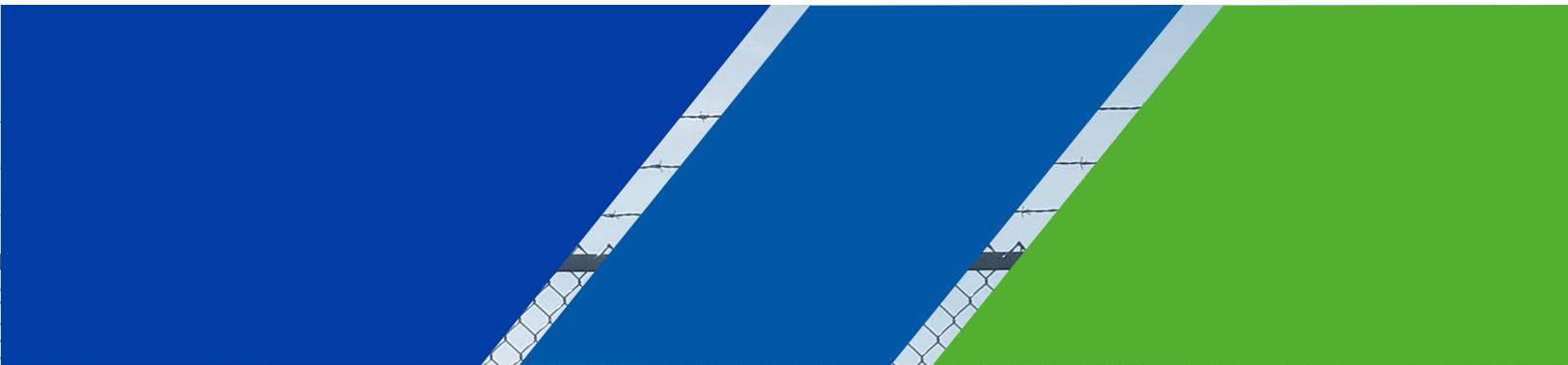




Appendix: A

Runway 2-20 Length Eligibility Analysis



TWEED
NEW HAVEN
AIRPORT

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TECHNICAL MEMORANDUM

To: Sean Scanlon
Tweed-New Haven Airport Authority (TNHAA)

From: Laura Canham
David Rosa
Jeff Wood

Date: March 9, 2022

Subject: Tweed-New Haven Airport Runway 02-20 Length Justification

Reference: Project Number 18839.00

The intent of this memorandum is to document the existing Tweed-New Haven Airport (HVN) Runway 02-20 length need justification and eligibility for **6,635 feet or more of total runway length** based on FAA guidance as documented in:

- FAA Order 5100.38D, Change 1, *Airport Improvement Program Handbook*, February 26, 2019
- FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, June 20, 2017
- FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, July 1, 2005
- FAA AC 150/5300-13A, Change 1, *Airport Design*, September 28, 2012

This memorandum includes the following sections:

Executive Summary

1. Runway 02-20 Existing Runway Length Critical Aircraft Determination
2. Runway 02-20 Existing Runway Length Justification
3. Future Transportation
4. AIP Project Eligibility and Justification
5. Summary

The last attachment (**Attachment 7**) is the original December 10, 2021 runway length eligibility memo for reference.

Executive Summary

Tweed-New Haven Airport currently has commercial operations by Avelo Airlines' B737-700W (B737W) to six (6) Florida destinations (five (5) of which were established in November 2021), four (4) additional destinations announced for April through September 2022 (combined >6,000 annual B737W operations), and general aviation operations with both aircraft between 12,500 and 60,000 pounds (mostly AAC B-C and ADG I-III) (>500 annual operations) and exceeding 60,000 pounds (mostly AAC B-D and ADG II-IV) (>400 annual operations) maximum takeoff weight to destinations as far as the West Coast. All of these aircraft operate under weight penalties on several of the existing routes. Additionally, the B737W is required to take off using a higher thrust setting due to the short runway than it would with a longer runway.

Avelo Airlines plans to introduce the B737-800W (B738W), which makes up the rest of its fleet not currently flying into HVN and which cannot yet operate at HVN due to the limited runway length.

Based on both the FAA's standard runway length review as well as Avelo Airlines' review of runway length need, it was determined that 6,635 feet or more of runway length is needed for commercial (up to 9,000 feet) and general aviation operations for the existing operations as well as the anticipated fleet mix

changes and expected new destinations. Although a longer runway is justified, physical constraints at the site limit the feasible runway length to approximately 6,635 feet.

1. Runway 02-20 Existing Runway Length Critical Aircraft Determination

According to AIP Handbook paragraph 3-11, “more than one critical aircraft may control the design of any specific airport’s different facility features, such as runway length”. Therefore, different groupings of aircraft were reviewed for runway length purposes.

Commercial Runway Length Critical Aircraft

HVN currently has a single runway active, Runway 02-20, which serves all fixed wing aircraft at the Airport, including scheduled air carrier operations by Avelo Airlines. Avelo Airlines flies its B737W to six (6) destinations in Florida in February 2022 (bolded) with another four (4) additional destinations recently announced, starting in May 2022¹ (not bolded):

- **Fort Lauderdale/Hollywood International Airport (FLL) – longest runway: 9,000 feet**
- **Southwest Florida International Airport (RSW) – longest runway: 12,000 feet**
- **Orlando International Airport (MCO) – longest runway: 12,005 feet**
- **Tampa International Airport (TPA) – longest runway: 11,002 feet**
- **Palm Beach International Airport (PBI) – longest runway: 10,001 feet**
- **Sarasota/Bradenton International Airport (SRQ) – longest runway: 9,500 feet**
- Myrtle Beach International Airport (MYR) – longest runway: 9,503 feet
- Charleston International Airport (CHS) – longest runway: 9,001 feet
- Savannah/Hilton Head International Airport (SAV) – longest runway: 9,351 feet
- Nashville International Airport (BNA) – longest runway: 11,030 feet

It should be noted that all of the airports Avelo is currently serving and is expected to serve all have runways with lengths of 9,000 feet or more. The B737W was specifically leased for use at HVN due to the runway length restriction. The intent is to deploy the B737W where the B738W operations are not economically feasible due to the runway length limitation at HVN. In the short-term, even the B737W aircraft has operational limitations as documented in **Attachment 1**.

Table 1 shows weekly departures and operations of Avelo based on the most current (received Feb. 16, 2022) 2022 schedule. As Table 1 shows, the B737W far exceeds the 500 annual operations threshold to meet the critical aircraft designation; there were 356 alone since operations started Nov. 3, 2021 through the end of calendar year 2021.

Table 1: Avelo Airlines Estimated 2022 Operations

Start Date	1/1/2022	4/1/2022	5/5/2022	5/26/2022	6/16/2022	9/8/2022
End Date	3/31/2022	5/4/2022	5/25/2022	6/15/2022	9/7/2022	12/31/2022
Weekly Departures	26	34	51	69	84	84
Weekly Operations	52	68	102	138	168	168
Total Operations During Time Period	661	321	291	394	1,992	2,736
Avelo Airlines Anticipated 2022 Operations						6,395

Source: Avelo Airlines schedule (**Attachment 2**).

¹ Avelo Airlines to offer four new flights from New Haven to Southeast U.S. cities. Feb. 16, 2022. <https://www.wtnh.com/news/connecticut/new-haven/avelo-airlines-to-offer-four-new-flights-from-new-haven-to-southeast-u-s-cities/>, accessed Feb. 16, 2022.

In 2021, total operations of C-III and larger aircraft include those shown in **Table 2** per the FAA's Traffic Flow Management System Count (TFMSC). This table does not include C-III and larger general aviation/business jet aircraft (operations shown in **Tables 3 and 4**).

Table 2: 2021 C-III and Larger Operations

Aircraft	2021 Annual Operations
Airbus A320 Series	1
Boeing 737-700	356
Boeing 757-200 (Air Force 2)	2
Embraer 175	422
Total	781

Sources: FAA TFMSC Jan. 1 – Dec. 31, 2021.

Since American Airlines is no longer flying their Embraer 175s, Avelo's B737W is the new critical commercial aircraft. Additionally, Avelo Airlines is planning to expand its HVN schedule rapidly in the short-term to approximately 9-12 daily departures of B737W and Boeing 738W aircraft as shown in **Attachment 2**.

General Aviation Runway Length Critical Aircraft

For runway length purposes, large general aviation aircraft are split into three categories per FAA AC 150/5325-4B:

1. 75 percent of fleet of aircraft with a maximum takeoff weight (MTOW) of greater than 12,500 pounds but less than 60,000 pounds.
2. 100 percent of fleet of aircraft with a maximum takeoff weight (MTOW) of greater than 12,500 pounds but less than 60,000 pounds.
3. Aircraft with a MTOW greater than 60,000 pounds.

Each of these GA categories of large GA aircraft exceeds or is close to the 500 annual operations threshold.

General Aviation Aircraft Between 12,500 and 60,000 Pounds MTOW

Tables 3 and 4 show 2019 through 2021 operations of a select group of aircraft weighting 12,500 pounds to 60,000 pounds that make up 75 and 100 percent of the fleet per FAA AC 150/5325-4B, Tables 3-1 and 3-2, respectively. Both groups of aircraft exceed 500 annual operations at HVN, each.

Table 3: Annual Operations by Aircraft That Make up 75 Percent of Fleet of 12,500-60,000 Pounds MTOW

Aircraft	2019 Annual Operations	2020 Annual Operations	2021 Annual Operations
Challenger 300	264	134	235
500 Citation/501 Citation Special	-	8	4
525A Citation II (CJ-2)	75	-	42
550 Citation Bravo	62	77	58
560 Citation Encore	154	93	154
560/560 XL Citation Excel	257	173	261
680 Citation Sovereign	125	44	73
Falcon 900	51	40	73
Falcon 50/50 EX	81	9	35
Learjet 31/31A/31A ER	27	50	34
Learjet 35/35A/36/36A	154	119	102
Learjet 40/45	-	26	64
Total	1,250	773	1,135

Sources: FAA TFMSC 2019-2021.

Table 4: Annual Operations by Aircraft That Make up 100 Percent of Fleet of 12,500-60,000 Pounds MTOW

Aircraft	2019 Annual Operations	2020 Annual Operations	2021 Annual Operations
Bombardier Challenger 600/601/504	91	50	87
Cessna 650 Citation III/IV	12	10	12
Cessna 750 Citation X	126	84	119
Dassault Falcon 2000	69	26	62
IAI Astra 1125	8	2	10
IAI Galaxy 1126 (G200)	36	29	19
Learjet 55/55B/55C	2	14	12
Learjet 60	68	62	78
Hawker 800/800XP	113	123	174
Hawker 1000	11	8	8
Total	536	408	581

Sources: FAA TFMSC 2019-2021.

General Aviation Aircraft with MTOW Greater than 60,000 Pounds

According to the FAA's TFMSC, there is a history of large general aviation aircraft (MTOW greater than 60,000 pounds) that approaches 500 annual operations, depending on the year. These aircraft are identified in **Table 4**.

Table 4: Average Annual Operations by Large General Aviation Aircraft

Aircraft	Average Annual Operations (2017 – 2019)
Gulfstream IV/G400	164
Gulfstream V/G500	133
Global Express	63
Global 5000	20
Gulfstream 6/G650	30
Total	411

Sources: FAA TFMSC.

Results:

- Existing commercial critical aircraft: Boeing 737-700W
- Existing general aviation exceed 500 annual operations in both:
 - GA aircraft between 12,500 and 60,000 pounds MTOW – 75% of the fleet
 - GA aircraft between 12,500 and 60,000 pounds MTOW – 100% of the fleet
- GA aircraft exceeding 60,000 pounds MTOW may exceed 500 annual operations in the next few years

2. Runway 02-20 Existing/Current Runway Length Justification

This section identifies the existing runway length needs for the three largest groups of aircraft using HVN. This commercial runway length need analysis is secondary to the airline performance engineering analysis (which is primary) shown in **Attachment 1**.

Commercial Critical Aircraft Runway Length Need

FAA AC 150/5325-4B, Chapter 4, determines that regional jets and those airplanes with a MTOW of more than 60,000 pounds, runway length needs are “based on using the performance charts published by the airplane manufacturers”. The B737W MTOW exceeds 60,000² pounds, as depicted in **Table 5**.

Table 5: General Characteristics: Model 737-700 with Winglets

Characteristics	Units	Model 737-700W
Max Design (Taxi Weight)	Pounds	153,500
Max Design (Takeoff Weight)	Pounds	153,000

Source: Boeing Commercial Airplanes 737 Airplane Characteristics for Airport Planning, Revision B dated September 2021, document number D6-58325-6.

The following assumptions were used in this runway length analysis per the FAA’s guidance:

- Boeing 737-700W, CFM56-7B22 engines
- Maximum payload (no weight penalties)
- Range: approximately 1,000 NM (HVN-RSW is 986.5 NM)
- Fuel burn: 91.4 pounds per seat per 1,000 NM³
- Fuel buffer: Per 14 CFR § 91.167 protect for flight to an alternate airport (100 NM) and “after that for 45 minutes at normal cruising speed”
- Mean daily maximum temperature of the hottest month: 83°F⁴ (ISA + 27°F)
- Runway elevation: 12.6 feet mean sea level
- Takeoff distances were adjusted based on the runway slope adjustment of 10 feet per one foot of difference in existing runway elevation
- Landing distances during wet conditions were reviewed

This results for the estimated range of weights to plan for are detailed in **Table 6**.

Table 6: Estimated Range of B737W Weights

Weights in pounds	B737W Max. Payload
Operating Empty Weight	83,000
Passengers and Carry-On	37,500
Checked Baggage	
Fuel Burn and Buffer	19,127
Takeoff Weight	139,627
Landing Weight	126,100

Sources: B737W Airport Planning Manual, Boeing Technical Data (2006), and McFarland Johnson analysis.

This analysis does not include:

- Departure obstacles.
- Takeoff and landing performance assessment (TALPA) adjustments during contaminated runway conditions (FAA Order 8900.1, Volume 4, Chapter 3).
- Hotter than average day of the hottest month temperatures.
- Wind of any kind.

² Boeing Commercial Airplanes 737 Airplane Characteristics for Airport Planning, Revision B dated September 2021. Document number D6-58325-6.

³ Boeing Commercial Airplanes

<https://web.archive.org/web/20140725005129/http://www.boeing.com/assets/pdf/commercial/startup/pdf/737ng_perf.pdf> accessed November 11, 2021.

⁴ NOAA National Weather Service Forecast Office,

<<https://w2.weather.gov/climate/xmacis.php?wfo=okx>>, accessed Jan. 23, 2020.

Attachment 3 shows the B737W charts. Based on these takeoff and landing weights, it was determined that the B737W requires at least 6,600 feet of runway length (more on hotter days) to eliminate weight penalties for its existing routes to Florida. This is in line with Avelo Airlines' internal review of runway length requirements, showing that the B737W on its existing routes to Florida needs 6,635 feet or more as shown in **Attachment 1**. New Haven has an average of 126 days per year with precipitation (rain or snow)⁵. Hourly aviation routine weather report (METAR) data from 2005-2019 shows 17.2% of hours at HVN have precipitation, which represents approximately 1,100 operations per year operating under a weight penalty due to runway contamination (assuming 12 departures per day per the schedule projected starting in June 2022 as shown in **Attachment 2**).

Result: B737W needs 6,635 feet or more of runway length to operate on its existing routes using standard thrust to eliminate or reduce weight penalties during dry runway conditions.

General Aviation Runway Length Need

This section reviews runway length needs for the three large GA aircraft categories per FAA AC 5325-4B, each of which are shown to have over 500 or close to 500 annual operations in Section 1.

While the FAA's City Pair data was reviewed and showed approximately 400 annual operations of GA aircraft with destinations 500 NM or further from HVN, the Flight Aware sample data is shown to provide concrete examples of destinations and a second estimate of operations. Flight Aware data shows that there are likely over 500 annual operations of GA aircraft that have stage lengths of 500 NM or more. Based on the two, two-week samples in November 2021 and February 2022, there are an estimated 455 annual departures (910 annual operations) that exceed 500 NM stage length. Therefore, the 90 percent load factor tables were used.

Based on a snapshot review of destinations for early November 2021 and end of February 2022, actual destinations include:

November 2021:

- San Jose International Airport (2,258 NM)
- Napa County Airport (2,256 NM)
- Salt Lake City International Airport (1,755 NM)
- Naples Municipal Airport (1,008 NM)
- Boca Raton Airport (962 NM)
- Palm Beach International Airport (945 NM)
- Treasure Coast International Airport (904 NM)
- Dekalb-Peachtree Airport (700 NM)
- Bermuda L. F. Wade International Airport (664 NM)
- Charleston Executive Airport (615 NM)

February 2022:

- Charles S. Schulz Sonoma County Airport (2,272 SM)
- Centennial Airport (1,455 NM)
- Gainesville Regional Airport (1,240 NM)
- Florida Keys Marathon International Airport (1,073 NM)
- Tampa International Airport (927 NM)
- Witham Field Airport (919 NM)

⁵ NOAA National Weather Service Forecast Office, <<https://w2.weather.gov/climate/xmacis.php?wfo=okx>>, accessed Mar. 9, 2022.

General Aviation Aircraft Between 12,500 and 60,000 Pounds MTOW

HVN has over 500 annual operations of general aviation aircraft between 12,500 pounds and 60,000 pounds MTOW at 75 and 100 percent of the fleet (according to FAA's definition as shown in AC 150/5325-4B Tables 3-1 and 3-2), respectively.

The FAA's standard runway length analysis, based on FAA AC 5325-4B, Figures 3-1 and 3-2, respectively, was used to identify the runway length requirement. As discussed previously, due to the sampling of destinations, the 90 percent load factor was used. **Attachment 4** shows the AC's chart and applicable runway length adjustment calculations that show:

- 75% of the fleet has a runway length need of approximately 6,300'
- 100% of the fleet has a runway length need of approximately 7,600'

These runway lengths were then compared to the aircraft that use HVN. The two tables below show the MTOW balanced field or maximum takeoff/landing runway lengths during standard atmospheric conditions (including 59F temperature) and how those runway lengths may change based on higher summer temperatures of 86F.

75% of the GA fleet of 12,500 – 60,000-pound MTOW aircraft (per Table 3-1)

Aircraft	Runway Length Need at MTOW (at 59F, no wind)
Challenger 300	4,810'
500 Citation/501 Citation Special	3,950'
525A Citation II (CJ-2)	4,628'
550 Citation Bravo	4,295'
560 Citation Encore	4,195'
680 Citation Sovereign	3,867'
Falcon 900	5,144'
Falcon 50/50 EX	5,000'
Learjet 40/45	4,350'
Average runway length at 59F	4,600'
Average runway length interpolated for 86F	5,300'

Sources: GlobalAir and FAA AC 150/5325-4B.

100% of the GA fleet of 12,500 – 60,000-pound MTOW aircraft (per Table 3-2)

Aircraft	Runway Length Need at MTOW (at 59F, no wind)
Bombardier Challenger 600/601/504	6,200'
Cessna S550 Citation S/II / C56X	4,500'
Cessna 650 Citation III/IV	5,630'
Cessna 750 Citation X	5,480'
Dassault Falcon 2000	5,440'
IAI Astra 1125	5,250'
IAI Galaxy 1126 (G200)	6,600'
Learjet 55/55B/55C	5,600'
Learjet 60	5,450'
Hawker 800/800XP	5,640'
Hawker 1000	6,000'
Average runway length at 59F	5,800'
Average runway length interpolated for 86F	7,200'

Sources: GlobalAir, and FAA AC 150/5325-4B.

These analyses show that an increase in the runway length would better serve the GA community including business jet needs as well as provide additional flexibility for these aircraft to carry more fuel to reach further destinations and/or added payload in forms or passengers/luggage. As aircraft fleets

change, a longer runway would be able to accommodate this changing fleet mix and associated changing runway length requirements.

Results:

- **12,500-60,000 lbs (100 percent of the fleet) existing takeoff runway length need: approximately 7,200' to 7,600'**
- **12,500-60,000 lbs (75 percent of the fleet) existing takeoff runway length need: approximately 5,300' to 6,300'**
- **A runway extension would better serve business jet needs and capabilities as well as provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken**

General Aviation Aircraft with MTOW Greater than 60,000 Pounds

FAA AC 150/5325-4B, Chapter 4, determines that regional jets and those airplanes with a MTOW of more than 60,000 pounds runway length needs are “based on using the performance charts published by the airplane manufacturers.” The GIV exceeds 60,000 pounds MTOW at 74,600 pounds⁶.

The following assumptions were used in this runway length analysis:

- Maximum useful load (no weight penalties)
- Range: approximately 1,000 to 2,300 NM (based on existing flights which occurred in early Nov. 2021)
- Fuel burn: 5,000 pounds for the first hour and 3,000 pounds every hour after⁷
- Fuel buffer: one hour
- Runway elevation: 12.6 feet mean sea level
- Mean daily maximum temperature of the hottest month: 83°F⁸ (ISA + 27°F)
- Landing distances were adjusted based on the minimum 15 percent increase during wet/contaminated conditions up to the FAA advisory circular’s maximum

This results for the estimated range of weights to plan for are detailed in **Table 8**:

Table 8: Estimated Range of Weights

Weights in pounds	GIV 1,000 NM	GIV 2,300 NM
Empty Weight	43,700	43,700
Fuel Burn and Buffer	11,522	20,000
Useful Load (after fuel)	19,378	10,900
Takeoff Weight	74,600	74,600
Landing Weight	66,000	57,600

Sources: NOAA and McFarland Johnson analysis.

This analysis does not include:

- Hotter than average day of the hottest month temperatures.
- Wind of any kind.
- Runway slope adjustments.
- Icy conditions.
- Departure obstacles.

⁶ National Oceanic and Atmospheric Administration (NOAA) – Department of Commerce, Gulfstream IV-SP, <<https://www.oma.noaa.gov/learn/aircraft-operations/aircraft/gulfstream-iv-sp-g-iv>> accessed Nov. 11, 2021.

⁷ Ibid.

⁸ NOAA National Weather Service Forecast Office, <<https://w2.weather.gov/climate/xmacis.php?wfo=okx>>, accessed Jan. 23, 2020.

Table 9 below shows a summary of the GIV charts (shown on **Attachment 5**).

Table 9: Summary of GIV Runway Length Requirements

Length in feet	GIV 1,000 NM	GIV 2,300 NM
Takeoff Length	6,367	6,367
Landing Length	7,343	6,435

Sources: Gulfstream Aircraft (Gulfstream IV OIS-2A Revision 1, Jan. 31, 2001) and McFarland Johnson analysis.

Based on these takeoff and landing weights, it was determined that the GIV would need approximately 7,300 feet to eliminate weight penalties. **Attachment 5** also shows existing takeoff and landing limitations/weight penalties and how a runway extension to 6,600 feet takeoff and 6,000 feet landing would provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken.

Results:

- **GIV existing runway length need: approximately 7,300'**
- **A runway extension would better serve business jet needs and capabilities as well as provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken**

Summary

Table 10 shows the summary of the different groups of aircraft using HVN and that all of these groups have a need for runway length extension.

Table 10: Table for Considering Runway Length by Aircraft Type

Group (Representative Critical Aircraft)	Runway Length Requirement	Annual Operations
Commercial (B737W)	6,635'	6,395+
GA 12,500 – 60,000 lbs MTOW (75% of Fleet)	6,300'	1,135
GA 12,500 – 60,000 lbs MTOW (100% of Fleet)	7,600'	581
GA >60,000 lbs MTOW (GIV)	7,300'	411

Source: TFMSC and McFarland Johnson analysis.

Although a longer runway is justified, physical constraints at the site limit the feasible runway length to approximately 6,635 feet.

3. Future Transportation

It is anticipated that should the runway be extended, Avelo Airlines will start flying its B737W to destinations ~1,300 NM or greater and add the B738W to its existing and new short-term destinations (**Attachment 1**). **Table 11** shows these and similar type aircraft and their runway length needs for the existing and future stage lengths based on airport planning manuals as shown in **Attachment 6**. In addition to the B737, the A320 family of aircraft is commonly used by ultra-low cost carriers such as Allegiant, Spirit, and others.

Table 11: Runway Length Needs for Future Aircraft and Routes

Aircraft	Range (in NM)	Runway Length Need
B737-700W	2,200	9,000'
B737-800W	1,000	6,300'*
B737-800W	2,200	8,200'
A320-200	1,000	5,800'*
A320-200	2,200	6,900'

* Additional runway length would allow lower thrust settings, which would reduce noise exposure to the local community

Sources: Boeing, Airbus, and McFarland Johnson analysis.

As noted previously, although a longer runway is justified, physical constraints at the site limit the feasible runway length to approximately 6,635 feet.

4. AIP Project Eligibility and Justification

According to the AIP Handbook, a project needs to be eligible and justified. This section goes through the eligibility and justification process in the AIP Handbook, as follows:

- Runway Types and Eligibility (Table G-1)
- Runway Project Requirements (Table G-5)
- Three Basic Tests to Determine if a Project is Justified (Paragraph 3-8, Table 3-4)
- Using the Critical Aircraft for Justification (Paragraph 3-11)
- Benefit-Cost Analysis for Capacity Projects Using Discretionary Funds (Paragraph 3-14)

Runway Types and Eligibility (Table G-1)

Runway 02-20 at HVN is the primary runway at this single runway airport as documented in the 2021 Master Plan. Based on Table G-1 (AIP Handbook), that means it is eligible for development consistent with FAA design and engineering standards.

Result: Runway 02-20 at HVN is the primary runway and is eligible.

Runway Project Requirements (Table G-5)

Conclusion: Runway 02-20 at HVN meets the various FAA criteria showing a need for a 6,635-foot or longer runway.

According to Table G-5, the runway length requirements shown below must be met.

Table G-5, Item a. sub-sections	Factors to Consider for Justification and Eligibility	Response
1	Where a study is required to demonstrate need, the FAA must have accepted the study and concurred with the need.	Section 2 demonstrates the need and therefore justifies a runway length of 6,635' or more. This criterion is met with FAA's acceptance of this memo.
2	For a runway capacity project intended to relieve scheduled commercial air service congestion or add capacity for scheduled commercial air service in metropolitan areas with a large or medium hub airport, the ADO must confirm consistency with a regional or state system plan document (if available) prior to programming the grant.	The 2016 CT SASP states that the CT Transportation Strategy Board "made recommendations [...] for preserving and enhancing Tweed-New Haven Airport's ability to serve southern Connecticut. " The target market for HVN is southern CT residents. Most of this target market would otherwise be using New York City airports. While this runway capacity project is not intended to relieve scheduled commercial service for New York City

Table G-5, Item a. sub- sections	Factors to Consider for Justification and Eligibility	Response
		airports, this may occur. This could result in additional benefits to the FAA's New York Airports District Office by opening up seats on NYC flights for NYC metro residents. NYC aviation growth can continue in spite of significant runway and airspace capacity constraints.
3	The length, width, and strength of the pavement work must be based on critical aircraft justification per Paragraph 3-10. The exception is if the project meets the requirements in Paragraph 3-24 to exceed FAA design standards.	Critical aircraft justification is provided in Section 1. Runway length justification is provided in Section 2.
4	Runways must be planned, designed and constructed in accordance with current FAA standards, including clearing the approach slopes that will be used upon completion of the project. For runway projects, object clearing and approach surfaces must be appropriate to the instrument approach procedures for that runway. If the approaches to a new runway or extended runway end will not be clear, the project does not meet FAA standards.	This runway project is being planned, designed, and will be constructed in accordance with current FAA standards, including clearing approaches for the instrument approach procedures. This criterion has been met.
5	If the runway has a non-standard runway protection zone (RPZ), the RPZ requirements per the current version of Advisory Circular 150/5300-13, Airport Design must be followed.	RPZs are shown to be acquired in easement/fee on the current ALP. This criterion has been met.
6	Crosswind runways may be justified if the crosswind criteria of 95% wind coverage are not met on the primary runway. In addition, the justification must be based upon the number and type of aircraft that would use the crosswind in accordance with current APP-400 policy.	Runway 02-20 is a primary runway; this does not apply.
7	The approval criteria and coding for turf and aggregate runways is the same as for paved runways. If this project is required because the FAA Office of Aviation Safety (AVS) has issued a finding that ultralight aircraft must be relocated from the paved runway, the ADO must contact AAS-100 for further guidance.	Runway 02-20 is paved. This does not apply.
8	Per 49 USC § 47106(c)(1)(A)(i), the sponsor must provide an opportunity for a public hearing for a new runway or major runway extension as part of meeting the environmental requirements.	While this project may not be a major runway extension, a public hearing will be scheduled. This criterion has been met.
9	The project may include runway safety area improvements (standalone projects are also covered in this table) or other runway approach obstruction removal (stand-alone projects are covered in Appendix D).	This will be included as part of the project. This criterion has been met.
10	Runway lighting may be included for the new runway pavement as long as it meets the runway lighting requirements in Appendix J. Per APP-520 policy, runway lighting for existing pavement must be coded as a lighting project unless the lighting is in pavement lighting (then it can be coded under the runway project).	Runway lighting included as part of the project is anticipated to meet Appendix J requirements. This criterion has been met.
11	The difference between construct, expand, modify, improve, rehabilitate, shift, and remove is listed in Table G-3.	This project meets Table G-3 "extend" definition. This criterion has been met.

Table G-5, Item a. sub-sections	Factors to Consider for Justification and Eligibility	Response
12	The runway must be eligible and justified as a primary, crosswind, or secondary runway per the requirements in Paragraph G-2.	According to Paragraph G-2 and Table G-1, Item A, Runway 02-20 is eligible as the primary runway.

Source: FAA Order 5100.38D Table G-5.a. and McFarland Johnson analysis.

Result: This project meets all factors to consider for justification and eligibility per Table G-5.

Three Basic Tests to Determine if a Project is Justified (Paragraph 3-8, Table 3-4)

AIP Handbook Paragraph 3-8, Table 3-4 identifies three basic tests for project justification. The ADO must apply the three basic tests to determine if a project is justified.

The three basic tests to determine if a project is justified are...	Response
a. The Project Advances an AIP Policy. The ADO must verify that the project advances at least one of the AIP policies contained in 49 USC § 47101. The basic goals and objectives in these policies include airport safety, airport security, airport capacity, meeting an FAA standard, preserving airport infrastructure through reconstruction or rehabilitation, protecting and enhancing the environment, minimizing aircraft noise impacts, and airport planning. AIP funds must not be used for a project that does not specifically advance one of the AIP policies.	Justified based on 49 USC § 47101 (a)(7) “that airport construction and improvement projects that increase the capacity of the facility to accommodate passenger [...] traffic be undertaken to the maximum feasible extent so that safety and efficiency increase and delays decrease.”
b. There is an Actual Need. Per FAA policy, the ADO must determine if there is an actual need for the project at the airport within the next five years (per the definition near-term development per the current version of Advisory Circular 150/5070-6, Airport Master Plans). This includes all subcomponents of the project.	Justified based on the existing grouping of runway length critical aircraft (Section 1) and the existing route runway length need (Section 2).
c. The Project Scope is Appropriate. The ADO must determine that only the elements that are required to obtain the full benefit of the project are included in the project scope. Any elements that do not meet these criteria must stand on their own separate merit and justification. The current version of FAA Order 5100.39, Airports Capital Improvement Plan, discusses this concept in further detail in the discussions on overall development objective.	Justified based on the runway extension need to meet the existing and short-term need shown in Sections 2 and 3.

Sources: AIP Handbook and McFarland Johnson analysis.

Result: This project meets all three basic tests to determine if a project is justified of Table 3-4. This project is justified.

Using the Critical Aircraft for Justification (Paragraph 3-11)

AIP Handbook paragraph 3-11 states that runway length should be justified using a critical aircraft, or group of aircraft, as determined by FAA AC 150/5000-17. As noted in Paragraph 3.1, different aircraft can define separate elements of airport design. This includes identifying critical aircraft, or a grouping of critical aircraft, for runway length. This was conducted in Section 1 of this memo and resulted in the existing runway length critical aircraft being a grouping that include the B737W and both 75% and 100% of the GA aircraft between 12,500 and 60,000 pounds MTOW.

Result: The following group of existing aircraft utilizing the airport are justified as the runway length critical aircraft:

- Existing commercial runway length critical aircraft: Boeing 737-700W
- Existing general aviation exceed 500 annual operations in both:
 - GA aircraft between 12,500 and 60,000 pounds MTOW – 75% of the fleet
 - GA aircraft between 12,500 and 60,000 pounds MTOW – 100% of the fleet

Benefit-Cost Analysis for Capacity Projects Using Discretionary Funds (Paragraph 3-14)

At the time of this writing, the benefit-cost analysis is underway and will be included in the associated environmental assessment.

Result: BCA is underway and will be included in the environmental assessment.

5. Summary

This memo has shown the following results:

- Runway 02-20 is an eligible primary runway
- The existing group of runway length critical aircraft of B737W (commercial) and Hawker 800 (general aviation) are justified based on the combination of their existing operations
- Commercial runway length need for approximately 6,635 feet is justified based on the existing commercial critical aircraft and runway use as well as short-term new destinations and aircraft (as shown in Section 3)
- General aviation runway length need for approximately 7,600 feet is justified based on the existing general aviation critical aircraft and runway use to existing destinations
- Commercial runway length need for 6,635 feet or more
- The runway length project satisfies eligibility and justification requirements per the AIP Handbook
- BCA is underway and will be included in the EA

Result: Runway 02-20 needs 6,635 feet or more for existing operations and short-term operational needs.

12/15/2021

Sean Scanlon
Executive Director
Tweed-New Haven Airport
155 Burr Street
New Haven, CT 06512

RE: Technical Memorandum Support for Project 18839.00

Dear Mr. Scanlon:

Please use this letter as our formal support to the Technical Memorandum dated December 10, 2021, for the Tweed (HVN) Airport Runway 2-20 Length Eligibility.

We find the Technical Memorandum drafted to be accurate and follows the guidance as documented in:

- FAA Order 5100.38D, Change 1, *Airport Improvement Program Handbook*, February 26, 2019
- FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, June 20, 2017
- FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, July 1, 2005
- FAA AC 150/5300-13A, Change 1, *Airport Design*, September 28, 2012

Avelo also concurs with the Technical Memorandum that Project 18839.00 meets the three basic tests to determine if a project is justified. Reference Table 3-4 of the Technical Memorandum.

Background

Avelo Airlines is a US 14 CFR § 121 Air Carrier utilizing Domestic Authority granted by the DOT to operate Scheduled Airline service from HVN. Avelo operates Boeing 737NG aircraft as a fleet type with a focus on B737-800 aircraft with 189 seats.

Per FAA AC 150/5325-4B, Chapter 4, The B737 aircraft we operate weighs over 60,000 pounds and therefore runway lengths needs are “based on using the performance charts published by the airplane manufacturers”.

- B737-700, 153,000 Maximum Takeoff Weight
- B737-800, 174,200 Maximum Takeoff weight

Note: Avelo Airlines operates both aircraft at the maximum certificated takeoff weights.

We have added B737-700 aircraft to our fleet for the sole purpose of operating flights to and from HVN airport due to the current runway length.

As stated in the Technical Memorandum, Avelo only acquired B737-700 aircraft due to the short runway of HVN. We fully intend to operate B737-800 aircraft in HVN once the runway length is extended.

Growth Plan for HVN

Avelo sees HVN the perfect airport to grow the Avelo network of destinations; only if the runway is extended.

The runway extension is must for HVN to be a commercially viable airport for Large Transport Category Aircraft. While we are currently operating B737-700 aircraft to and from Florida destinations, approximately 900 miles. Any destinations of 1,500 miles or greater will take catastrophic weight penalties, see Section 3, Future Transportation, Table 11 of the Technical Memorandum.

Weight Penalties on B737-700

The current runway length of 02-20 allows Avelo to carry full loads to and from Florida destinations only when the conditions are “good”.

If there are weather conditions that drive the condition of the runway to be wet, contaminated, or even hot temperatures; the B737-700 takes significant penalties on passengers in seats.

Note: When Runway Condition Code, RCC is a 4 we take a large penalty. When a RCC of 3 is reported Avelo ceases operations at HVN due to the runway length.

Operating an airline at HVN only in “good weather” is not a sustainable business plan.

Runway Length Requested

Therefore, as previously stated, Avelo fully supports the extension of runway 2-20 at HVN. The Boeing AFM for both the 737-700 and 800 aircraft indicate a runway length of 9,000 feet is the ideal runway length. We fully understand that is not a viable option at HVN; but an extension to 6,635 feet is not only needed, but mandatory for any commercial growth at HVN.

The extension of runway 2-20 at HVN is both eligible and justified for existing operations and short and long-term operational needs.

Sincerely,



Andrew Lotter
VP Flight Operations
Avelo Airlines

02/15/2022

Sean Scanlon
Executive Director
Tweed-New Haven Airport
155 Burr Street
New Haven, CT 06512

RE: Technical Memorandum Support for Project 18839.00, Revision 1(Performance)

Dear Mr. Scanlon:

Please use this letter as our further support to the Technical Memorandum dated December 10, 2021, for the Tweed (HVN) Airport Runway 2-20 Length Eligibility.

This revision is being provided to give accurate takeoff and landing data with the FAA requested format. Avelo has calculated the following utilizing our aircraft performance partner, AeroData for the following:

Input Criteria Aircraft

1. Farthest existing B737-700 destination, KRSW
2. Farthest existing B737-800 destination, no current destination (performance calculated for KRSW to show performance)
3. Farthest planned B737-700 and -800 destination, KDFW

Aircraft Weight

All aircraft weights have been calculated for maximum MRTW (Maximum Runway Takeoff Weight) for each runway length. All obstacles have been identified for runway lengths of 5600 and 6635. For runway lengths of 7,000, 7,500, and 8,000 obstacles have been interpolated.

Controlling Obstacles

Avelo Airlines utilized AeroData for all performance calculations. The restrictors for any aircraft performance are the following:

- Field (Runway Length, Runway Slope, Accelerate Stop distance, Brake Energy, and VMCG)
- 2nd Segment Climb
- Obstacle (trees, hills, structures, etc....)
- Aircraft Structural Limitations

Avelo's conclusion with all our performance calculation is primarily Field Length limited. While there are some Obstacles that show up as a restrictor on occasion; the main restrictor remains Field Length Limiting.

Runways and Runway Condition

All performance was calculated with runways 02 and 20 separately, utilizing a Dry runway RCC 6 for takeoff, and a Wet runway RCC 5 for landing. All performance follows the guidelines of 14 CFR Part 121 regulatory guidance.

Note: Performance that was calculated for the 6635-foot runway is the actual planned distances added to each respective runway end.

Temperature and Wind

Avelo has made all calculations with calm winds and temperature of 86F. For flight plan enroute time Avelo has utilized Q4 average winds.

Note: Avelo has utilized standard atmospheric barometric pressure of 29.92" inches of mercury.

Elevation and Thrust

Avelo has utilized the KHVN field elevation of 13' MSL and maximum thrust for each engine type. No fixed derate or thrust reduction was utilized.

Engines used for calculations are as follows:

- B737-700, CFM56-7B22
- B737-800, CFM56-7B26

Flaps

For all performance calculations, takeoff and landing, Avelo has utilized optimum flap settings per AeroData.

Performance

Takeoff all Runway Lengths

5600 Feet

B737-800	MRTW	DFW Payload	RSW Payload
RWY 02	143000	24920 (112)	28624 (129)
RWY 20	145800	27422 (124)	31122 (140)

5600 Feet

B737-700	MRTW	DFW Payload	RSW Payload
RWY 02	133500	25889 (117)	28998 (131)
RWY 20	137200	29198 (132)	32449 (147)

6635 Feet

B737-800	MRTW	DFW Payload	RSW Payload
RWY 02	151700	31440 (142)	35344 (159)
RWY 20	155100	34544 (156)	38444 (173)

6635 Feet

B737-700	MRTW	DFW Payload	RSW Payload
RWY 02	138400	29651 (129)	MAX
RWY 20	142800	MAX	MAX

7000 Feet

B737-800	MRTW	DFW Payload	RSW Payload
RWY 02	163000	MAX	MAX
RWY 20	165000	MAX	MAX

7000 Feet

B737-700	MRTW	DFW Payload	RSW Payload
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

7500 Feet

B737-800	MRTW	DFW Payload	RSW Payload
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

7500 Feet

B737-700	MRTW	DFW Payload	RSW Payload
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

8000 Feet

B737-800	MRTW	DFW Payload	RSW Payload
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

8000 Feet

B737-700	MRTW	DFW Payload	RSW Payload
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

Note: Maximum seating configurations for the B737-800 is 189 and for the B737-700 it is 147. The MTOW for the B737-800 is 174,200 and for the B737-700 it is 154,500. In the payload columns Pounds is represented by the first number and passenger numbers are followed in ().

Anytime the aircraft performance reaches a certificated limit, MAX was inserted in the table. All calculations equate one passenger to one bag.

Landing

5600 Feet

B737-800	MLDW WET	Payload	Count
RWY 02	130900	31450	142
RWY 20	119400	19969	90

5600 Feet

B737-700	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	125600	MAX	MAX

6635 Feet

B737-800	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

6635 Feet

B737-700	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

7000 Feet

B737-800	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	135000	35569	MAX

7000 Feet

B737-700	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

7500 Feet

B737-800	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

7500 Feet

B737-700	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

8000 Feet

B737-800	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

8000 Feet

B737-700	MLDW WET	Payload	Count
RWY 02	MAX	MAX	MAX
RWY 20	MAX	MAX	MAX

Note: Maximum landing weight for the B737-800 is 146,300 and for the B737-700 it is 128,000.

Anytime the aircraft performance reaches a certificated limit, MAX was inserted in the table.

Reduced Thrust Departures

Avelo has reviewed the McFarland and Johnson reduced thrust profiles and agrees with the following:

1. Avelo will operate the B737-700 with a 5% reduced thrust for our 22K engines.
2. Avelo will operate the B737-700 with a 15% reduced thrust for all runway extensions.
3. Avelo intends to utilize reduced thrust for all B737-800 departures.

These calculations are used for all departures, calculated at 86F.

In closing, as previously stated Avelo intends to grow our fleet in HVN and the runway extension will allow Avelo to grow the market and maintain FAA Safety Standards.

If any other information is needed, please feel free to ask.

Sincerely,



Andrew Lotter
VP Flight Operations
Avelo Airlines

ATTACHMENT 2

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 11/03/21

						1100	1355	MCO	301	737	3
302	737	3	MCO	1435	1715						

SCHEDULE FOR 11/04/21

						730	1025	MCO	301	737	X23
302	737	X23	MCO	1105	1345						

SCHEDULE FOR 11/05/21

						730	1025	MCO	301	737	X23
						900	1210	FLL	323	737	X23
302	737	X23	MCO	1105	1345						
324	737	X23	FLL	1250	1540						

SCHEDULE FOR 11/06/21

						730	1025	MCO	301	737	X23
						900	1210	FLL	323	737	X23
302	737	X23	MCO	1105	1345						
324	737	X23	FLL	1250	1540						

SCHEDULE FOR 11/07/21

						730	1025	MCO	301	737	X23
						900	1210	FLL	323	737	X23
302	737	X23	MCO	1105	1345						
324	737	X23	FLL	1250	1540						

SCHEDULE FOR 11/08/21

						730	1025	MCO	301	737	X23	
						900	1210	FLL	323	737	X23	
302	737	X23	MCO	1105	1345	0:45	1430	1735	TPA	369	737	156
324	737	X23	FLL	1250	1540							
370	737	156	TPA	1815	2100							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----

<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>	<u>FRM</u>	<u>DPT</u>	<u>ARR</u>	<u>DPT</u>	<u>ARR</u>	<u>TO</u>	<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>
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*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 01/13/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

SCHEDULE FOR 01/14/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

SCHEDULE FOR 01/15/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

SCHEDULE FOR 01/16/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----

<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>	<u>FRM</u>	<u>DPT</u>	<u>ARR</u>	<u>DPT</u>	<u>ARR</u>	<u>TO</u>	<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>
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*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 01/17/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

SCHEDULE FOR 01/18/22

								700 955	MCO	301	737	23
302	737	23	MCO	1035	1315	0:45	1400	1710	NEW1	315	737	2
316	737	2	NEW1	1750	2040							

SCHEDULE FOR 01/19/22

								700 955	MCO	301	737	23
302	737	23	MCO	1035	1315	0:45	1400	1705	TPA	369	737	3
370	737	3	TPA	1745	2030							

SCHEDULE FOR 01/20/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

SCHEDULE FOR 01/21/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----

<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>	<u>FRM</u>	<u>DPT</u>	<u>ARR</u>	<u>DPT</u>	<u>ARR</u>	<u>TO</u>	<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>
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*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 01/27/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

SCHEDULE FOR 01/28/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

SCHEDULE FOR 01/29/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1900	TPA	369	737	156
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
370	737	156	TPA	1940	2225							

SCHEDULE FOR 01/30/22

								700 1010	PBI	345	737	X23
								830 1140	FLL	323	737	X23
								1000 1255	MCO	301	737	X23
346	737	X23	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X23
324	737	X23	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X23	MCO	1335	1615							
358	737	X23	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----

<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>	<u>FRM</u>	<u>DPT</u>	<u>ARR</u>	<u>DPT</u>	<u>ARR</u>	<u>TO</u>	<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>
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*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 02/18/22

								700 1010	PBI	345	737	X3
								830 1140	FLL	323	737	X2
								1000 1255	MCO	301	737	X2
346	737	X3	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X3
324	737	X2	FLL	1220	1510	0:45	1555	1900	TPA	369	737	1356
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
370	737	1356	TPA	1940	2225							

SCHEDULE FOR 02/19/22

								700 1010	PBI	345	737	X3
								830 1140	FLL	323	737	X2
								1000 1255	MCO	301	737	X2
346	737	X3	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X3
324	737	X2	FLL	1220	1510	0:45	1555	1900	TPA	369	737	1356
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
370	737	1356	TPA	1940	2225							

SCHEDULE FOR 02/20/22

								700 1010	PBI	345	737	X3
								830 1140	FLL	323	737	X2
								1000 1255	MCO	301	737	X2
346	737	X3	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X3
324	737	X2	FLL	1220	1510	0:45	1555	1905	NEW1	315	737	47
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

SCHEDULE FOR 02/21/22

								700 1010	PBI	345	737	X3
								830 1140	FLL	323	737	X2
								1000 1255	MCO	301	737	X2
346	737	X3	PBI	1050	1340	0:45	1425	1745	RSW	357	737	X3
324	737	X2	FLL	1220	1510	0:45	1555	1900	TPA	369	737	1356
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
370	737	1356	TPA	1940	2225							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 02/22/22

								700 1010	PBI		345 737	X3
346	737	X3	PBI	1050	1340	0:45	1425 1745	RSW			357 737	X3
358	737	X3	RSW	1825	2120							

SCHEDULE FOR 02/23/22

								830 1140	FLL		323 737	X2
								1000 1255	MCO		301 737	X2
324	737	X2	FLL	1220	1510	0:45	1555 1900	TPA			369 737	1356
302	737	X2	MCO	1335	1615							
370	737	1356	TPA	1940	2225							

SCHEDULE FOR 02/24/22

								700 1010	PBI		345 737	X3
								830 1140	FLL		323 737	X2
								1000 1255	MCO		301 737	X2
346	737	X3	PBI	1050	1340	0:45	1425 1745	RSW			357 737	X3
324	737	X2	FLL	1220	1510	0:45	1555 1905	NEW1			315 737	47
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
316	737	47	NEW1	1945	2235							

SCHEDULE FOR 02/25/22

								700 1010	PBI		345 737	X3
								830 1140	FLL		323 737	X2
								1000 1255	MCO		301 737	X2
346	737	X3	PBI	1050	1340	0:45	1425 1745	RSW			357 737	X3
324	737	X2	FLL	1220	1510	0:45	1555 1900	TPA			369 737	1356
302	737	X2	MCO	1335	1615							
358	737	X3	RSW	1825	2120							
370	737	1356	TPA	1940	2225							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 04/01/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2	1025	0:45	1110		NEW5		383	737	X23
346	737	Daily	PBI	1050	1340	0:45	1425		NEW1	315	737	1457
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
316	737	1457	NEW1		2105							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

SCHEDULE FOR 04/02/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2	1025	0:45	1110		NEW5		383	737	X23
346	737	Daily	PBI	1050	1340	1:05	1445		NEW3	393	737	6
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
394	737	6	NEW3		2100							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----

<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>	<u>FRM</u>	<u>DPT</u>	<u>ARR</u>	<u>DPT</u>	<u>ARR</u>	<u>TO</u>	<u>FLT</u>	<u>EQP</u>	<u>FREQ</u>
------------	------------	-------------	------------	------------	------------	------------	------------	-----------	------------	------------	-------------

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 04/03/22

						600		NEW2	377	737	X23	
						700	1010	PBI	345	737	Daily	
						745	1040	MCO	301	737	Daily	
						830	1140	FLL	323	737	Daily	
378	737	X23	NEW2	1025	0:45	1110		NEW5	383	737	X23	
346	737	Daily	PBI	1050	1340	0:45	1425	NEW1	315	737	1457	
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5	1725	0:45	1810		NEW4	309	737	X23	
316	737	1457	NEW1	2105								
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4	2235								

SCHEDULE FOR 04/04/22

						600		NEW2	377	737	X23	
						700	1010	PBI	345	737	Daily	
						745	1040	MCO	301	737	Daily	
						830	1140	FLL	323	737	Daily	
378	737	X23	NEW2	1025	0:45	1110		NEW5	383	737	X23	
346	737	Daily	PBI	1050	1340	0:45	1425	NEW1	315	737	1457	
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5	1725	0:45	1810		NEW4	309	737	X23	
316	737	1457	NEW1	2105								
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4	2235								

SCHEDULE FOR 04/05/22

						700	1010	PBI	345	737	Daily	
						745	1040	MCO	301	737	Daily	
						830	1140	FLL	323	737	Daily	
346	737	Daily	PBI	1050	1340	0:45	1425	1730	TPA	369	737	23
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510							
370	737	23	TPA	1810	2055							
358	737	Daily	RSW	1850	2145							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 04/11/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2		1025	0:45	1110		NEW5	383	737	X23
346	737	Daily	PBI	1050	1340	0:45	1425		NEW1	315	737	1457
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
316	737	1457	NEW1		2105							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

SCHEDULE FOR 04/12/22

							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
346	737	Daily	PBI	1050	1340	0:45	1425	1730	TPA	369	737	23
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510							
370	737	23	TPA	1810	2055							
358	737	Daily	RSW	1850	2145							

SCHEDULE FOR 04/13/22

							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
346	737	Daily	PBI	1050	1340	0:45	1425	1730	TPA	369	737	23
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510							
370	737	23	TPA	1810	2055							
358	737	Daily	RSW	1850	2145							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 04/14/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2	1025	0:45	1110		NEW5		383	737	X23
346	737	Daily	PBI	1050	1340	0:45	1425		NEW1	315	737	1457
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
316	737	1457	NEW1		2105							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

SCHEDULE FOR 04/15/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2	1025	0:45	1110		NEW5		383	737	X23
346	737	Daily	PBI	1050	1340	0:45	1425		NEW1	315	737	1457
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
316	737	1457	NEW1		2105							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

AVELO AIRLINES
STATION FLIGHT SCHEDULE
11/03/21 - 04/20/22

----- ARRIVALS ----- DEPARTURES -----
FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR 04/18/22

							600	NEW2		377	737	X23
							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
378	737	X23	NEW2		1025	0:45	1110		NEW5	383	737	X23
346	737	Daily	PBI	1050	1340	0:45	1425		NEW1	315	737	1457
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510	0:45	1555	1900	TPA	369	737	X23
384	737	X23	NEW5		1725	0:45	1810		NEW4	309	737	X23
316	737	1457	NEW1		2105							
358	737	Daily	RSW	1850	2145							
370	737	X23	TPA	1940	2225							
310	737	X23	NEW4		2235							

SCHEDULE FOR 04/19/22

							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
346	737	Daily	PBI	1050	1340	0:45	1425	1730	TPA	369	737	23
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510							
370	737	23	TPA	1810	2055							
358	737	Daily	RSW	1850	2145							

SCHEDULE FOR 04/20/22

							700	1010	PBI	345	737	Daily
							745	1040	MCO	301	737	Daily
							830	1140	FLL	323	737	Daily
346	737	Daily	PBI	1050	1340	0:45	1425	1730	TPA	369	737	23
302	737	Daily	MCO	1120	1400	0:45	1445	1805	RSW	357	737	Daily
324	737	Daily	FLL	1220	1510							
370	737	23	TPA	1810	2055							
358	737	Daily	RSW	1850	2145							

AVELO AIRLINES FLIGHT SCHEDULE
04/01/2022-05/04/2022

----- ARRIVALS ----- DEPARTURES -----
 FLT EQP FREQ FRM DPT ARR DPT ARR TO FLT EQP FREQ

*** [HVN] NEW HAVEN, CT ***

SCHEDULE FOR SATURDAY

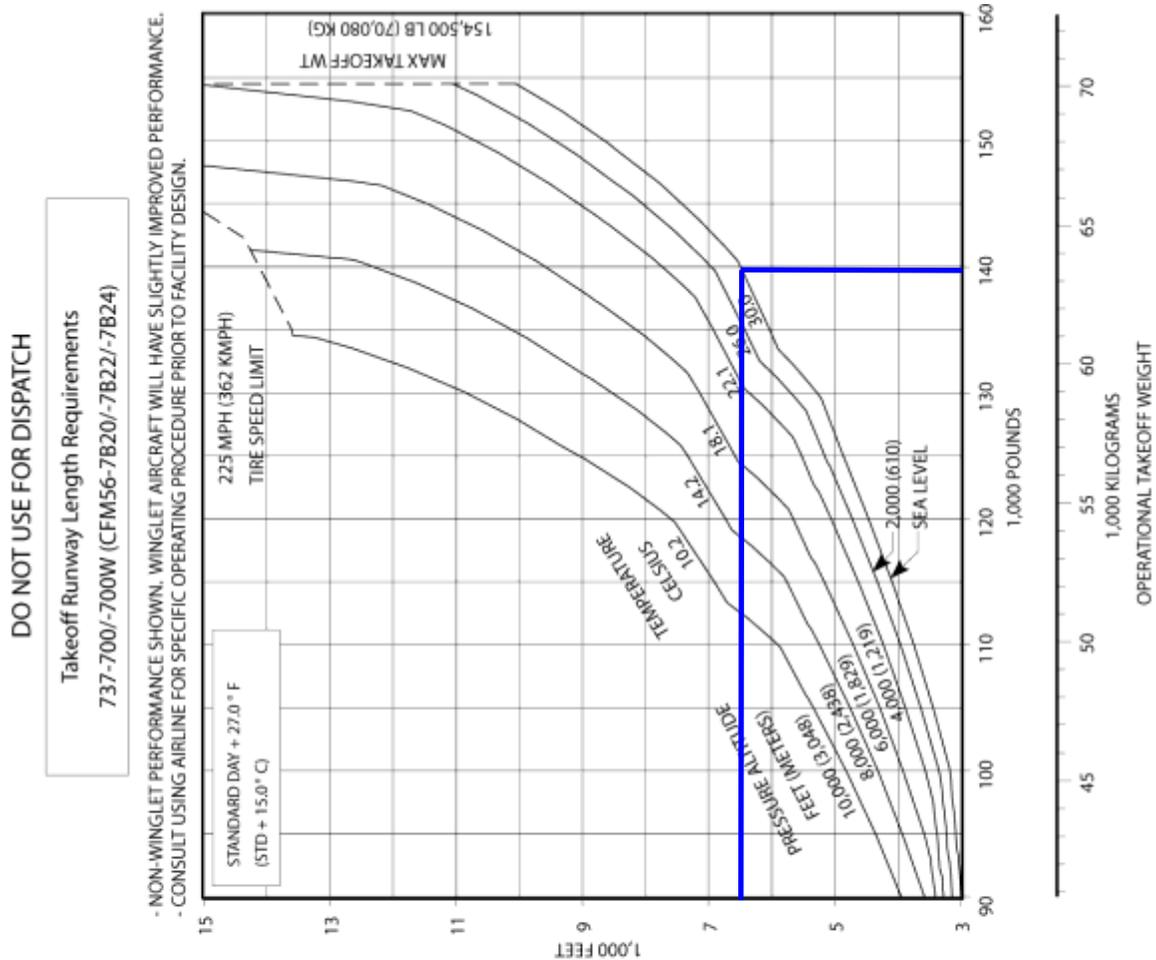
							700 1010 PBI		345 737 X3
							830 1140 FLL		323 737 X2
							1000 1255 MCO		301 737 X2
346	737	X3	PBI	1050 1340	0:45		1425 1745 RSW		357 737 X3
324	737	X2	FLL	1220 1510	0:45		1555 1900 TPA		369 737 1356
302	737	X2	MCO	1335 1615					
358	737	X3	RSW	1825 2120					
370	737	1356	TPA	1940 2225					

SCHEDULE FOR SUNDAY

							700 1010 PBI		345 737 X3
							830 1140 FLL		323 737 X2
							1000 1255 MCO		301 737 X2
346	737	X3	PBI	1050 1340	0:45		1425 1745 RSW		357 737 X3
324	737	X2	FLL	1220 1510	0:45		1555 1905 SRQ		305 737 47
302	737	X2	MCO	1335 1615	0:45		1700 1955 MCO		319 737 57
358	737	X3	RSW	1825 2120					
306	737	47	SRQ	1945 2235					
320	737	57	MCO	2035 2315					

Note: flight 319 HVN-MCO and 320 MCO-HVN operate on Friday April 8, 15, and 22, and on Sunday April 17 and 24 only.

3.3.32 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C), Dry Runway: Model 737-700 (CFM56-7B20/-7B22/-7B24 Engines at 20,000 LB SLST)



DRY RUNWAY
ZERO WIND
ZERO RUNWAY GRADIENT
AIR CONDITIONING OFF
OPTIMUM FLAP SETTING

Runway Slope Adjustment:
 $12.6' - 6.5' = 6.1' \times 10 = 61'$
 $6,500' + 61' = 6,561'$

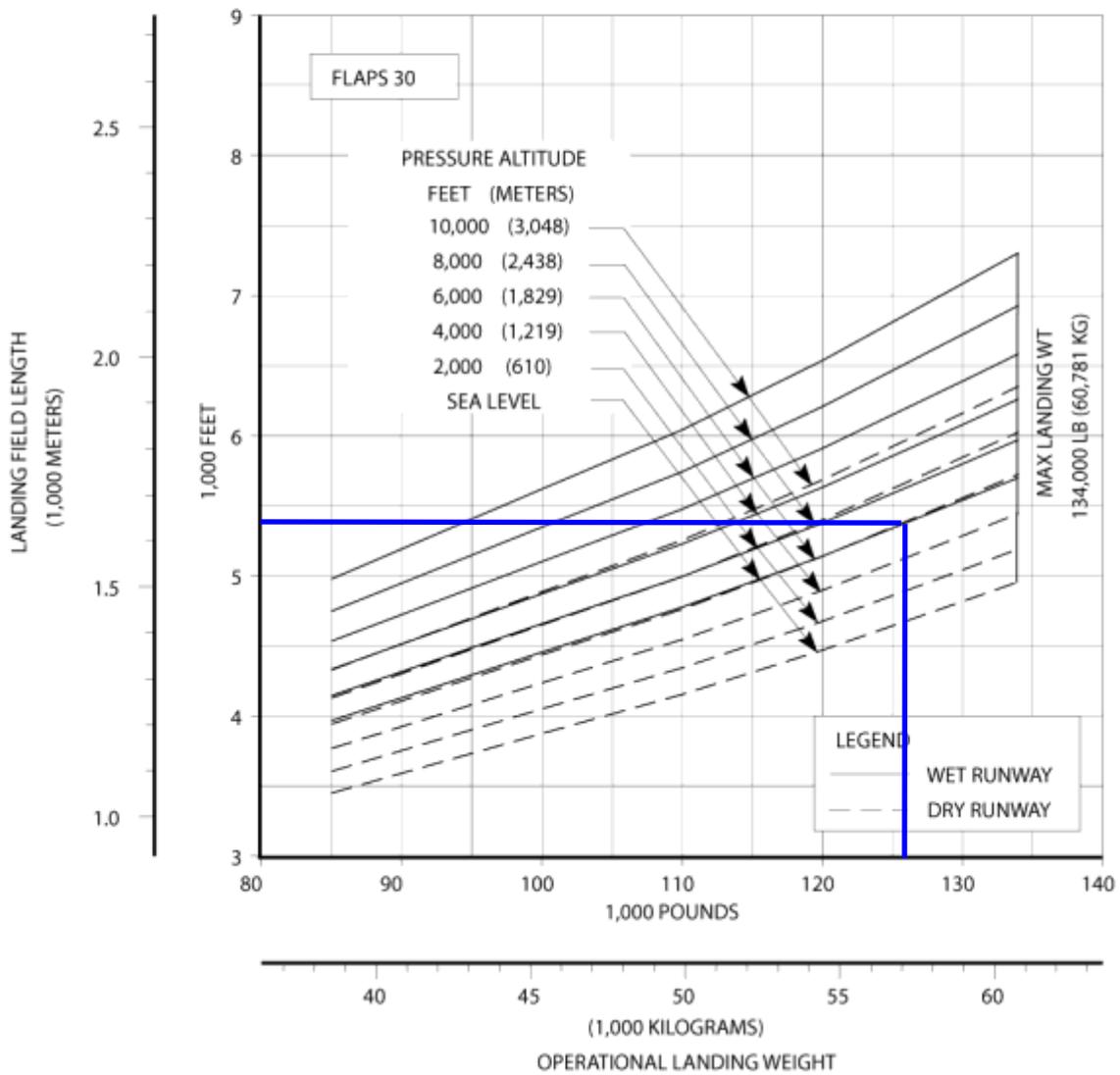
Florida Destinations (maximum payload)

3.4.20 F.A.R. Landing Runway Length Requirements - Flaps 30: Model 737-700ER

DO NOT USE FOR DISPATCH

Landing Field Length
737-700/-700W/-700ER/-700ERW/-700C/-700CW/BBJ1 (CFM56-7B Series)

- STANDARD DAY, ZERO WIND
- AUTO SPOILERS OPERATIVE
- ANTI-SKID OPERATIVE
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

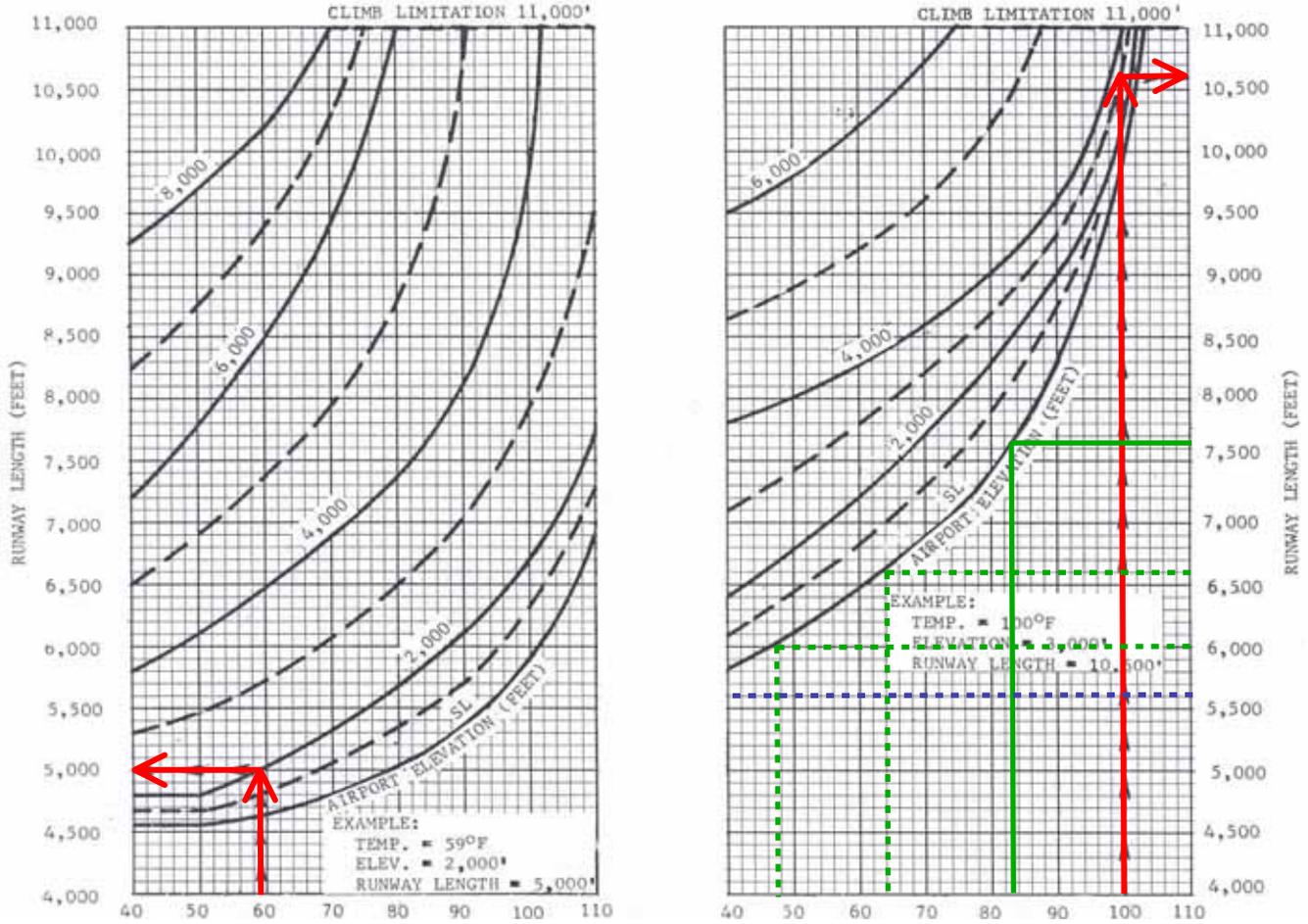


ATTACHMENT 4

7/1/2005

AC 150/5325-4B

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load

100 percent of feet at 90 percent useful load

Takeoff length adjustment for effective runway gradient: 61'
 90 percent useful load: 7,611'

Landing length adjustment for wet and slippery runways: 15% (does not apply for lengths over 7,500')
 90 percent useful load: 7,600'

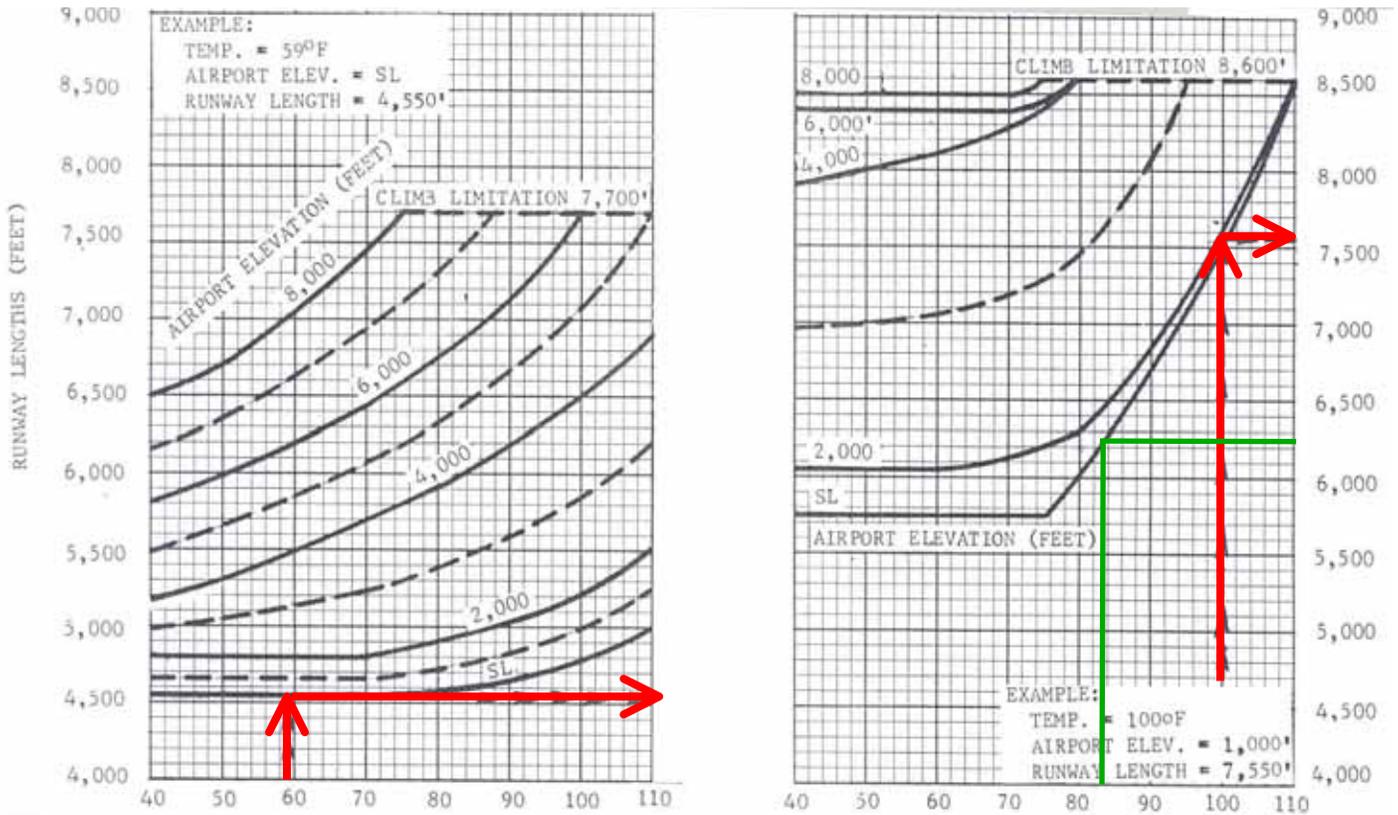
6,600' of takeoff distance would allow no weight penalties on a dry runway at or below temperatures of 64F.

6,000' landing distance would allow no weight penalties on a dry runway at or below temperatures of approximately 48F.

Wet runways would result in a usable runway length of 5,217 feet, which is below the temperature measure of the chart and therefore results in weight penalties on landing.

Existing runway length of 5,600' imposes a weight penalties on all flights.

Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit	
75 percent of feet at 60 percent useful load	75 percent of feet at 90 percent useful load

Takeoff length adjustment for effective runway gradient: 61'
 90 percent useful load: 6,250' + 61' = 6,311'

ATTACHMENT 5

GULFSTREAM AEROSPACE GULFSTREAM GIV OPERATIONAL INFORMATION SUPPLEMENT

ADVISORY DATA ONLY – NOT FAA APPROVED

GIV-OIS-2A

4. Landing Distance Using Twin-Engine Reverse Thrust Only (No Braking)

The following table shows landing distances when using reverse thrust only to bring the aircraft to a stop. The distances shown below assume reverse thrust is used to 20 knots with stowage by 10 knots.

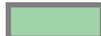
Conditions:

- Two Engine Reverse Thrust Only
- No Slope
- No Wind
- Standard Day Temperature
- AUTO Ground Spoilers
- No RSC Accumulation
- Full Reverse Thrust To 20 Knots
- Stowage By 10 Knots
- Minimal Braking Below 10 Knots
- Flaps 39°

LANDING DISTANCE USING TWIN-ENGINE REVERSE THRUST ONLY

Landing Distance (ft)											
ALT (ft)	GROSS WEIGHT – (lb)										
	74600	73200	70000	66000	65000	60000	58500	55000	50000	45000	40000
15000	15166	14850	14122	13209	12985	11890	11564	10813	9787	8776	7827
14000	14346	14045	13359	12501	12287	11264	10952	10250	9282	8330	7440
12000	12837	12569	11960	11204	11019	10112	9837	9212	8359	7516	6732
10000	11495	11255	10719	10052	9886	9082	8841	8289	7532	6788	6093
8000	10524	10309	9823	9215	9068	8342	8122	7623	6940	6270	5648
6000	9847	9649	9199	8639	8500	7831	7630	7169	6541	5925	5358
4000	9265	9081	8665	8144	8015	7395	7207	6784	6204	5638	5116
2000	8771	8601	8213	7727	7608	7028	6855	6458	5920	5398	4921
0	8320	8161	7795	7343	7230	6692	6530	6160	5657	5178	4744

NOTE: Flight Manual procedures recommend that cancellation of thrust reversers be initiated by 70 knots so as to be completely cancelled by the time normal taxi speed is achieved. If landing runway conditions will result in compromised braking performance, this table may be used to provide additional information for pilot judgement.

-  Route: 1,000 NM (Florida)
-  Route: 2,300 NM (West Coast)
- Interpolation for 57,600 pounds of landing weight: 6,435'
-  Existing Runway 20 landing limitation (LDA = 5,248')
-  6,000' landing distance

REVISION 1

GIV-OIS-2A

**GULFSTREAM AEROSPACE
GULFSTREAM GIV
OPERATIONAL INFORMATION SUPPLEMENT**

ADVISORY DATA ONLY – NOT FAA APPROVED

GIV-OIS-2A

GIV-SP TAKEOFF PLANNING CHART

WET RUNWAY		AIRPORT PRESSURE ALTITUDE = SEA LEVEL						TAKEOFF FLAP 20°				
74,600 LB MTOGW	OAT (°C)	50	45	40	35	30	25	20	15	5	-5	-15
	OAT (°F)	122	113	104	95	86	77	68	59	41	23	5
	RATED EPR	1.59	1.62	1.64	1.67	1.70	1.70	1.70	1.70	1.69	1.69	1.69
-- 74,600 LB --												
V _{FS} = 173 KCAS	FLD LNGTH	*****	*****	*****	6,820	6,400	6,300	6,190	6,090	5,930	5,720	5,510
V _{SE} = 180 KCAS	V ₁ KCAS	*****	*****	*****	133	131	132	132	132	132	133	133
V _{REF} = 158 KCAS	V _R KCAS	*****	*****	*****	146	145	145	145	145	145	145	145
MAX TEMP = 37°C	V ₂ KCAS	*****	*****	*****	150	150	150	150	150	150	150	150
-- 70,000 LB --												
V _{FS} = 167 KCAS	FLD LNGTH	*****	*****	6,410	6,000	5,640	5,550	5,460	5,370	5,230	5,040	4,860
V _{SE} = 174 KCAS	V ₁ KCAS	*****	*****	129	127	125	125	125	125	126	126	126
V _{REF} = 154 KCAS	V _R KCAS	*****	*****	141	140	140	140	140	140	140	140	140
MAX TEMP = 43°C	V ₂ KCAS	*****	*****	145	145	145	145	145	145	145	145	145
-- 65,000 LB --												
V _{FS} = 161 KCAS	FLD LNGTH	*****	5,910	5,530	5,190	4,880	4,800	4,720	4,640	4,520	4,360	4,210
V _{SE} = 168 KCAS	V ₁ KCAS	*****	123	121	119	117	117	118	118	118	118	119
V _{REF} = 148 KCAS	V _R KCAS	*****	136	135	134	134	134	134	134	134	134	134
MAX TEMP = 49°C	V ₂ KCAS	*****	140	140	140	140	140	140	140	140	140	140
-- 60,000 LB --												
V _{FS} = 155 KCAS	FLD LNGTH	5,410	5,090	4,930	4,780	4,650	4,570	4,490	4,410	4,270	4,110	3,960
V _{SE} = 161 KCAS	V ₁ KCAS	118	116	116	117	117	117	117	117	117	117	118
V _{REF} = 142 KCAS	V _R KCAS	130	129	129	128	127	127	127	127	127	127	127
MAX TEMP = 50°C	V ₂ KCAS	135	135	135	135	135	135	135	135	135	135	135
-- 55,000 LB --												
V _{FS} = 148 KCAS	FLD LNGTH	5,030	4,870	4,720	4,580	4,460	4,380	4,310	4,240	4,090	3,940	3,800
V _{SE} = 154 KCAS	V ₁ KCAS	116	116	117	117	118	118	118	118	118	118	118
V _{REF} = 136 KCAS	V _R KCAS	126	125	124	124	123	123	123	123	123	123	123
MAX TEMP = 50°C	V ₂ KCAS	131	131	131	131	131	131	131	131	131	131	131
-- 50,000 LB --												
V _{FS} = 142 KCAS	FLD LNGTH	4,780	4,640	4,500	4,380	4,270	4,190	4,120	4,050	3,910	3,770	3,630
V _{SE} = 147 KCAS	V ₁ KCAS	117	117	117	118	118	118	118	118	119	119	119
V _{REF} = 130 KCAS	V _R KCAS	125	124	123	122	122	122	122	122	122	122	122
MAX TEMP = 50°C	V ₂ KCAS	131	131	131	131	131	131	131	131	131	131	131
-- 45,000 LB --												
V _{FS} = 134 KCAS	FLD LNGTH	4,550	4,420	4,300	4,190	4,080	4,020	3,950	3,880	3,750	3,610	3,480
V _{SE} = 139 KCAS	V ₁ KCAS	117	118	118	119	119	119	119	119	119	120	120
V _{REF} = 123 KCAS	V _R KCAS	124	123	122	121	121	121	121	121	121	121	121
MAX TEMP = 50°C	V ₂ KCAS	131	131	131	131	131	131	131	131	131	131	131

- NOTES:** 1. INCREASE AVAILABLE FIELD LENGTH 2% FOR EACH 5 KNOTS HEADWIND (UP TO 40 KNOTS).
2. DECREASE AVAILABLE FIELD LENGTH 18% FOR EACH 1% OF UPHILL SLOPE (UP TO 2%).

Interpolation for 83F: 6,367'

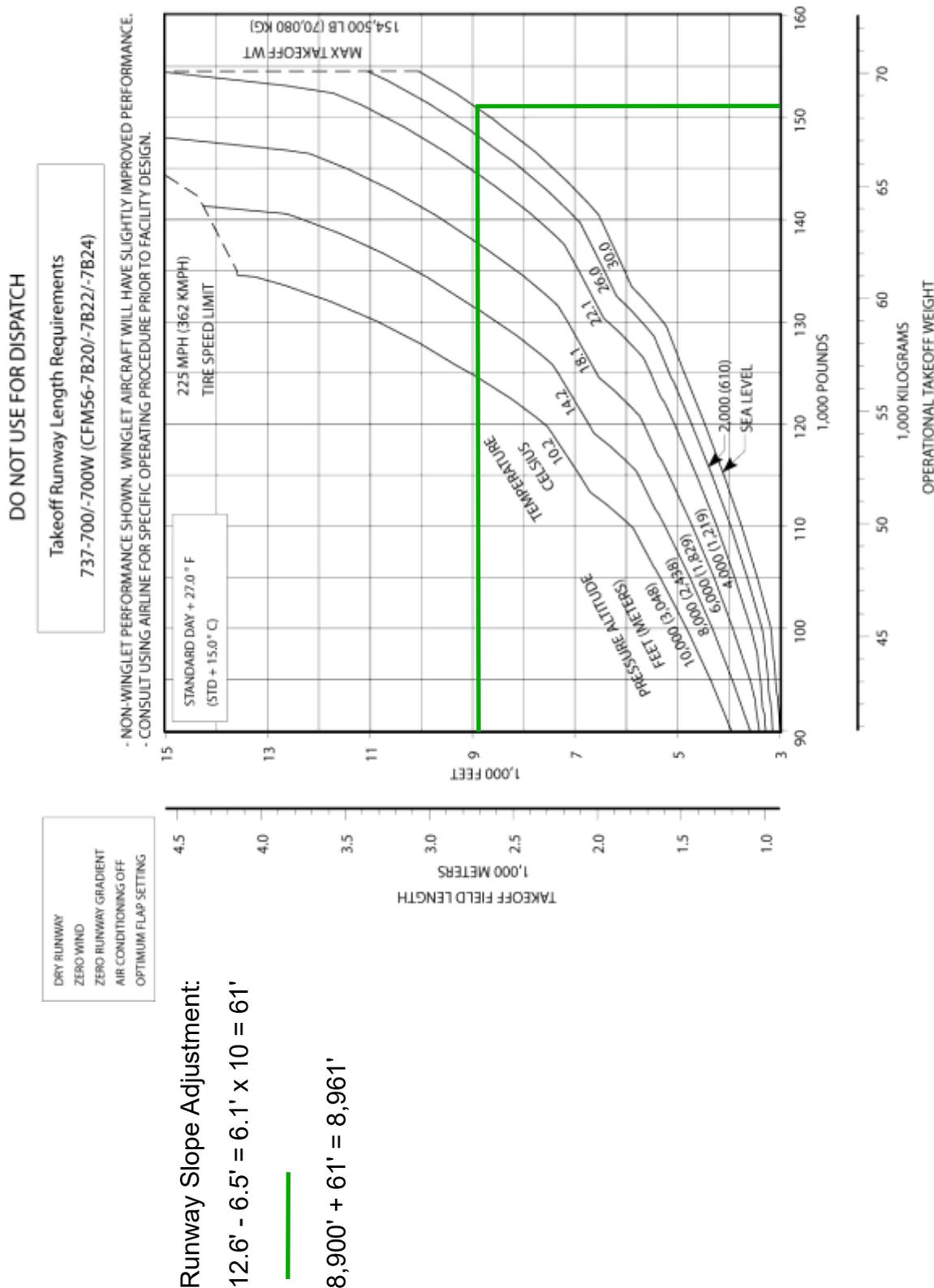
Existing 5,600' takeoff distance

6,600' takeoff distance

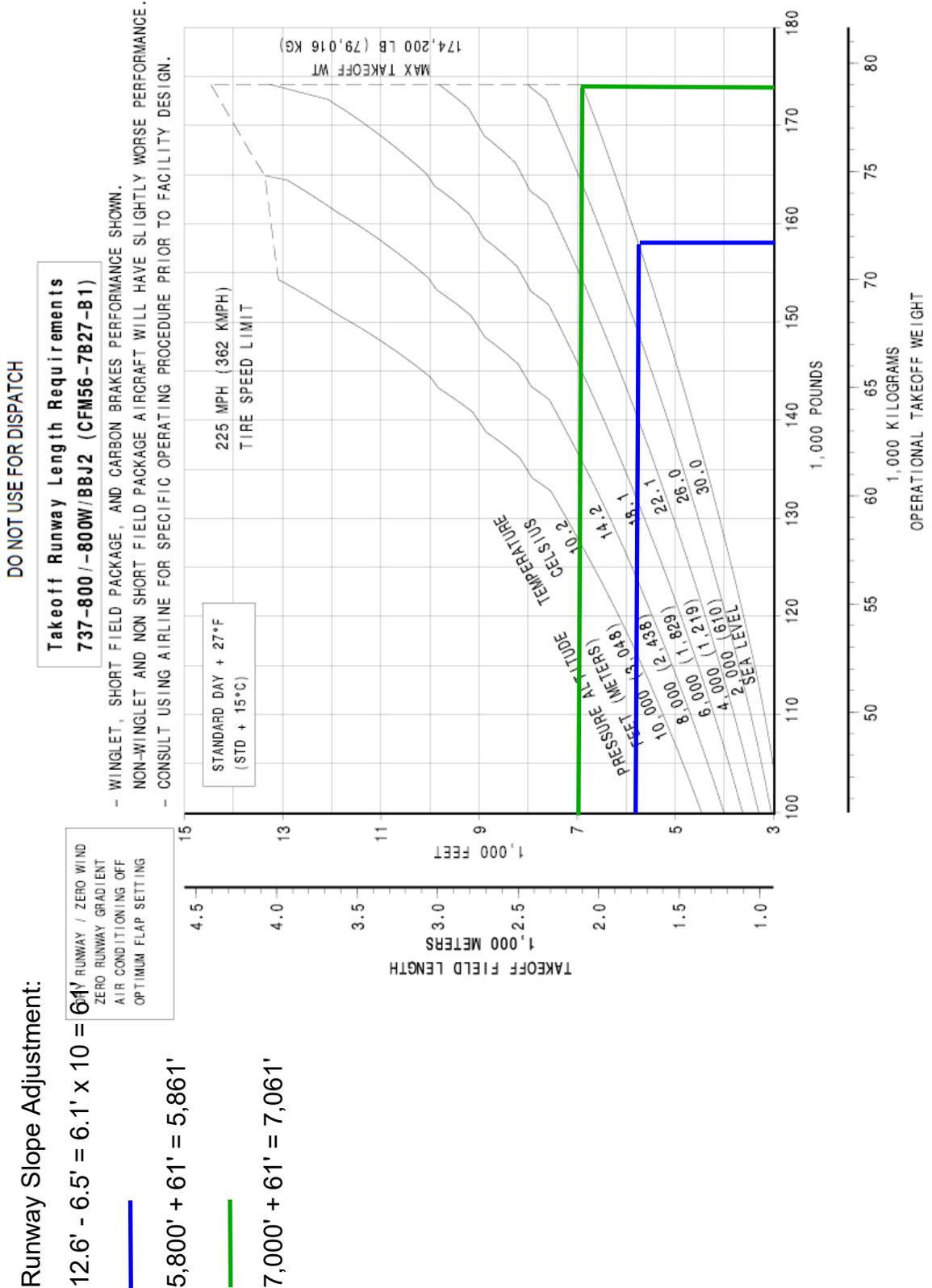
REVISION 1

GIV-OIS-2A

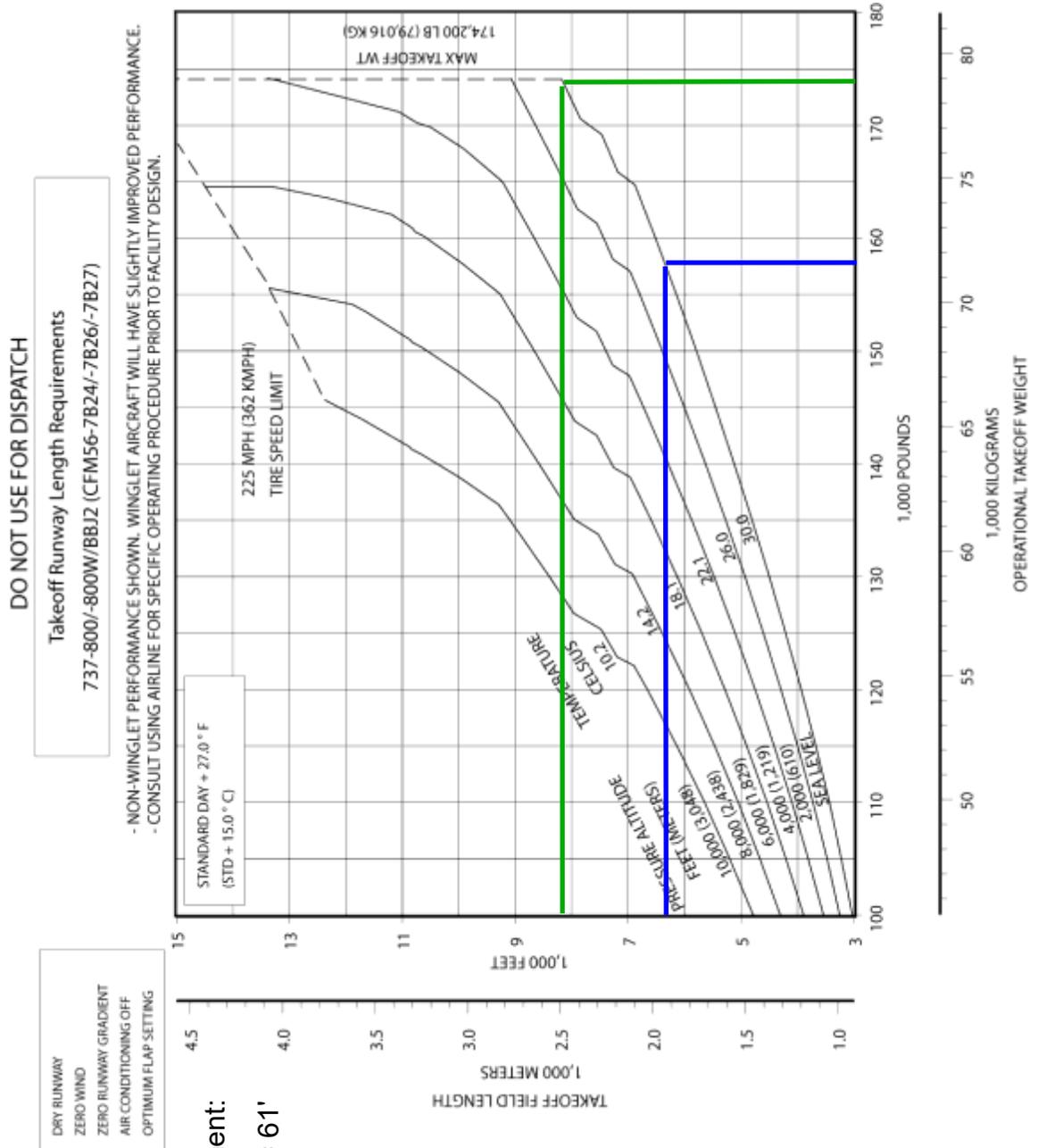
3.3.32 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C), Dry Runway: Model 737-700 (CFM56-7B20/-7B22/-7B24 Engines at 20,000 LB SLST)



3.3.48 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C), Dry Runway: Model 737-800/-800W/BBJ2 (CFM56-7B27-B1 Engine at 26,000 LB SLST)

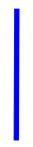


3.3.52 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C), Dry Runway: Model 737-800 / -800W / BBJ2 (CFM56-7B24/-7B26/-7B27 Engines at 26,000 LB SLST)



Runway Slope Adjustment:

$12.6' - 6.5' = 6.1' \times 10 = 61'$



$6,300' + 61' = 6,361'$

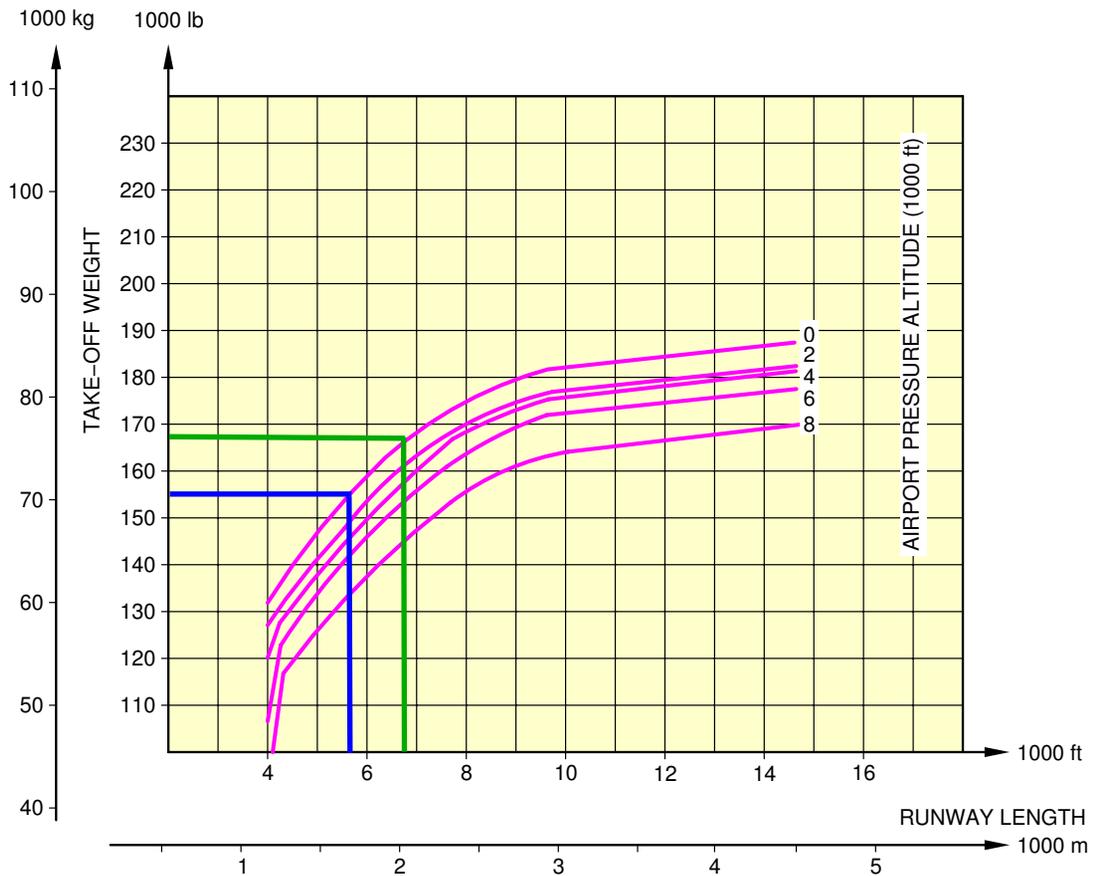


$8,100' + 61' = 8,161'$

- 1,000 NM Destinations
- 2,200 NM Destinations/MTOW

****ON A/C A320-200**

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING
MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.



Runway Length Slope Adjustment:

$$12.6' - 6.5' = 6.1' \times 10 = 61'$$

—

$$5,700' + 61' = 5,761'$$

—

$$6,800' + 61' = 6,861'$$

N_AC_030302_1_0050101_01_01

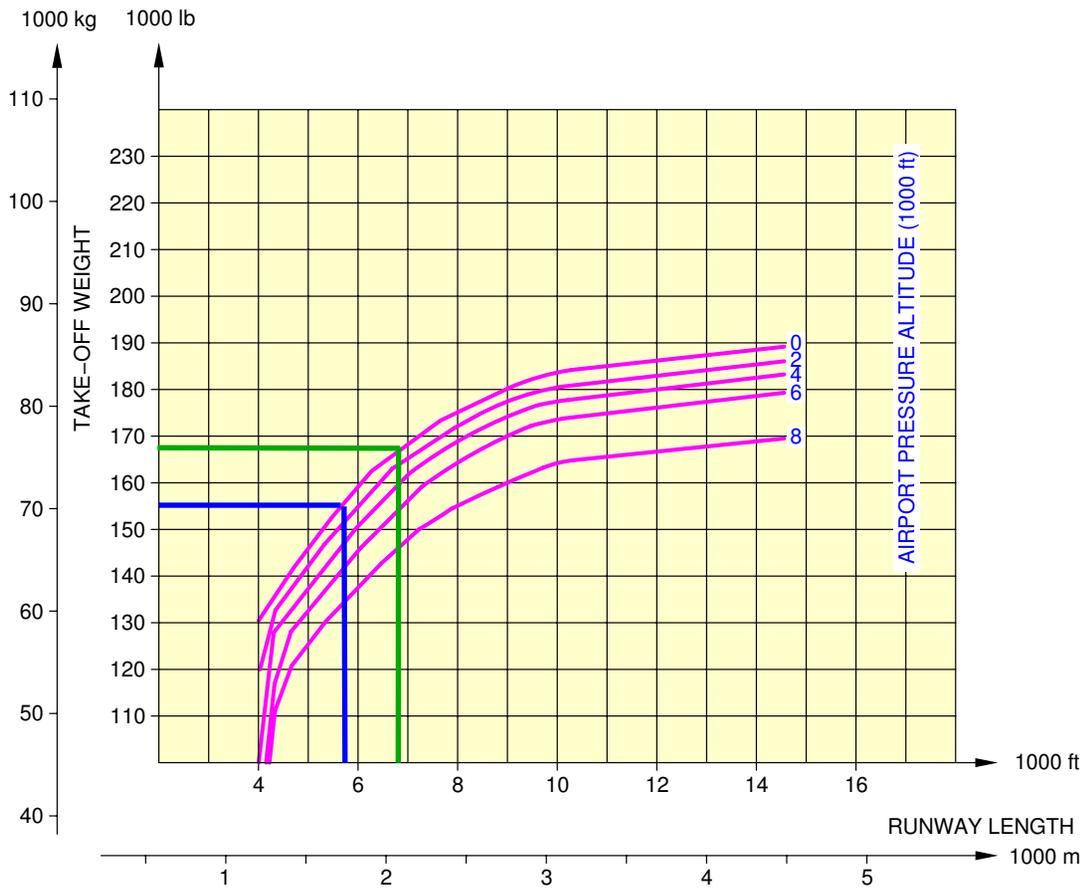
Take-Off Weight Limitation - ISA +15° C (+27° F) Conditions
CFM56 Series Engine
FIGURE-3-3-2-991-005-A01

— 1,000 NM Destinations

— 2,200 NM Destinations

****ON A/C A320-200**

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING
MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.



Runway Length Slope Adjustment:

$$12.6' - 6.5' = 6.1' \times 10 = 61'$$

$$5,700' + 61' = 5,761'$$

$$6,800' + 61' = 6,861'$$

N_AC_030302_1_0060101_01_00

Take-Off Weight Limitation - ISA +15° C (+27° F) Conditions
IAE V2500 Series Engine
FIGURE-3-3-2-991-006-A01

— 1,000 NM Destinations

— 2,200 NM Destinations

ATTACHMENT 7



McFarland Johnson

Innovative Solutions / Sustainable Results

239 Littleton Road, Suite 1A • Westford, MA 01886

Phone: (978) 692-0522 • Fax: (978) 392-5806

www.mjinc.com

TECHNICAL MEMORANDUM

To: Lisa Lesperance
Richard Doucette
Federal Aviation Administration (FAA)

From: Laura Canham
David Rosa
Jeff Wood

Date: December 10, 2021

Subject: Tweed-New Haven Airport Runway 2-20 Length Eligibility (Existing)

Reference: Project Number 18839.00

The intent of this memorandum is to document the existing Tweed-New Haven Airport (HVN) Runway 2-20 length need justification and eligibility for more than **6,635 feet of total runway length** based on FAA guidance as documented in:

- FAA Order 5100.38D, Change 1, *Airport Improvement Program Handbook*, February 26, 2019
- FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, June 20, 2017
- FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, July 1, 2005
- FAA AC 150/5300-13A, Change 1, *Airport Design*, September 28, 2012

This memorandum includes the following sections:

Executive Summary

1. Runway 2-20 Existing Runway Length Critical Aircraft Determination
2. Runway 2-20 Existing Runway Length Justification
3. Future Transportation
4. AIP Project Eligibility and Justification
5. Summary

Executive Summary

Tweed-New Haven Airport currently has commercial operations by Avelo Airlines' B737-700W (B737W) to five (5) Florida destinations (>1,300 annual operations) and general aviation operations with both aircraft between 12,500 and 60,000 pounds (>500 annual operations) and exceeding 60,000 pounds (>400 annual operations) maximum takeoff weight to destinations as far as the West Coast. All of these aircraft operate under weight penalties on their existing routes. Additionally, the B737W is required to take off using a higher thrust setting due to the short runway than it would with a longer runway, which increases the noise exposure to the local community.

Avelo Airlines is only leasing the B737W as a temporary "band-aid" fix for service at HVN as the B737-800W (B738W), that makes up the rest of its fleet, cannot yet operate at HVN due to the limited runway length.

Based on both the FAA's standard runway length review as well as Avelo Airlines' review of runway length need, it was determined that a minimum 6,635 feet of runway length is needed both for commercial and general aviation operations both for the existing operations as well as the anticipated short-term fleet mix changes and new destinations. Additionally, the longer runway would allow the B737W to operate at a lower thrust setting (meeting its policy to use the lowest safe settings) reducing the noise to the local community.

1. Runway 2-20 Existing Runway Length Critical Aircraft Determination

According to AIP Handbook paragraph 3-11, “more than one critical aircraft may control the design of any specific airport’s different facility features, such as runway length”. Therefore, different groupings of aircraft were reviewed for runway length purposes.

Commercial Runway Length Critical Aircraft

HVN currently maintains one runway, Runway 2-20, which serves all fixed wing aircraft at the Airport, including scheduled air carrier operations by Avelo Airlines. Avelo Airlines flies its B737W to five destinations in Florida by end of December 2021:

- Fort Lauderdale/Hollywood International Airport (FLL)
- Southwest Florida International Airport (RSW)
- Orlando International Airport (MCO)
- Tampa International Airport (TPA)
- Palm Beach International Airport (PBI)

The B737W was specifically leased for HVN due to the runway length restriction. The intent is to deploy the B737W to longer range missions (e.g. West Coast) where the B738W operations are not economically feasible due to the runway length at HVN. In the short-term, even the B737W aircraft has operational limitations as documented in **Attachment 1**.

Table 1 shows daily departures of Avelo by destination and day of the week based on its Dec. 3, 2021 schedule. Interpolating those weekly departures into annual operations, the B737W far exceeds the 500 annual operations threshold to meet the critical aircraft designation.

Table 1: Daily Departures by Destination of Avelo Airlines at HVN, Week of Dec. 3, 2021

Destination	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Total
FLL (980.1 NM)	1	0	0	1	1	1	1	5
RSW (986.5 NM)	0	0	0	1	0	0	1	2
MCO (873.6 NM)	1	0	0	1	0	0	1	3
TPA (927.3 NM)	1	0	0	0	1	1	0	3
Total Weekly Departures								13
Total Weekly Operations								26
Total Annual Operations								1,352

Source: Avelo Airlines booking site accessed November 10, 2021.

In 2021, total operations of C-III and larger aircraft include those shown in **Table 2**. This table does not include C-III and larger general aviation/business jet aircraft (operations shown in **Tables 3 and 4**) and Traffic Flow Management System Count (TFMSC) operations are only captured through September 30, 2021. Actual numbers are expected to be higher.

Table 2: 2021 C-III and Larger Operations

Aircraft	2021 Annual Operations
Airbus A320 Series	1 ¹
Boeing 737-700	6 ¹
Boeing 757-200 (Air Force 2)	2 ¹
Embraer 175	422 ¹
Boeing 737-700 (estimated Nov. 1 – Dec. 31)	234 ²
Total	665

Sources: (1) FAA TFMSC Jan. 1 – Sep. 30, 2021, (2) Avelo Airlines and McFarland Johnson analysis.

Since American Airlines is no longer flying their Embraer 175s, Avelo’s B737W is the new critical aircraft. It is anticipated that 2022 operations will exceed the **Table 1** annual operations as Avelo has already

announced three additional destinations that will be added by January 2022 and expects to reach nine peak day flights by the second quarter of 2022. Additionally, Avelo Airlines plans to expand its HVN schedule rapidly to approximately 9-12 daily departures of B737W and Boeing 738W aircraft as shown in **Attachment 2**.

General Aviation Runway Length Critical Aircraft

For runway length purposes, large general aviation aircraft are split into two categories:

1. Aircraft with a maximum takeoff weight (MTOW) of greater than 12,500 pounds but less than 60,000 pounds.
2. Aircraft with a MTOW greater than 60,000 pounds.

This section reviews critical aircraft and annual operations for each of these two categories.

General Aviation Aircraft Between 12,500 and 60,000 Pounds MTOW

According to FAA's TFMSC, **Table 3** shows 2019 and 2020 operations of a select group of aircraft weighting 12,500 pounds to 60,000 pounds that make up 100 percent of the fleet per FAA AC 150/5325-4B, Table 3-2. This group of aircraft exceeds 500 annual operations at HVN.

Table 3: Annual Operations by Aircraft That Make up 100 Percent of Fleet of 12,500-60,000 Pounds MTOW

Aircraft	2020 Annual Operations ¹	2019 Annual Operations ¹	Sample Destinations ²
Bombardier Challenger 600/601/504	50	91	Raleigh-Durham
Cessna S550 Citation S/II	71	62	Unknown
Cessna 650 Citation III/IV	10	12	Hanscom
Cessna 750 Citation X	84	126	Napa County Salt Lake City
Dassault Falcon 900	40	51	Unknown
Dassault Falcon 2000	26	69	Unknown
IAI Astra 1125	2	8	Unknown
IAI Galaxy 1126	29	36	Unknown
Learjet 45 XR	-	-	Boca Raton
Learjet 55/55B/55C	14	2	Unknown
Learjet 60	62	68	Unknown
Hawker 800/800XP	123	113	Naples Municipal Treasure Coast International
Hawker 1000	8	11	Unknown
Total	519	649	

Sources: (1) FAA TFMSC 2019-2020, (2) Flight Aware schedule two weeks prior to November 15, 2021.

The Hawker 800 is the representative aircraft for the general aviation grouping of aircraft with MTOW greater than 12,500 pounds but less than 60,000 pounds. Based on a snapshot review of destinations for early November 2021, destinations range from Napa County Airport (2,256 NM), Salt Lake City International Airport (1,755 NM), Naples Municipal Airport (1,008 NM), Boca Raton (962 NM), and Treasure Coast International Airport (904 NM).

General Aviation Aircraft with MTOW Greater than 60,000 Pounds

According to the FAA's TFMSC, there is a history of large general aviation aircraft (MTOW greater than 60,000 pounds) that approaches 500 annual operations, depending on the year. These aircraft are identified in **Table 4**.

Table 4: Average Annual Operations by Large General Aviation Aircraft

Aircraft	Average Annual Operations (2017 – 2019)	Sample Destinations (early Nov. 2021)
Gulfstream IV/G400	164	San Jose International
Gulfstream V/G500	133	Palm Beach International
Global Express	63	Bermuda
Global 5000	20	Unknown
Gulfstream 6/G650	30	Unknown
Total	411	

Sources: FAA TFMSC and FlightAware (accessed Nov. 11, 2021).

The Gulfstream IV/G400 (GIV) is the representative aircraft for the general aviation grouping of aircraft with MTOW greater than 60,000 pounds. Based on a snapshot review of destinations for early November 2021, destinations range from San Jose International Airport (2,300 NM), Palm Beach International (950 NM), and Bermuda (760 NM).

Results:

- Existing commercial critical aircraft: **Boeing 737-700W**
- Existing general aviation representative critical aircraft: **Hawker 800**

2. Runway 2-20 Existing Runway Length Justification

This section identifies the existing runway length needs for the three largest groups of aircraft using HVN.

Commercial Critical Aircraft Runway Length Need

FAA AC 150/5325-4B, Chapter 4, determines that regional jets and those airplanes with a MTOW of more than 60,000 pounds, runway length needs are “based on using the performance charts published by the airplane manufacturers.” The B737W MTOW exceeds 60,000¹ pounds, as depicted in **Table 5**.

Table 5: General Characteristics: Model 737-700 with Winglets

Characteristics	Units	Model 737-700W
Max Design (Taxi Weight)	Pounds	153,500
Max Design (Takeoff Weight)	Pounds	153,000

Source: Boeing Commercial Airplanes 737 Airplane Characteristics for Airport Planning, Revision B dated September 2021, document number D6-58325-6.

The following assumptions were used in this runway length analysis:

- Boeing 737-700W, CFM56-7B22 engines
- Maximum payload (no weight penalties)
- Range: approximately 1,000 nautical miles (HVN-RSW is 986.5 NM)
- Fuel burn: 91.4 pounds per seat per 1,000 nautical miles²
- Fuel buffer: Per 14 CFR § 91.167 protect for flight to an alternate airport (100 NM) and “after that for 45 minutes at normal cruising speed”
- Mean daily maximum temperature of the hottest month: 83°F³ (ISA + 27°F)
- Runway elevation: 12.6 feet mean sea level

¹ Boeing Commercial Airplanes 737 Airplane Characteristics for Airport Planning, Revision B dated September 2021. Document number D6-58325-6.

² Boeing Commercial Airplanes
<https://web.archive.org/web/20140725005129/http://www.boeing.com/assets/pdf/commercial/startup/pdf/737ng_perf.pdf> accessed November 11, 2021.

³ NOAA National Weather Service Forecast Office,
<<https://w2.weather.gov/climate/xmacis.php?wfo=okx>>, accessed Jan. 23, 2020.

- Takeoff distances were adjusted based on the runway slope adjustment of 10 feet per one foot of difference in existing runway elevation
- Landing distances were adjusted based on the minimum 15 percent increase during wet/contaminated conditions

This results for the estimated range of weights to plan for are detailed in **Table 6**.

Table 6: Estimated Range of B737W Weights

Weights in pounds	B737W Max. Payload
Operating Empty Weight	83,000
Passengers and Carry-On Checked Baggage	37,500
Fuel Burn and Buffer	19,127
Takeoff Weight	139,627
Landing Weight	126,100

Sources: B737W Airport Planning Manual, Boeing Technical Data (2006), and McFarland Johnson analysis.

This analysis does not include:

- Additional runway length needed due to using reduced thrust settings to reduce noise exposure to the local community. **Attachment 1** shows the impact the different thrust settings make on aircraft weight limitations.
- Takeoff and landing performance assessment (TALPA) adjustments during contaminated runway conditions (FAA Order 8900.1, Volume 4, Chapter 3).
- Hotter than average day of the hottest month temperatures.
- Wind of any kind.
- Factored landing distance that accounts for an airplane to land and stop within 60-80 percent of the available runway when the runway is dry (FAA AC 91-79A/14 CFR § 135.385 and §135.387).

Attachment 3 shows the B737W charts. Based on these takeoff and landing weights, it was determined that the B737W requires approximately 6,600 feet of runway length to eliminate weight penalties for its existing routes to Florida. This is in line with Avelo Airlines' internal review of runway length requirements, which shows that the B737W needs 6,635 feet to operate weight penalty free on its existing routes to Florida as shown in **Attachment 1**.

Result: B737W needs 6,635 feet of runway length to operate weight penalty free on its existing routes to Florida using standard thrust without any TALPA additional runway length needs.

General Aviation Critical Aircraft Runway Length Need

General Aviation Aircraft Between 12,500 and 60,000 Pounds MTOW

HVN has over 500 annual operations of general aviation aircraft between 12,500 pounds and 60,000 pounds MTOW at 100 percent of the fleet (according to FAA's definition as shown in AC 150/5325-4B Table 3-2). Based on FAA AC 5325-4B, Figure 3-2 was used to identify the runway length requirement. The sampling of destinations from Flight Aware for the two weeks prior to November 15, 2021 showed that most destinations were in the 1,000 to 2,300 NM range. A planning-level review of the Cessna Citation X and Hawker 800 aircraft was done to understand if the 60 percent or 90 percent useful load chart applies to this group of aircraft. **Table 7** compares a planning-level estimated range at maximum payload to actual flight ranges these aircraft fly. The results show that at maximum payload, the Hawker 800 is close to the estimated range and the Cessna Citation X actual flight distance exceeds the range. This shows that both aircraft have to take a weight penalty at 100 percent useful load to fly to their current destinations and the higher 90 percent useful load chart should be applied.

Table 7: Estimated Maximum Payload Range to Actual Flight Range

Aircraft	Estimated Max. Payload Range (NM)	Actual Flight Ranges (NM)	Percent Useful Load Applied
Cessna Citation X	1,500	1,755 – 2,256	90 Percent
Hawker 800	1,000	904 – 1,008	90 Percent

Sources: Cessna, Bae Hawker, and McFarland Johnson analysis.

Attachment 4 shows the AC's chart and applicable runway length adjustment calculations that show a required length of 7,600 feet and that existing operations incur a weight penalty. An increase in the runway length would provide additional flexibility for these aircraft to carry more fuel to reach further destinations and/or added payload in forms or passengers/luggage.

Results:

- **12,500-60,000 MTOW existing takeoff runway length need: approximately 7,600'**
- **A runway extension would provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken**

General Aviation Aircraft with MTOW Greater than 60,000 Pounds

FAA AC 150/5325-4B, Chapter 4, determines that regional jets and those airplanes with a MTOW of more than 60,000 pounds runway length needs are "based on using the performance charts published by the airplane manufacturers." The GIV exceeds 60,000 pounds MTOW at 74,600 pounds⁴.

The following assumptions were used in this runway length analysis:

- Maximum useful load (no weight penalties)
- Range: approximately 1,000 to 2,300 nautical miles (based on existing flights which occurred in early Nov. 2021)
- Fuel burn: 5,000 pounds for the first hour and 3,000 pounds every hour after⁵
- Fuel buffer: one hour
- Runway elevation: 12.6 feet mean sea level
- Mean daily maximum temperature of the hottest month: 83°F⁶ (ISA + 27°F)
- Landing distances were adjusted based on the minimum 15 percent increase during wet/contaminated conditions up to the FAA advisory circular's maximum

This results for the estimated range of weights to plan for are detailed in **Table 8**:

Table 8: Estimated Range of Weights

Weights in pounds	GIV 1,000 NM	GIV 2,300 NM
Empty Weight	43,700	43,700
Fuel Burn and Buffer	11,522	20,000
Useful Load (after fuel)	19,378	10,900
Takeoff Weight	74,600	74,600
Landing Weight	66,000	57,600

Sources: NOAA and McFarland Johnson analysis.

This analysis does not include:

- Hotter than average day of the hottest month temperatures.

⁴ National Oceanic and Atmospheric Administration (NOAA) – Department of Commerce, Gulfstream IV-SP, <<https://www.oma.noaa.gov/learn/aircraft-operations/aircraft/gulfstream-iv-sp-g-iv>> accessed Nov. 11, 2021.

⁵ Ibid.

⁶ NOAA National Weather Service Forecast Office, <<https://w2.weather.gov/climate/xmacis.php?wfo=okx>>, accessed Jan. 23, 2020.

- Wind of any kind.
- Runway slope adjustments.
- Icy conditions.

Table 9 below shows a summary of the GIV charts (shown on **Attachment 5**).

Table 9: Summary of GIV Runway Length Requirements

Length in feet	GIV 1,000 NM	GIV 2,300 NM
Takeoff Length	6,367	6,367
Landing Length	7,343	6,435

Sources: Gulfstream Aircraft and McFarland Johnson analysis.

Based on these takeoff and landing weights, it was determined that the GIV would need approximately 7,300 feet to eliminate weight penalties. **Attachment 5** also shows existing takeoff and landing limitations/weight penalties and how a runway extension to 6,600 feet takeoff and 6,000 feet landing would provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken.

Results:

- **GIV existing runway length need: approximately 7,300'**
- **A runway extension would provide flexibility to carry more fuel to reach further destinations and/or added payload and eliminate or reduce weight penalties currently being taken**

Summary

Table 10 shows the summary of the different groups of aircraft using HVN and that all of these groups have a need for runway length extension to a minimum of 6,635 feet.

Table 10: Table for Considering Runway Length by Aircraft Type

Group (Representative Critical Aircraft)	Runway Length Requirement	Annual Operations
Commercial (B737W)	6,635'	1,352+
GA 12,500 – 60,000 lbs MTOW (Hawker 800)	7,600'	519
GA >60,000 lbs MTOW (GIV)	7,300'	411

Source: McFarland Johnson analysis.

3. Future Transportation

It is anticipated that should the runway be extended, Avelo Airlines will start flying its B737W to California and/or add B738W to its existing Florida and/or fly to California (**Attachment 1**). Additionally, other airlines have historically expressed interest in operating out of HVN including the most recent letter sent by Allegiant Airlines (flying Airbus A319 and A320 aircraft) attached to the 2021 Master Plan. **Table 11** shows these and similar type aircraft and their runway length needs for the existing and West Coast stage lengths based on airport planning manuals as shown in **Attachment 6**.

Table 11: Runway Length Needs for Future Aircraft and Routes

Aircraft	Range (in NM)	Runway Length Need
B737-700W	2,200	9,000'
B737-800W	1,000	6,300'
B737-800W	2,200	8,200'
A320-200	1,000	5,800'
A320-200	2,200	6,900'

* Additional runway length would allow lower thrust settings, which would reduce noise exposure to the local community

Sources: Boeing, Airbus, and McFarland Johnson analysis.

4. AIP Project Eligibility and Justification

According to the AIP Handbook, a project needs to be eligible and justified. This section goes through the eligibility and justification process in the AIP Handbook, as follows:

- Runway Types and Eligibility (Table G-1)
- Runway Project Requirements (Table G-5)
- Three Basic Tests to Determine if a Project is Justified (Paragraph 3-8, Table 3-4)
- Using the Critical Aircraft for Justification (Paragraph 3-11)
- Benefit-Cost Analysis for Capacity Projects Using Discretionary Funds (Paragraph 3-14)

Runway Types and Eligibility (Table G-1)

Runway 2-20 at HVN is the primary runway at this single runway airport as documented in the 2021 Master Plan. Based on Table G-1 (AIP Handbook), that means it is eligible for development consistent with FAA design and engineering standards.

Result: Runway 2-20 at HVN is the primary runway and is eligible.

Runway Project Requirements (Table G-5)

Conclusion: Runway 2-20 at HVN meets the various FAA criteria to justify a more than 6,635-foot-long runway.

According to Table G-5, the runway length requirements shown below must be met.

Table G-5, Item a. sub- sections	Factors to Consider for Justification and Eligibility	Response
1	Where a study is required to demonstrate need, the FAA must have accepted the study and concurred with the need.	Section 2 demonstrates the need and therefore justifies a runway length of more than 6,635'. This criterion is met with FAA's acceptance of this memo.
2	For a runway capacity project intended to relieve scheduled commercial air service congestion or add capacity for scheduled commercial air service in metropolitan areas with a large or medium hub airport, the ADO must confirm consistency with a regional or state system plan document (if available) prior to programming the grant.	The 2016 CT SASP states that the CT Transportation Strategy Board "made recommendations [...] for preserving and enhancing Tweed-New Haven Airport's ability to serve southern Connecticut. " The target market for HVN is southern CT residents. Most of this target market would otherwise be using New York City airports. While this runway capacity project is not intended to relieve scheduled commercial service for New York City airports, this may occur. This could result in additional benefits to the FAA's New York Airports District Office by opening up seats on NYC flights for NYC metro residents. NYC aviation growth can continue in

Table G-5, Item a. sub- sections	Factors to Consider for Justification and Eligibility	Response
		spite of significant runway and airspace capacity constraints.
3	The length, width, and strength of the pavement work must be based on critical aircraft justification per Paragraph 3-10. The exception is if the project meets the requirements in Paragraph 3-24 to exceed FAA design standards.	Critical aircraft justification is provided in Section 1. Runway length justification is provided in Section 2.
4	Runways must be planned, designed and constructed in accordance with current FAA standards, including clearing the approach slopes that will be used upon completion of the project. For runway projects, object clearing and approach surfaces must be appropriate to the instrument approach procedures for that runway. If the approaches to a new runway or extended runway end will not be clear, the project does not meet FAA standards.	This runway project is being planned, designed, and will be constructed in accordance with current FAA standards, including clearing approaches for the instrument approach procedures. This criterion has been met.
5	If the runway has a non-standard runway protection zone (RPZ), the RPZ requirements per the current version of Advisory Circular 150/5300-13, Airport Design must be followed.	RPZs are shown to be acquired in easement/fee on the current ALP. This criterion has been met.
6	Crosswind runways may be justified if the crosswind criteria of 95% wind coverage are not met on the primary runway. In addition, the justification must be based upon the number and type of aircraft that would use the crosswind in accordance with current APP-400 policy.	Runway 2-20 is a primary runway; this does not apply.
7	The approval criteria and coding for turf and aggregate runways is the same as for paved runways. If this project is required because the FAA Office of Aviation Safety (AVS) has issued a finding that ultralight aircraft must be relocated from the paved runway, the ADO must contact AAS-100 for further guidance.	Runway 2-20 is paved. This does not apply.
8	Per 49 USC § 47106(c)(1)(A)(i), the sponsor must provide an opportunity for a public hearing for a new runway or major runway extension as part of meeting the environmental requirements.	While this project may not be a major runway extension, a public hearing will be scheduled. This criterion has been met.
9	The project may include runway safety area improvements (standalone projects are also covered in this table) or other runway approach obstruction removal (stand-alone projects are covered in Appendix D).	This will be included as part of the project. This criterion has been met.
10	Runway lighting may be included for the new runway pavement as long as it meets the runway lighting requirements in Appendix J. Per APP-520 policy, runway lighting for existing pavement must be coded as a lighting project unless the lighting is in pavement lighting (then it can coded under the runway project).	Runway lighting included as part of the project is anticipated to meet Appendix J requirements. This criterion has been met.
11	The difference between construct, expand, modify, improve, rehabilitate, shift, and remove is listed in Table G-3.	This project meets Table G-3 “extend” definition. This criterion has been met.
12	The runway must be eligible and justified as a primary, crosswind, or secondary runway per the requirements in Paragraph G-2.	According to Paragraph G-2 and Table G-1, Item A, Runway 2-20 is eligible as the primary runway.

Source: FAA Order 5100.38D Table G-5.a. and McFarland Johnson analysis.

Result: This project meets all factors to consider for justification and eligibility per Table G-5.

Three Basic Tests to Determine if a Project is Justified (Paragraph 3-8, Table 3-4)

AIP Handbook Paragraph 3-8, Table 3-4 identifies three basic tests for project justification. The ADO must apply the three basic tests to determine if a project is justified.

The three basic tests to determine if a project is justified are...	Response
a. The Project Advances an AIP Policy. The ADO must verify that the project advances at least one of the AIP policies contained in 49 USC § 47101. The basic goals and objectives in these policies include airport safety, airport security, airport capacity, meeting an FAA standard, preserving airport infrastructure through reconstruction or rehabilitation, protecting and enhancing the environment, minimizing aircraft noise impacts, and airport planning. AIP funds must not be used for a project that does not specifically advance one of the AIP policies.	Justified based on 49 USC § 47101 (a)(7) “that airport construction and improvement projects that increase the capacity of the facility to accommodate passenger [...] traffic be undertaken to the maximum feasible extent so that safety and efficiency increase and delays decrease.”
b. There is an Actual Need. Per FAA policy, the ADO must determine if there is an actual need for the project at the airport within the next five years (per the definition near-term development per the current version of Advisory Circular 150/5070-6, Airport Master Plans). This includes all subcomponents of the project.	Justified based on the existing grouping of runway length critical aircraft (Section 1) and the existing route runway length need (Section 2).
c. The Project Scope is Appropriate. The ADO must determine that only the elements that are required to obtain the full benefit of the project are included in the project scope. Any elements that do not meet these criteria must stand on their own separate merit and justification. The current version of FAA Order 5100.39, Airports Capital Improvement Plan, discusses this concept in further detail in the discussions on overall development objective.	Justified based on the runway extension need to meet the existing and short-term need shown in Sections 2 and 3.

Sources: AIP Handbook and McFarland Johnson analysis.

Result: This project meets all three basic tests to determine if a project is justified of Table 3-4. This project is justified.

Using the Critical Aircraft for Justification (Paragraph 3-11)

AIP Handbook paragraph 3-11 states that runway length should be justified using a critical aircraft, or group of aircraft, as determined by FAA AC 150/5000-17. As noted in Paragraph 3.1, different aircraft can define separate elements of airport design. This includes identifying critical aircraft, or a grouping of critical aircraft, for runway length. This was conducted in Section 1 of this memo and resulted in the existing runway length critical aircraft being a grouping that include the B737W, Hawker 800, and GIV.

Result: The following group of existing aircraft utilizing the airport are justified as the runway length critical aircraft:

- Existing commercial runway length critical aircraft: Boeing 737-700W
- Existing general aviation runway length critical aircraft: Hawker 800

Benefit-Cost Analysis for Capacity Projects Using Discretionary Funds (Paragraph 3-14)

At the time of this writing, the benefit-cost analysis is underway and will be included in the associated environmental assessment.

Result: BCA is underway and will be included in the environmental assessment.

5. Summary

This memo has shown the following results:

- Runway 2-20 is an eligible primary runway
- The existing group of runway length critical aircraft of B737W (commercial) and Hawker 800 (general aviation) are justified based on the combination of their existing operations
- Commercial runway length need for approximately 6,635 feet is justified based on the existing commercial critical aircraft and runway use as well as short-term new destinations and aircraft (as shown in Section 3)
- General aviation runway length need for approximately 7,600 feet is justified based on the existing general aviation critical aircraft and runway use to existing destinations
- Commercial runway length need for approximately
- The runway length project meets all eligibility and justification requirements per the AIP Handbook
- BCA is underway and will be included in the EA

Result: Runway 2-20 is both eligible and justified for needing a minimum of 6,635 feet for existing operations and short-term operational needs.