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I. Executive Summary

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers’ characteristics manuals, an analysis was conducted to determine the runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). Based on 100% maximum takeoff weights (MTOW) of the existing and future aircraft fleet mix through year 2020, the following runway lengths are justified at DAY.

Justified Runway Lengths

<table>
<thead>
<tr>
<th>Runway</th>
<th>Justified Runway Length (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6R-24L</td>
<td>13,900</td>
</tr>
<tr>
<td>6L-24R</td>
<td>13,900</td>
</tr>
<tr>
<td>18-36</td>
<td>11,120</td>
</tr>
</tbody>
</table>

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- **Runway 6R-24L** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R-24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot length of Runway 6L-24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100% MTOW.

  Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R-24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95% or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. The flight range distance for each aircraft is also adequate to serve the current commercial
markets at DAY. The proposed 9,500-foot Runway 6R-24L is based on the premise that both parallel 6-24 runways are in operation.

During peak arrival periods, the proposed 9,500-foot long Runway 6R-24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- **Runway 18-36** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length of 11,120 feet, which is 80% of the justified 13,900-foot Runway 6L-24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6% annually.

The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95% or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

- **Runway 6L-24R** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L-24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100% MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100% MTOW. The draft Future ALP proposes a length of 12,600 feet for Runway 6L-24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100% MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. The worst case is the DC-8-62 aircraft with a 97.3% MTOW. Although, all of the cargo aircraft can takeoff with 100% payload weight, their flight range distances and markets that are reachable non-stop are limited.
Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure maximum efficiency and utilization of the airport runway system.
II. Introduction

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers characteristics manuals, an analysis was conducted to determine the theoretical runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). The runway length requirements were calculated using charts published in the aircraft manufacturers’ characteristics manuals and the International Civil Aviation Organization (ICAO) Aerodrome Design Manual. Requirements were calculated by taking into consideration the elevation and average temperature of the airport, the performance characteristics of the individual aircraft, runway conditions, and the operating weight and engine type of the aircraft, which is dependent on the amount of fuel needed to reach the destination, and the amount of payload (passengers, baggage, and cargo).

FAA Advisory Circular 150/5325-4A, dated 1/29/90, “Runway Length Requirements for Airport Design”, notes the following: “Parallel Runways should have a length based on the airplanes that will use the runways. Parallel runways should be approximately equal in length. A Crosswind Runway should have a length of at least 80 percent of the primary runway length.” These criteria will be taken into consideration for the runway length analysis.

Also to be considered for this analysis is the Draft Advisory Circular 150/5325-4B, “Runway Length Requirements for Airport Design,” currently out for review and comment. This draft AC makes the following recommendations: “When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to individual airplanes. The design objective for the main primary runway is to determine a recommended runway length that serves all airplanes without operational weight restrictions. The design objective for the length of crosswind runways for scheduled transport service is to equal 100% of the primary runway.”

In accordance with FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS), the following is noted regarding airport dimensional standards. “Airport dimensional standards (such as runway length and width, separation standards, surface gradients, etc.) should be selected which are appropriate for the critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations, or scheduled commercial service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft.” This planning standard will be taken into consideration when determining the runway length requirements.

Dayton International Airport has a three-runway airfield system that consists of two parallel 6-24 runways, and a single 18-36 runway. Runway 6L-24R serves as the primary runway and has a length of 10,900 feet with Category II/III approach
capability on Runway 6L, and Category I approach capability on Runway 24R. Runway 6R-24L serves as the secondary parallel runway and has a length of 7,000 feet with Category I approach capability on Runway 24L, and a Non-Precision (non-directional beacon) approach capability on Runway 6R. Runway 18-36 serves as the cross-wind runway and has a length of 8,500 feet with Category I approach capability on Runway 18, and Visual approach capability on Runway 36. Runway 18-36 provides operations beyond that of a typical crosswind runway and is used approximately 10.6% of the time.

III. Forecast Aircraft Operations and Aircraft Fleet Mix

Based on the FAA approved February 20, 2004 Forecasts of Aviation Activity at DAY, total annual operations are to increase from approximately 125,217 in 2002 to 158,600 in 2020. This represents an average annual increase of 1.4 percent over the forecast period. Table 1 summarizes the total annual aircraft operations forecast for Dayton International Airport.

Air carrier passenger operations are projected to grow 1.5% per year, beginning in 2004. The regional passenger operations are projected to grow 1.7% per year, beginning in 2004. In addition, the cargo operations are anticipated to grow 3.3% per year.

UPS has recently acquired (December 2004) the Menlo Worldwide Forwarding freight hub at DAY that currently has 34 daily flights. The following information was taken from the UPS pressroom web site:

The acquisition (Menlo) reinforces UPS’s strategy of providing broad supply chain solutions to enable global commerce. As a result of the acquisition, UPS will expand its global capabilities and add guaranteed heavy airfreight services around the world, enabling customers to reach the global marketplace faster. This also means UPS will introduce new time-definite products such as overnight, two-day and deferred heavy airfreight to North America. www.pressroomups.com (10/5/04).

“Menlo Worldwide Forwarding’s capabilities complement UPS’s ability to manage customers’ shipments of any size, anywhere and in virtually any time frame,” said Bob Stoffel, UPS senior vice president, Supply Chain Group. Menlo Worldwide Forwarding services soon will be sold under the UPS brand, he added. www.pressroomups.com (1/24/05).
In addition, the following are excerpts from an article in the October 21, 2004, Dayton Daily News:

“If you look at their (UPS) commitment to going into a heavy weight, global, time-definite product, our hub (DAY) has those capabilities,” Trimarco said. The Menlo executive said he expects to sign on with the new owner. He also said that he expects Dayton hub employment to remain stable under UPS provided the economy continues to grow.

Based on these comments, it has been assumed that UPS will continue to operate and grow the DAY cargo hub as anticipated in the February 20, 2004 Forecast of Aviation Activity.

Based on this forecast, Table 2 summarizes the anticipated passenger air carrier and commuter aircraft fleet-mix at DAY. The air carrier fleet mix is projected to remain a narrow-body fleet. Based on the proposed 2020 air carrier fleet mix, the Boeing 717-200 will represent approximately 57% of the fleet, the Airbus 320-200 will represent approximately 28%, and the Boeing 737-800/900 will represent approximately 15% of the air carrier fleet mix. Based on a total of 14,200 annual air carrier operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

The air carrier aircraft fleet-mix and engine types used in this analysis are presented in Table 3, and are grouped by aircraft weight classes for informational purposes only. Heavy – Aircraft capable of takeoff weights of more than 255,000 pounds, including the B757, whether or not they are operating at this weight during a particular phase of flight. Large – Aircraft of more than 41,000 pounds, maximum certificated takeoff weight, up to 255,000 pounds. Small – Aircraft of 41,000 pounds or less maximum certificated takeoff weight.

Today, the commuter aircraft fleet is dominated with 50-seat regional jets, and small turboprop aircraft. Over the forecast horizon, the regional carriers are expected to phase out virtually all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 90 seats. The Canadair Regional Jet CRF-200/700 and the Embraer Regional Jet ERJ 135/140/145 will dominate the commuter aircraft fleet mix at approximately 86% of the fleet. Based on a total of 68,200 annual commuter operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

With the recent acquisition of Menlo Worldwide Forwarding by UPS (December 2004), it was assumed that all cargo aircraft types that have served the airport over the past five years, along with the current UPS aircraft fleet would be used in this analysis. Table 4 summarizes the anticipated cargo aircraft fleet mix.
IV. Takeoff Runway Length Requirements

When aircraft operate during periods of high temperatures, the relative increased density altitude decreases an aircraft’s operational performance. Loss in performance requires longer takeoff distances and faster ground speeds during landings, which results in longer runway length requirements. This section discusses the takeoff runway length requirements for the aircraft currently or projected to be in operation at Dayton International Airport throughout the planning horizon. Runway length requirements are identified for air carrier, commuter, and cargo aircraft.

Air Carrier Aircraft Requirements

Takeoff runway length requirements were determined from the “standard day” charts (59 degrees Fahrenheit) and a mean daily high temperature of 85 degrees Fahrenheit was used to determine the ultimate runway length requirements for air carrier and commuter aircraft. Based on an airport elevation of 1009 msl, the density altitude at 85°F is approximately 3,000 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. Exhibit A-1 in Appendix A illustrates the calculation for density altitude. The density altitude is the altitude at which the density of the International Standard Atmosphere (ISA) is the same as the density of the air being evaluated. The temperature at ISA is 15 degrees Celsius (59°F).

Exhibit 1 shows the takeoff runway length requirements for air carrier aircraft at 100% Maximum Takeoff Weight (MTOW) for each of the existing runways at DAY. The required lengths for each runway are slightly different due to the variation in their centerline slope. The “standard day” runway length has been increased 10 feet for every foot of difference in centerline elevation between the high and low points. The following table summarizes the necessary runway length at 100% MTOW for some of the existing and future air carrier aircraft type that are anticipated to be in operation through the year 2020.

100% MTOW Runway Length

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Runway Length (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-717-200</td>
<td>7,600</td>
</tr>
<tr>
<td>A320-200</td>
<td>9,600</td>
</tr>
<tr>
<td>MD-80-83</td>
<td>10,600</td>
</tr>
<tr>
<td>B-757-300</td>
<td>12,000</td>
</tr>
<tr>
<td>B-737-900</td>
<td>12,800</td>
</tr>
</tbody>
</table>
**Commuter Aircraft Requirements**

Runway length requirements for commuter regional jets and turboprop aircraft were taken from the *Jane’s All The World Aircraft* manuals based on maximum takeoff weight and standard day temperature (15 degrees Celsius). These runway length requirements were then adjusted for airport elevation, temperature, and runway slope as specified in the ICAO Aerodrome Runway Design Manual.

**Exhibit 2** shows the standard day (Jane’s) and adjusted (ICAO) runway lengths. For this analysis, the adjusted ICAO runway lengths were used to determine the optimum commuter aircraft takeoff runway length requirements because there is insufficient detailed data from the aircraft manufacturers. As shown, the commuter aircraft require between 5,000 feet and 9,350 feet of runway length at 100% MTOW. The majority of the commuter aircraft fleet will be comprised of regional jets that require the longer runway length.

**Cargo Aircraft Requirements**

Takeoff runway length requirements were determined from the “standard day” charts (59 degrees Fahrenheit) and a mean morning high temperature of 65 degrees Fahrenheit was used to determine the ultimate runway length requirements for cargo aircraft. The lower temperature was used for the cargo aircraft to reflect the typical morning hours in which these aircraft depart. Based on an airport elevation of 1009 msl, the density altitude at 65°F is approximately 1,900 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. **Exhibit A-2** in Appendix A illustrates the calculation for density altitude.

Cargo aircraft takeoff length requirements were calculated in the same manner as the air carrier aircraft and are presented in **Exhibit 3**. Likewise, it is desirable to accommodate 100% of the cargo aircraft payload for maximum revenue potential. As shown, the cargo aircraft will require a runway length ranging from 8,000 feet for the B-757-200 and 13,900 feet for the B-727-200 aircraft.

**V. Landing Runway Length Requirements**

Landing runway length requirements were also determined for the air carrier, commuter, and cargo aircraft at Dayton International Airport. **Exhibits 4, 5 and 6** depict the runway lengths necessary with maximum aircraft landing weight for wet and dry pavement conditions. All of the air carrier aircraft should be able to land on a 7,000-foot long runway, while
all of the commuter aircraft should be able to land on a 6,400-foot long runway under wet conditions. In addition, all of the cargo aircraft should be able to land on an 8,900-foot long runway under wet conditions. The landing runway lengths are not the critical metric for determining the optimum runway length requirements, because it requires less runway length to conduct aircraft landings. This information is provided for airport planning purposes and potential runway usage during peak arrival periods.

VI. Summary

Runway takeoff and landing length requirements were identified for air carrier, commuter, and cargo aircraft at Dayton International Airport in accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers’ characteristics manuals. Based on 100% maximum takeoff and landing weights, the table below shows the runway lengths that are justified for use by the three aircraft groups.

### Runway Length Requirements

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Takeoff Length at MTOW (ft.)</th>
<th>Landing Length (ft.)(wet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Carrier</td>
<td>12,800</td>
<td>7,000</td>
</tr>
<tr>
<td>Commuter</td>
<td>9,350</td>
<td>6,400</td>
</tr>
<tr>
<td>Cargo</td>
<td>13,900</td>
<td>8,900</td>
</tr>
</tbody>
</table>

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- **Runway 6R-24L** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R-24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot
length of Runway 6L-24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100% MTOW.

Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R-24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95% or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. Table 7 shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY as shown in Table 6. The proposed 9,500-foot Runway 6R-24L is based on the premise that both parallel 6-24 runways are in operation. However, if the airlines wish to add new markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve these new markets with payloads that are economically viable for the airlines.

An additional analysis was conducted to determine the performance of the cargo aircraft on a 9,500-foot long runway. Table 8 shows the percent MTOW and maximum stage length for each of the cargo aircraft. The flight range distance for each aircraft is less than those for the proposed 12,600-foot long Runway 6L-24R. The MTOW for all of the cargo aircraft are between 90% and 100% based on the 9,500-foot long runway.

The cargo aircraft could also use Runway 6R-24L primarily during peak arrival periods and will require a minimum landing length of 8,900 feet. The proposed 9,500-foot long Runway 6R-24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- **Runway 18-36** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary parallel runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length between 11,120 feet, which is 80% of the justified 13,900-foot Runway 6L-24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6% annually.

The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95% or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. Table 7 shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is adequate to serve the current commercial markets at DAY as shown in Table 6. However, as previously noted, if the airlines wish to add new
markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve the new markets with payloads that are economically viable for the airlines.

- **Runway 6L-24R** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L-24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100% MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100% MTOW. The draft Future Airport Layout Plan (ALP) dated January 18, 2005 proposes a length of 12,600 feet for Runway 6L-24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100% MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. **Table 5** shows the percent MTOW and maximum stage length (nautical miles) for each of the cargo aircraft based on a 12,600-foot long runway. The worst case is the DC-8-62 aircraft with a 97.3% MTOW. Although, all of the cargo aircraft can takeoff with 100% payload weight, their flight range distances and markets that are reachable non-stop are limited. **Table 6** shows the current markets that are being served by UPS today (previous Menlo Worldwide Forwarding markets).

Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 draft Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage at DAY. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure Dayton International Airport’s ability to competitively serve the existing and future cargo and passenger markets.
Table 1 – Aircraft Operations Forecast

<table>
<thead>
<tr>
<th>Year</th>
<th>Air Carrier</th>
<th>Regional</th>
<th>Cargo</th>
<th>Other</th>
<th>Total</th>
<th>Annual Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>24,148</td>
<td>31,398</td>
<td>42,540</td>
<td>53,393</td>
<td>151,479</td>
<td>\1</td>
</tr>
<tr>
<td>1999</td>
<td>24,239</td>
<td>30,330</td>
<td>38,987</td>
<td>58,448</td>
<td>152,004</td>
<td>\1 0.3%</td>
</tr>
<tr>
<td>2000</td>
<td>25,540</td>
<td>33,466</td>
<td>35,118</td>
<td>51,277</td>
<td>145,401</td>
<td>\2 -4.3%</td>
</tr>
<tr>
<td>2001</td>
<td>21,795</td>
<td>40,114</td>
<td>22,706</td>
<td>47,994</td>
<td>132,609</td>
<td>\2 -8.8%</td>
</tr>
<tr>
<td>2002</td>
<td>15,079</td>
<td>44,940</td>
<td>16,066</td>
<td>49,132</td>
<td>125,217</td>
<td>\2 -5.6%</td>
</tr>
<tr>
<td>2003</td>
<td>2004</td>
<td>12,200</td>
<td>51,500</td>
<td>47,100</td>
<td>124,300</td>
<td>-0.7%</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>12,400</td>
<td>54,400</td>
<td>47,300</td>
<td>128,700</td>
<td>3.5%</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>12,600</td>
<td>59,600</td>
<td>47,700</td>
<td>135,700</td>
<td>1.6%</td>
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<tr>
<td></td>
<td>2007</td>
<td>12,700</td>
<td>60,800</td>
<td>47,900</td>
<td>137,800</td>
<td>1.5%</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>12,900</td>
<td>62,000</td>
<td>48,100</td>
<td>140,000</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>2009</td>
<td>13,000</td>
<td>62,900</td>
<td>48,300</td>
<td>141,800</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>13,100</td>
<td>63,500</td>
<td>48,500</td>
<td>143,300</td>
<td>1.1%</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>13,200</td>
<td>63,800</td>
<td>48,700</td>
<td>144,500</td>
<td>0.8%</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>13,400</td>
<td>64,200</td>
<td>48,900</td>
<td>146,000</td>
<td>1.0%</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>13,500</td>
<td>64,600</td>
<td>49,100</td>
<td>147,400</td>
<td>1.0%</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>13,600</td>
<td>65,000</td>
<td>49,300</td>
<td>148,800</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>13,700</td>
<td>65,400</td>
<td>49,500</td>
<td>150,200</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>2016</td>
<td>13,800</td>
<td>65,900</td>
<td>49,700</td>
<td>151,800</td>
<td>1.1%</td>
</tr>
<tr>
<td></td>
<td>2017</td>
<td>13,900</td>
<td>66,400</td>
<td>49,900</td>
<td>153,400</td>
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</tr>
<tr>
<td></td>
<td>2018</td>
<td>14,000</td>
<td>67,000</td>
<td>50,100</td>
<td>155,100</td>
<td>1.1%</td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td>14,100</td>
<td>67,600</td>
<td>50,300</td>
<td>156,800</td>
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<tr>
<td></td>
<td>2020</td>
<td>14,200</td>
<td>68,200</td>
<td>50,500</td>
<td>158,600</td>
<td>1.1%</td>
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</table>

Average Annual Growth Rates

<table>
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<tr>
<th>Period</th>
<th>Change</th>
<th>Air Carrier</th>
<th>Regional</th>
<th>Cargo</th>
<th>Other</th>
<th>Total</th>
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<td>1998-2003</td>
<td>-14.6%</td>
<td>10.4%</td>
<td>-19.1%</td>
<td>-2.5%</td>
<td>-3.9%</td>
<td></td>
</tr>
<tr>
<td>2003-2010</td>
<td>2.5%</td>
<td>3.0%</td>
<td>3.1%</td>
<td>0.4%</td>
<td>2.1%</td>
<td></td>
</tr>
<tr>
<td>2010-2020</td>
<td>0.8%</td>
<td>0.7%</td>
<td>3.5%</td>
<td>0.4%</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>2003-2020</td>
<td>1.5%</td>
<td>1.7%</td>
<td>3.3%</td>
<td>0.4%</td>
<td>1.4%</td>
<td></td>
</tr>
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</table>

Notes:
- Other Operations includes military, non-commercial air taxi, and general aviation.
- \1 Total from FAA TAF
- \2 Total from Airport records
Table 2 – Future Annual Passenger Aircraft Fleet Mix

<table>
<thead>
<tr>
<th>Air Carrier</th>
<th>Aircraft</th>
<th>Seats</th>
<th>2003</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
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<tbody>
<tr>
<td></td>
<td>757</td>
<td>180</td>
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<td>0.0%</td>
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<tr>
<td></td>
<td>739</td>
<td>177</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
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</tr>
<tr>
<td></td>
<td>738</td>
<td>162</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>10.7%</td>
<td>10.3%</td>
</tr>
<tr>
<td></td>
<td>320</td>
<td>144</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>26.6%</td>
<td>27.8%</td>
</tr>
<tr>
<td></td>
<td>M80</td>
<td>142</td>
<td>23.3%</td>
<td>35.6%</td>
<td>39.8%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>733</td>
<td>134</td>
<td>10.4%</td>
<td>5.9%</td>
<td>5.6%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>M80</td>
<td>129</td>
<td>3.3%</td>
<td>11.9%</td>
<td>5.6%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>319</td>
<td>126</td>
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<td>0.0%</td>
<td>0.0%</td>
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<td>27.8%</td>
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<tr>
<td></td>
<td>717</td>
<td>117</td>
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<td>28.9%</td>
<td>32.4%</td>
<td>46.7%</td>
<td>56.8%</td>
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<tr>
<td></td>
<td>735</td>
<td>116</td>
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<td>11.9%</td>
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<td>10.7%</td>
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<tr>
<td></td>
<td>D9S</td>
<td>106</td>
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</tr>
<tr>
<td></td>
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<td>87</td>
<td>9.4%</td>
<td>0.0%</td>
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<td>0.0%</td>
<td>0.0%</td>
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<tr>
<td></td>
<td>DC9</td>
<td>78</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
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</table>

| Total Operations | 11,152 | 12,400 | 13,100 | 13,700 | 14,200 |

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<thead>
<tr>
<th>Air Carrier</th>
<th>Aircraft</th>
<th>Seats</th>
<th>2003</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>142/146 (NB)</td>
<td>85</td>
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<td>2.3%</td>
<td>2.2%</td>
<td>2.1%</td>
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<tr>
<td></td>
<td>ARJ</td>
<td>82</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
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<tr>
<td></td>
<td>CR7</td>
<td>70</td>
<td>1.9%</td>
<td>2.3%</td>
<td>3.4%</td>
<td>4.5%</td>
<td>5.4%</td>
</tr>
<tr>
<td></td>
<td>CRJ/ERJ/ER4</td>
<td>50</td>
<td>40.6%</td>
<td>69.5%</td>
<td>69.4%</td>
<td>75.8%</td>
<td>80.9%</td>
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<td>DH3 (TP)</td>
<td>50</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
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<td>ATR (TP)</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
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<td>ERD (RJ)</td>
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<td>2.2%</td>
<td>1.1%</td>
<td>2.3%</td>
<td>3.0%</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>DH8 (TP)</td>
<td>37</td>
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<td>2.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>ER3 (RJ)</td>
<td>37</td>
<td>4.0%</td>
<td>4.5%</td>
<td>4.6%</td>
<td>4.5%</td>
<td>4.1%</td>
</tr>
<tr>
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<td>SF3 (TP)</td>
<td>34</td>
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<td>8.5%</td>
<td>8.0%</td>
<td>2.2%</td>
<td>0.0%</td>
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<td>FRJ (RJ)</td>
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<td>4.7%</td>
<td>4.6%</td>
<td>4.5%</td>
<td>2.1%</td>
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<td>EM2/SF3</td>
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<tr>
<td></td>
<td>D38/J41</td>
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<td>BEH/BE1/J31</td>
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<td>1.8%</td>
<td>0.0%</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
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<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
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</table>

| Total Operations | 52,234 | 58,500 | 63,500 | 65,400 | 68,200 |
### Table 3 – Air Carrier Aircraft Fleet Mix Characteristics

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Model</th>
<th>Engine Type</th>
<th>MTOW (pounds)</th>
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</thead>
<tbody>
<tr>
<td><strong>Heavy Aircraft</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boeing 757</td>
<td>200</td>
<td>RB211-535E-4B</td>
<td>255,000</td>
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<td>Boeing 757</td>
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<td>PW2037</td>
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<td>RB211-535E-4B</td>
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<td>300</td>
<td>PW2043</td>
<td>270,000</td>
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<td><strong>Large Aircraft</strong></td>
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<td></td>
<td></td>
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<td>Boeing 737</td>
<td>300</td>
<td>CFM56-3B2</td>
<td>139,500</td>
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<tr>
<td>Boeing 737</td>
<td>500</td>
<td>CFM56-3B1</td>
<td>133,500</td>
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<tr>
<td>Boeing 737</td>
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<td>CFM56-7B-24</td>
<td>174,200</td>
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<tr>
<td>Boeing 737</td>
<td>900</td>
<td>CFM56-7B-24</td>
<td>174,200</td>
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<td>149,911</td>
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<tr>
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<td>CFM56-5A1</td>
<td>169,754</td>
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<tr>
<td>Airbus 319</td>
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<td>CFM56-5B6</td>
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<td>PW-JT8D-219</td>
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<td>PW-JT8D-217C</td>
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<td>PW-JT8D-9</td>
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<td>51</td>
<td>PW-JT8D-17</td>
<td>121,000</td>
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<tr>
<td>Avro Regional Jet</td>
<td>70/85/100</td>
<td>ASE-LF507-1F</td>
<td>101,500</td>
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<tr>
<td>Fokker</td>
<td>100</td>
<td>RR-Tay 650</td>
<td>98,000</td>
</tr>
<tr>
<td>British Aerospace 146</td>
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<td>ASE-ALF502R-5</td>
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<td>44,092</td>
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<tr>
<td>Canadair Regional Jet</td>
<td>900</td>
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<td>80,500</td>
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<tr>
<td>De Havilland DHC8</td>
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<td>PW123</td>
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Small Aircraft

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Model</th>
<th>Engine Type</th>
<th>MTOW (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saab</td>
<td>340</td>
<td>GE-CT7-5A2</td>
<td>28,000</td>
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<td>British Aerospace Jetstream</td>
<td>41</td>
<td>ASE-TPE331-14GR</td>
<td>24,000</td>
</tr>
<tr>
<td>Beechcraft</td>
<td>1900D</td>
<td>PWC PT6A-67D</td>
<td>17,120</td>
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<td>Fairchild Dornier 328</td>
<td>310</td>
<td>PWC-PW306B</td>
<td>34,524</td>
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MTOW=Maximum Takeoff Weight
Source: October 2003 Official Airline Guide

Table 4 – Cargo Aircraft Fleet Mix Characteristics

<table>
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<th>Engine Type</th>
<th>MTOW (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airbus 300</td>
<td>B4/203</td>
<td>CF6-50C2</td>
<td>363,756</td>
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<td>Boeing 727</td>
<td>100C</td>
<td>JT8D-7</td>
<td>169,000</td>
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<tr>
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<td>200F</td>
<td>JT8D-15</td>
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<td>Boeing 747</td>
<td>200C</td>
<td>JT9D-7Q</td>
<td>833,000</td>
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<tr>
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<td>11F</td>
<td>PW4460</td>
<td>602,500</td>
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<tr>
<td>DC-10</td>
<td>10CF</td>
<td>CF6-6D</td>
<td>440,000</td>
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<td>30CF</td>
<td>CF6-50C</td>
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<td>JT3D-3B</td>
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<td>CFM56-2</td>
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<td>JT8D-15</td>
<td>114,000</td>
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MTOW=Maximum Takeoff Weight
Source: 2001-2002 Cargo Landings from FAA Form 5100-108
Table 5 – Cargo Aircraft Takeoff Requirements (12,600’ Runway)

<table>
<thead>
<tr>
<th>Cargo Aircraft</th>
<th>Engine Type</th>
<th>Takeoff Weights (lbs.)</th>
<th>OEW Plus Payload (lbs.)</th>
<th>Max. Structural Payload (lbs.)</th>
<th>Loss in Payload (lbs.)</th>
<th>MTOW</th>
<th>Percent of Total Payload</th>
<th>Percent of MTOW</th>
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<tr>
<td>A300-B4/203</td>
<td>CF6-50C2</td>
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<td>273,369</td>
<td>78,252</td>
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<td>A-727-100C</td>
<td>JT8D-7</td>
<td>45,500 35,800 87,696</td>
<td>169,000</td>
<td>123,500</td>
<td>35,800</td>
<td>0</td>
<td>169,000</td>
<td>100.0%</td>
</tr>
<tr>
<td>A-747-200C</td>
<td>JT9D-7Q</td>
<td>243,000 244,670 345,330</td>
<td>833,000</td>
<td>590,000</td>
<td>244,670</td>
<td>0</td>
<td>833,000</td>
<td>100.0%</td>
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<td>MD-11F</td>
<td>PW4460</td>
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<td>451,300</td>
<td>202,733</td>
<td>0</td>
<td>602,500</td>
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<td>188,000</td>
<td>47,060</td>
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</tr>
<tr>
<td>DC-8-62F</td>
<td>JT3D-3B</td>
<td>110,600 91,440 182,040</td>
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<td>230,000</td>
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<td>DC-9-41</td>
<td>JT8D-15</td>
<td>21,000 31,665 61,335</td>
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<td>31,665</td>
<td>0</td>
<td>114,000</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
### Table 6 – Takeoff Destination and Distance

<table>
<thead>
<tr>
<th>Passenger Aircraft Markets</th>
<th>Cargo Aircraft Markets</th>
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</thead>
<tbody>
<tr>
<td><strong>City</strong></td>
<td><strong>Distance (nautical miles)</strong></td>
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<td>Dallas</td>
<td>747</td>
</tr>
<tr>
<td>St. Louis</td>
<td>294</td>
</tr>
<tr>
<td>Chicago</td>
<td>209</td>
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<tr>
<td>Cleveland</td>
<td>141</td>
</tr>
<tr>
<td>New York</td>
<td>480</td>
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<tr>
<td>Houston</td>
<td>807</td>
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<tr>
<td>Cincinnati</td>
<td>56</td>
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<td>Atlanta</td>
<td>376</td>
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<td>Detroit</td>
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<td>Minneapolis</td>
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<td>Washington</td>
<td>339</td>
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<td>Charlotte</td>
<td>322</td>
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<td>Pittsburgh</td>
<td>186</td>
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<td>Philadelphia</td>
<td>413</td>
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<tr>
<td>Milwaukee</td>
<td>247</td>
</tr>
<tr>
<td>Ft. Lauderdale</td>
<td>593</td>
</tr>
<tr>
<td></td>
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<tr>
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</table>
Table 7 – Air Carrier Aircraft Takeoff Requirements (9,500’ Runway)

<table>
<thead>
<tr>
<th>Air Carrier Aircraft</th>
<th>Engine Type</th>
<th>Takeoff Weights (lbs.)</th>
<th>OEW Plus Payload (lbs.)</th>
<th>Loss in Payload (lbs.)</th>
<th>MTOW</th>
<th>Percent of Total Payload</th>
<th>Percent of MTOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-757-200</td>
<td>RB211-535E-4B</td>
<td>37,000 47,060 136,940 225,000</td>
<td>188,000 47,060 0</td>
<td>255,000</td>
<td>100.0% 88.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-757-200</td>
<td>PW2037</td>
<td>56,000 53,125 130,875 246,000</td>
<td>188,000 53,125 0</td>
<td>255,000</td>
<td>100.0% 96.5%</td>
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<td></td>
</tr>
<tr>
<td>B-757-300</td>
<td>PW2043</td>
<td>57,000 68,200 141,800 267,000</td>
<td>210,000 68,200 0</td>
<td>270,000</td>
<td>100.0% 98.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-757-300</td>
<td>RB211-535E-4B</td>
<td>42,500 67,650 142,350 252,500</td>
<td>210,000 67,650 0</td>
<td>270,000</td>
<td>100.0% 93.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-737-300</td>
<td>CFM56-3B2</td>
<td>26,500 33,960 72,540 133,000</td>
<td>106,500 33,960 0</td>
<td>139,500</td>
<td>100.0% 95.3%</td>
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<td></td>
</tr>
<tr>
<td>B-737-500</td>
<td>CFM56-3B-1</td>
<td>26,500 33,470 69,030 129,000</td>
<td>102,500 33,470 0</td>
<td>133,500</td>
<td>100.0% 96.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-737-800</td>
<td>CFM56-7B-24</td>
<td>26,700 47,000 91,300 165,000</td>
<td>138,300 47,000 0</td>
<td>174,200</td>
<td>100.0% 94.7%</td>
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<td></td>
</tr>
<tr>
<td>B-737-900</td>
<td>CFM56-7B-24</td>
<td>27,000 35,420 94,580 157,000</td>
<td>130,000 45,720 10,300</td>
<td>174,200</td>
<td>77.5% 90.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A320-200</td>
<td>CFM56-5A1</td>
<td>36,374 44,028 89,350 169,754</td>
<td>133,380 44,028 0</td>
<td>169,754</td>
<td>100.0% 100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A319-112</td>
<td>CFM56-5B6</td>
<td>15,434 37,116 86,476 141,096</td>
<td>125,662 37,116 0</td>
<td>141,096</td>
<td>100.0% 100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-80-83</td>
<td>PW-JT8D-219</td>
<td>32,187 42,127 79,686 154,000</td>
<td>121,813 42,127 0</td>
<td>160,000</td>
<td>100.0% 96.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-80-87</td>
<td>PW-JT8D-217C</td>
<td>26,000 38,726 73,274 140,000</td>
<td>112,000 38,726 0</td>
<td>140,000</td>
<td>100.0% 100.0%</td>
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<td></td>
</tr>
<tr>
<td>B-717-200</td>
<td>RR-BR715</td>
<td>18,000 26,170 69,830 114,000</td>
<td>96,000 26,170 0</td>
<td>114,000</td>
<td>100.0% 100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC-9-51</td>
<td>PW-JT8D-17</td>
<td>19,000 33,825 64,675 117,500</td>
<td>98,500 33,825 0</td>
<td>121,000</td>
<td>100.0% 97.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC-9-32</td>
<td>PW-JT8D-9</td>
<td>24,645 11,000 56,855 92,500</td>
<td>67,855 30,145 19,145</td>
<td>108,000</td>
<td>36.5% 85.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average 94.3% 95.5%

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
### Table 8 – Cargo Aircraft Takeoff Requirements (9,500’ Runway)

<table>
<thead>
<tr>
<th>Cargo Aircraft</th>
<th>Engine Type</th>
<th>Takeoff Weights (lbs.)</th>
<th>OEW Plus Payload (lbs.)</th>
<th>Max. Structural Payload (lbs.)</th>
<th>Loss in Payload (lbs.)</th>
<th>MTOW</th>
<th>Percent of Total Payload</th>
<th>Percent of MTOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>A300-B4/203</td>
<td>CF6-50C2</td>
<td>75,631</td>
<td>78,252</td>
<td>195,117</td>
<td>349,000</td>
<td>273,369</td>
<td>0</td>
<td>363,756</td>
</tr>
<tr>
<td>B-727-100C</td>
<td>JT8D-7</td>
<td>45,500</td>
<td>35,800</td>
<td>87,696</td>
<td>169,000</td>
<td>123,500</td>
<td>35,800</td>
<td>169,000</td>
</tr>
<tr>
<td>B-727-200F</td>
<td>JT8D-15</td>
<td>47,000</td>
<td>43,300</td>
<td>100,700</td>
<td>191,000</td>
<td>144,000</td>
<td>43,300</td>
<td>209,500</td>
</tr>
<tr>
<td>B-747-200C</td>
<td>JT9D-7Q</td>
<td>185,000</td>
<td>244,670</td>
<td>345,330</td>
<td>590,000</td>
<td>244,670</td>
<td>0</td>
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</tr>
<tr>
<td>MD-11F</td>
<td>PW4480</td>
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<td>202,733</td>
<td>248,567</td>
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<tr>
<td>DC-10-10CF</td>
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<td>423,500</td>
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<td>0</td>
<td>440,000</td>
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<tr>
<td>DC-10-30CF</td>
<td>CF6-50C</td>
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<td>152,964</td>
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<td>0</td>
<td>555,000</td>
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<td>B-767-300</td>
<td>CF6-80A</td>
<td>68,000</td>
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<td>346,000</td>
<td>278,000</td>
<td>88,248</td>
<td>350,000</td>
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<tr>
<td>B-757-200</td>
<td>RB211-535E-4B</td>
<td>67,000</td>
<td>47,060</td>
<td>136,940</td>
<td>255,000</td>
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<td>47,060</td>
<td>255,000</td>
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<td>JT3D-3B</td>
<td>85,000</td>
<td>91,440</td>
<td>138,560</td>
<td>315,000</td>
<td>230,000</td>
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<td>DC-8-73F</td>
<td>CFM56-2</td>
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<td>111,800</td>
<td>149,200</td>
<td>330,000</td>
<td>261,000</td>
<td>111,800</td>
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<tr>
<td>DC-9-41</td>
<td>JT8D-15</td>
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<td>31,665</td>
<td>61,335</td>
<td>114,000</td>
<td>93,000</td>
<td>31,665</td>
<td>114,000</td>
</tr>
</tbody>
</table>

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
### Dayton Runway Takeoff Length Requirements Exhibit

#### International Airport

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Runway 6R-24L</th>
<th>Runway 18-36</th>
<th>Runway 6L-24R</th>
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<tr>
<td>DC-9-32</td>
<td>6,500</td>
<td>6,500</td>
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<tr>
<td>DC-9-51</td>
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<td>B-717-200</td>
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<td>MD-80-83</td>
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<td>B-757-200</td>
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<td>11,000</td>
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<tr>
<td>B-757-200</td>
<td>10,500</td>
<td>10,500</td>
<td>10,500</td>
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</table>

### Notes:

1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals

H:\DAY\Runway Lengths\[Rwy 8R Length Analysis_12-04.xls]9,500' RW

01/27/05

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** Dayton International Airport **

Runway Takeoff Length Requirements
Air Carrier Aircraft - 100% MTOW

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Landrum & Brown

20

Draft – February 9, 2005
<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Runway Length (Feet)</th>
<th>Jane's</th>
<th>ICAO</th>
</tr>
</thead>
<tbody>
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<td>CRJ-900</td>
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<tr>
<td>CRJ-700</td>
<td>9,500'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRJ-200ER</td>
<td>9,500'</td>
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<td>EMB-195LR</td>
<td>9,500'</td>
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<td>EMB-190LR</td>
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<td>EMB-170LR</td>
<td>9,500'</td>
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</tr>
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<td>ERJ-145LR</td>
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<td>ERJ-140LR</td>
<td>9,500'</td>
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<td>ERJ-135LR</td>
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</tr>
<tr>
<td>Avro RJ-85</td>
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<tr>
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<tr>
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<tr>
<td>BAE Jetstream 41</td>
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<tr>
<td>Dornier 328</td>
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</tr>
<tr>
<td>Saab 340A</td>
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<td></td>
<td></td>
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</tbody>
</table>

Notes:
1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\(Rwy 6R Length Analysis_12-04.xls)\9,500' RW
01/27/05
Notes:
1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAYS\Runway Lengths\Rwy Length Analysis_12-04.xls\Cargo T-O Graph
01/27/05
Notes:
1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\(Rwy 6R Length Analysis_12-04.xls)Cargo T-O Graph
Notes:
1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\Rwy 6R Length Analysis_12-04.xls|Cargo T-O Graph 01/27/05
Notes:
1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls\]Cargo T-O Graph 01/27/05
APPENDIX A
Exhibit A-1: Density Altitude Calculator for Air Carrier Aircraft

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

Density Altitude Calculator

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>1009 feet</td>
</tr>
<tr>
<td>Air Temperature</td>
<td>85 degrees F</td>
</tr>
<tr>
<td>Altimeter Setting</td>
<td>29.92 inches Hg</td>
</tr>
<tr>
<td>Dew Point</td>
<td>50 degrees F</td>
</tr>
</tbody>
</table>

Density Altitude: 3054 feet
Absolute Pressure: 28.845 inches Hg
Relative Density: 91.37%
Exhibit A-2: Density Altitude Calculator for Cargo Aircraft

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

<table>
<thead>
<tr>
<th>Density Altitude Calculator</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>1009 feet</td>
</tr>
<tr>
<td>Air Temperature</td>
<td>65 degrees F</td>
</tr>
<tr>
<td>Altimeter Setting</td>
<td>29.92 inches Hg</td>
</tr>
<tr>
<td>Dew Point</td>
<td>60 degrees F</td>
</tr>
<tr>
<td>Density Altitude</td>
<td>1867 feet</td>
</tr>
<tr>
<td>Absolute Pressure</td>
<td>28.845 inches Hg</td>
</tr>
<tr>
<td>Relative Density</td>
<td>94.65 %</td>
</tr>
</tbody>
</table>

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