



# Federal Aviation Administration

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## Memorandum

Date: November 8, 2023

To: Christopher Hope, Manager, Flight Technologies and Procedures Division  
THRU: Romana Wolf, Manager, Flight Procedures and Airspace Group

From: Bev Bordy, Manager, Instrument Flight Procedures Coordination Team, AJV-A45

Prepared by: Jeff Rutledge, Sr. ATC Specialist, NAVTAC CTR Support

Subject: Approval Request: Baltimore, MD (KBWI) TRISH (RNAV) STAR  
DECELERATION LEG LENGTH FAILURE

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### STALK to STARZ Segment

The requirements stated in Order 8260.3F, (United States Standard for Terminal Instrument Procedures (TERPS) ), paragraph 2-2-10.a. are:

**“2-2-10. Deceleration.** Sufficient distance and a reduced descent gradient are required prior to any fix with a speed restriction. STARs not meeting the requirements of this paragraph may be authorized with Flight Standards approval (see paragraph 1-4-2).

**a.** Where deceleration is required but descent is not permitted (for example, between two fixes with the same mandatory altitudes) or is not required (for example, between two fixes with the same minimum altitudes), provide a minimum distance of at least 4 NM prior to a fix with a speed reduction of 40 KIAS or less. For deceleration greater than 40 KIAS, allow 1 NM between fixes for every 10 knots of deceleration required. For example, a deceleration of 10, 20, 30, or 40 KIAS requires a minimum length of 4 NM; a deceleration of 50 KIAS requires a minimum length of 5 NM; a deceleration of 60 KIAS requires 6 NM.

Paragraph 1-4-2. ...states in part:

**“Nonstandard IFP.** ...obstacles, navigation information, or traffic congestion may require special consideration where justified by operational requirements. In such cases, nonstandard IFPs that deviate from these criteria may be approved, provided they are documented and an equivalent level of safety exists...”

**RSO179: [Approval Required] The length of the leg from STALK to STARZ is 5.86 NM. This leg must be at least 8.0 NM long due to deceleration from 250.0 KIAS to 210 KIAS between 5000.0 ft. MSL to 4000.0 ft. MSL. Flight Standards approval is required.**

The segment with the restrictions of at 7000B5000 at STALK followed by at 5000B4000 210K IAS at STARZ requires a 8 NM length, per the 8260.3F paragraph 2-2-10 a, for a reduction of 10- 40Kts. The deceleration required by the STALK-STARZ segment is 40 Kts. The reduction from 250 Kts to 210 Kts from STALK to STARZ is 5.86 NM. The previous fix TRISH has a restriction of less than 9000 therefore the aircraft will be at or below 250 KIAS 17.65 NM prior to reaching STALK. The distance from TRISH to STARZ is 23.51 NM allowing ample distance to reduce speed to 210 KIAS. The KBWI TRISH STAR has been in publication for several years and there have been no instances where aircraft could not make this restriction reported.

Leg #	Leg Type	Start Point	End Point	Turn Type	Alt Restr 1	Alt Restr 2	Spd Restr	Leg Alts	Dist (nm)	Cum. Dist(nm)
1	IF	TRISH [IFPA r9 08-10-23 TO UNK]	TRISH [IFPA r9 08-10-23 TO UNK]		-9000			Not Initialized	0.00	0.00
2	TF	TRISH [IFPA r9 08-10-23 TO UNK]	STALK [IFPA r3 03-31-16 TO UNK]	FLY_BY	+5000	-7000		Not Initialized	17.65	17.65
3	TF	STALK [IFPA r3 03-31-16 TO UNK]	STARZ_	FLY_BY	+4000	-5000	210	Not Initialized	5.86	23.51

Consideration was given to removing and or changing the restrictions at STALK and or STARZ. However, to allow aircraft to be configured for the segments following STARZ restrictions remained unchanged since there has never been a reported difficulty and was not an impediment to the safety or profile of the procedure.



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Subject: Approval Request: Baltimore, MD (KBWI), TRISH (RNAV) STAR  
Descent Gradient

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### FINNZ to ASHOR Segment

The requirements stated in Order 8260.3F, (United States Standard for Terminal Instrument Procedures (TERPS), paragraph 2-2-8.a. are:

“(1) the maximum permissible gradient 10000 MSL and above is 330 ft/NM (approximately 3.11 degrees).

“(2) The maximum permissible DG below 10000 feet MSL is 318 ft. /NM (approximately 3.0 degrees).

**Paragraph 2-2-10. b states:**

**“When descent is permitted, the descent gradient leading to the fix with the speed restriction must be reduced. Apply formula 2-2-2 to determine the minimum deceleration distance (DecelD) required before the fix; the greater distance leads to a reduced descent gradient.**

**(1) In determining the applicable formula gradient value, “G,” use 330 ft/NM (approximately 3.11 degrees) when the ending speed restriction is greater than or equal to 250 KIAS; use 318 ft/NM (approximately 3.0 degrees) when the ending speed restriction is less than 250 KIAS but greater than 220 KIAS; use 250 ft/NM (approximately 2.36 degrees) when the ending speed restriction is 220 KIAS or less.”**

**Paragraph 1-4-2. ...states in part:**

“**Nonstandard IFP.** ...obstacles, navigation information, or traffic congestion may require special consideration where justified by operational requirements. In such cases, nonstandard that deviate from these criteria may be approved, provided they are documented and an equivalent level of safety exists...”

**RSO144: [Approval Required] The Descent Gradient (296.99) from FINNZ to ASHOR is greater than the Maximum Permissible Descent Gradient (250.0). Flight Standards approval is required.**

A computed descent gradient value from FINNZ to ASHOR of 296.99 ft./NM resulted from the descent gradient being calculated from descending from the restriction of AT 5000 at FINNZ to cross ASHOR AT 4000 over 3.37 NM. Calculating a Descent Gradient that reflect current traffic flows required to descend from FREEE at 9000 to cross ASHOR at 4000 is 32.41 NM. Calculating the descent gradient from FREEE to ASHOR resulted in a descent gradient of 175.99 ft./NM. Users have flown this procedure without any negative comments on Descent Gradient or Deceleration issues.

Route Evaluation for BAINS:KBWI:RW28											
BAINS:KBWI:RW28 Evaluation Results Part 1/2											
Leg Tp	End Pt	Turn Tp	Alt Restr	Alt Restr 2	Spd Restr	Turn Ang	Leg Length	Min Seg Length	Descent Gradient	Max Descent Grad	Min Decel Dist
IF	BAINS [IFPA r13 03-29-18 TO UNK]						0.0	0.0	0.0	0.0	0.0
TF	KRVER [IFPA r0 10-15-15 TO UNK]	FLY_BY	10000.00			0.0	8.32	1.0	0.0	0.0	0.0
TF	FREEE [IFPA r2 12-10-15 TO UNK]	FLY_BY	+9000.00			29.47	8.39	1.54	119.15	318.0	0.0
TF	TRISH [IFPA PND r9 08-10-23 TO UNK]	FLY_BY	-9000.00			33.39	6.73	3.19	0.0	318.0	0.0
TF	WUUDI [IFPA r0 10-15-15 TO UNK]	FLY_BY	+5000.00	-6000.0		0.0	8.23	1.64	486.01	318.0	0.0
TF	FINNZ [IFPA r0 10-15-15 TO UNK]	FLY_BY	5000.00		210.0	62.12	5.69	1.41	0.0	318.0	4.0
TF	ASHOR	FLY_BY	4000.00			37.69	3.37	2.5	296.99	250.0	0.0
TF	GRAMZ	FLY_OVER	4000.00				2.5	1.08	0.0	250.0	0.0
VM							0.0	0.0	0.0	0.0	0.0

Consideration was given to removing and or changing the constraints/restrictions at FREEE, TRISH, WUUDI, FINNZ and ASHOR. However, due to airspace constraints and traffic flows it was decided that the restrictions are necessary to prevent aircraft from entering adjacent airspace, prevent conflicts from other traffic and procedures, and reduce ATC workload due to required coordination, (point outs).



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Descent Gradient

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### TRISH to WUUDI Segment

The requirements stated in Order 8260.3F, (United States Standard for Terminal Instrument Procedures (TERPS), paragraph 2-2-8.a. are:

“(1) the maximum permissible gradient 10000 MSL and above is 330 ft/NM (approximately 3.11 degrees).

“(2) The maximum permissible DG below 10000 feet MSL is 318 ft. /NM (approximately 3.0 degrees).

Paragraph 2-2-8.b states:

**“When a gradient exceeds the maximum DG allowed in paragraph 2-2-8.a, the STAR requires approval”.**

**Paragraph 1-4-2. ...states in part:**

**“Nonstandard IFP. ...obstacles, navigation information, or traffic congestion may require special consideration where justified by operational requirements. In such cases, nonstandard IFPs that deviate from these criteria may be approved, provided they are documented and an equivalent level of safety exists...”**

**RSO144: [Approval Required] The Descent Gradient (486.01) from TRISH to WUUDI is greater than the Maximum Permissible Descent Gradient (318.0). Flight Standards approval is required.**

A computed descent gradient value from TRISH to WUUDI of 486.01 ft./NM resulted from the descent gradient being calculated from descending from the restriction of AOB 9000 at TRISH to cross WUUDI AOB 6000 and AOA 5000 (6000 B 5000) over 8.23 NM. The restriction after WUUDI is at FINNZ, a restriction of AT 5000. The distance required to descend from TRISH at 9000 to FINNZ at 5000 is 13.92 NM. Calculating a descent gradient from TRISH to FINNZ 13.92 NM resulted in a descent gradient of 297.36 ft./NM.

TF	TRISH [IFPA r0 03-29-18 TO UNK]	FLY_BY	-9000.00			33.39	6.73	3.19	0.0	318.0	0.0
TF	WUUDI [IFPA r0 10-15-15 TO UNK]	FLY_BY	+5000.00	-6000.0		0.0	8.23	1.64	486.01	318.0	0.0
TF	FINNZ [IFPA r0 10-15-15 TO UNK]	FLY_BY	5000.00		210.0	0.0	5.69	1.0	0.0	318.0	4.0

Consideration was given to removing and or changing the restrictions at TRISH, WUUDI and FINNZ. However, due to airspace constraints and traffic flows it was decided that the restrictions are necessary to prevent aircraft from entering adjacent airspace, prevent conflicts from other traffic and procedures, and reduce ATC workload due to required coordination, (point outs).