total operations for that aircraft type as shown by the TFMSC data. For those reasons, the 2019 Study fails to determine "the haul lengths and service needs" of the existing and forecast critical design aircraft

for runway length. The Study fails to adequately justify its selection of the 90 percent useful load threshold over the 60 percent useful load threshold in figure.

Flaws in the Draft Airport Master Plan Chapter 3

The draft airport master plan (draft AMP) includes many of the errors contained in the 2019 Study. For clarification, the AMP cannot rely on the 2019 Study to determine the existing critical design aircraft for the various airport design categories (e.g. AAC, ADG, runway length). As explained above, the airport master plan must make that determination through "an operations count by aircraft make and model for the most recent 12-month period of activity that is available." AC 15/5000-17 at 2.1.1. The 2019 Study only includes information through 2018. For that reason, the draft airport master plan cannot rely on the findings "in the data review contained in the 2019 Constrained Operations Runway Justification Study" for either the existing or forecast design aircraft for any airport design category. AMP 3-13. Instead, the AMP must make those determinations based "on the review of current… aircraft operations data." *Id.*, Table 3-8.

ARC Design Aircraft

The most recent data shown in Table 3-8 show fewer than 500 itinerant operations for AAC category C airplanes in 2021. The table also only shows only 96 total operations among three category D airplanes, some of which have low numbers of operations within the most recent 12-month period of activity. AMP 3-14. The draft AMP uses the AAC category D airplanes as the basis for its AAC category C-II critical aircraft determination. Given the low number of operations for the Lear 35 (D-1) and the Gulfstream V/G500 (D-III) it is not clear that operations from these two airplanes are "indicative of sustained operations." AC 15/5000-17 at B.8.3. The same can be said of the Gulfstream IV/G400 which shows a large jump in operations between 2020 and 2021, and it is not clear that those numbers will continue into the future. The AMP and the 2019 Study also recognize that TFMSC activity are based on flight plans, which do not always correspond to actual flight activity. 2019 Study at 1-15 ("not every flight plan results in an operation"). Under these circumstances, the guidance provided by the Advisory Circulars do not justify selecting C-II over B-II as the existing critical aircraft for runway and taxiway separation determined by ARC or RDC. AC 15/5000-17 at B.8.3.

Critical Design Airplanes for Runway Length

The draft AMP fails to justify or even explain its use of "the composite of Approach Category C and D jet aircraft" as the critical design airplanes for runway length. Draft AMP at 3-24. First, runway length is determined in part by MTOW, not AAC. AC 150/5325-4B at 102.b.3 (explaining use of MTOW). Next, three of the four AAC category D aircraft shown in Table 3-8 are over 60,000 pounds and cannot be used to determine runway length using the methods for

aircraft between 12,000 and 60,000 pounds in Chapter 3 of Advisory Circular 150/5325-4B. The decision in the draft AMP to select the critical design aircraft for runway length based on a composite of AAC category C and D aircraft does not comply with the methodology explained in Advisory Circular 150/5325-4B.

Second, the draft AMP does not contain any analysis of operations count by aircraft make and model for the purpose of determining the existing (or forecast) critical aircraft for runway length based "a family grouping of airplanes" that have "similar performance characteristics and operating weights." AC 150/5325-4B at 102.b.2. The AAC category C and D aircraft listed in the itinerant operations tables (Table 3-8) do not represent a family grouping of airplanes with similar performance characteristics and operating weights. Those categories include aircraft with widely varying "operating weights" as well as widely ranging "performance characteristics" in terms of runway length. The draft AMP fails to identify the family grouping of airplanes with 500 annual itinerant operations required to determine the critical design aircraft for runway length.

Third, the draft AMP does not provide any information on "haul lengths and service needs of the critical design airplanes." AC 150/5325-4B at 302. For that reason, the draft AMP does not present the information needed to determine whether to use a 60 percent and 90 percent useful load factor to determine runway length. Simply put, the draft AMP fails to provide any analysis or explanation of its selection, nor does it follow the methodology required by Advisory Circular 150/5325-4B for determining the critical design aircraft used for existing and forecast runway length determinations.

Finally, the AMP cannot rely on the outdated information included in the 2019 study. Draft AMP 2-18 (explaining conclusions of the 2019 Study). Not only does the 2019 Study not provide information required to determine the existing critical design aircraft for runway length, it also fails to provide the basis for a forecast for a 2022 airport master plan. Circumstances have changed since 2018. As an example, the Study identified the Astra 1125 and Cessna 750 Citation as potential "design aircraft" for the master planning process. However, more recent operations data shows that operations for both of those aircraft had declined significantly since 2016. Draft AMP 3-14, Table 3-8. The draft AMP must provide updated analysis and information.

Conclusion

Both the 2019 Study and the draft AMP are flawed. However, the draft AMP fails to include *any* relevant information or analysis for the purpose of selecting a critical design aircraft for runway length. The draft AMP simply does not provide the information required to determine the existing critical design aircraft for runway length, much less the information required for a forecast for runway length. The draft AMP's selection of a design aircraft for ARC is also

flawed. For those reasons, 1000 Friends requests that the Oregon Aviation Department update the draft AMP to provide the required analysis and requests that the FAA decline to approve the draft AMPs selection of the design aircraft for ARC and runway length.

Sincerely,

Andrew Mulkey, Staff Attorney
1000 Friends of Oregon
(503) 497-1000x138
andrew@friends.org

1000 Friends of Oregon is a non-profit organization founded by Governor Tom McCall shortly after the Legislature passed Senate Bill 100, which created the land use planning rules that shape Oregon's communities. Since its founding in 1975, 1000 Friends has served Oregon by defending Oregon's land use system—a system of rules that creates livable communities, protects family farms and forestlands, and conserves the natural resources and scenic areas that make Oregon such an extraordinary place to live. 1000 Friends accomplishes this mission by monitoring local and statewide land use issues, enforcing state land use laws, and working with state agencies and the Legislature to uphold the integrity of the land use system.