Advisory Circular

GUIDANCE ON THE CALCULATION OF DECLARED DISTANCES

AC AGA–CDD–01–2024

(First Issue)

Aerodrome & Air Navigation Safety Oversight Office (AANSOO)
Office of the Director General
Civil Aviation Authority of the Philippines
Old MIA Road, Pasay City, 1300

OCTOBER 2024

Advisory Circulars (AC) are intended to provide recommendations and guidance, illustrate a means-but not necessarily the only means of complying with regulatory requirements, or to explain certain regulatory requirements by providing interpretative and explanatory materials.

CAAP will generally accept that when the provisions of an Advisory Circular have been met, compliance with the relevant regulatory obligations has been satisfied.

Where an AC is referred to in a "Note" within regulatory documentation, the AC remains as a guidance material.

ACs should always be read in conjunction with the referenced regulations.

I. PURPOSE

This Advisory Circular (AC AGA-CDD-01-2024) is issued to provide supplementary guidance to aerodrome operators on the calculation of declared distances for each runway direction at an aerodrome. It provides guidance on what is acceptable to the Aerodrome and Air Navigation Safety Oversight (AANSOO) of Civil Aviation Authority of Philippines (CAAP) to demonstrate compliance with regulatory requirements in Section 5.2 - Illustration of Declared Distances of the Manual of Aerodrome Standards (MOS).

II. APPLICATION

AC AGA-CDD-01-2024 is applicable to all airport operators in the Philippines.

III. RELATED RULES

This AC relates specifically to the requirements of MOS-Aerodromes under Chapter 5 Section 5.2 Illustration of Declared Distances.

IV. ACKNOWLEDGEMENT

Aerodrome and Air Navigation Safety Oversight Office (AANSOO) of the Civil Aviation Authority of the Philippines (CAAP) acknowledges the valuable information provided by ICAO through its published Documents and other related guidance materials and best practices developed by international organizations.

V. COPIES OF THIS AC

AC AGA-CDD-01-2024 is available and can be downloaded at the official website of CAAP at www.caap.gov.ph. A printed copy of this AC can be requested from the Regulatory Safety Standards Division (RSSD) of the Aerodrome and Air Navigation Safety Oversight Office (AANSOO), Civil Aviation Authority of the Philippines, located at MIA Road corner, Ninoy Aquino Avenue, Pasay City, Metro Manila, 1300 with Tel. No.: (02) 8246 4988 local 2040.

CAPTAIN MANUEL ANTONIO L. TAMAYO
Director General
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FOREWORD

Pursuant to the overarching mandate to uphold safety and efficiency within the realm of aviation operations and in adherence to the regulatory edicts as prescribed by the Civil Aviation Authority of the Philippines (CAAP) and of the International Civil Aviation Organization (ICAO), this Advisory Circular (hereinafter referred to as "the ACA AGA-CDD-01-2024") is hereby promulgated. This AC is imbued with the objective of providing Aerodrome Operators with comprehensive guidance on the calculation of declared distances for the available operational distances notified to a pilot for take-off, landing or safely aborting a take-off. These distances are used to determine whether the runway is adequate for the proposed landing or take-off or to determine the maximum payload permissible for a landing or take-off.

Declared distances are a combination of the runway (i.e. full strength pavement), any stopway (SWY) and clearway (CWY) provided.

The regulatory framework underpinning this Advisory Circular is based on the following documents:

1. Civil Aviation Regulations for Aerodromes
2. Manual of Standards for Aerodromes
3. ICAO Annex 14, Volume I Aerodrome Design and Operation
4. ICAO Document 9774 - Manual of Certification of Aerodromes
5. ICAO Document 9981- PANS Aerodromes
6. ICAO Document 9157 - Aerodrome Design Manual Part 1 - Runways

Furthermore, it is imperative to underscore that this advisory circular is not to be construed as a substitute for, nor does it supersede any existing laws, regulations, or mandates. Rather, it should be interpreted as a supplementary instrument designed to enhance the understanding and implementation of the aforesaid statutory requirements.

Lastly, AC AGA-CDD-01-2024 is dynamic in nature, reflective of the fluidity of the aviation domain. It is subject to periodic revisions and updates, which will be duly effected to encapsulate advancements in the aviation industry, shifts in operational paradigms, and the evolution of regulatory landscapes.

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DEFINITIONS

Declared distances are the available operational distances notified to a pilot for take-off, landing or safely aborting a take-off. These distances are used to determine whether the runway is adequate for the proposed landing or take-off or to determine the maximum payload permissible for a landing or take-off.

Take-off run available (TORA) is defined as the length of runway available for the ground run of an aeroplane taking off. This is normally the full length of the runway; neither the SWY nor CWY are involved.

TORA = Length of RWY

Take-off distance available (TODA) defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft. It will normally be the full length of the runway plus the length of any clearway. Where there is no designated clearway, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA. This practice has been notified to ICAO and details published in AIP. Any stopway is not involved.

TODA =TORA + CWY

Accelerate-stop distance available (ASDA) defined as the length of the take-off run available plus the length of any stopway. Any clearway is not involved.

ASDA = TORA + SWY

Landing distance available (LDA) defined as the length of runway available for the ground run of a landing aeroplane. The LDA commences at the runway threshold. Neither stopway nor clearway are involved.

LDA = Length of RW (if threshold is not displaced.)

Clearway A defined rectangular area on the ground or water under the control of an appropriate authority; at the end of the take-off run available on the ground or water under the control of the aerodrome operator, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

Stopway A defined rectangular area on the ground at the end of the take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

ACRONYMS AND ABBREVIATIONS

AANSOO	Aerodrome and Air Navigation Safety Oversight Office
AC	Advisory Circular
AGA	Aerodrome Ground Aids
ASDA	Accelerate-stop distance available
CAAP	Civil Aviation Authority of the Philippines
CWY	Clearway
DD	Declared Distances
ICAO	International Civil Aviation Organization
LDA	Landing distance available
RSSD	Regulatory Safety Standards Division
SWY	Stopway
TORA	Take-off run available
TODA	Take-off distance available

CHAPTER 1. CALCULATION OF DECLARED DISTANCES

1.1 Declared distances are the available operational distances notified to a pilot for take-off, landing or safely aborting a take-off. These distances are used to determine whether the runway is adequate for the proposed landing or take-off or to determine the maximum payload permissible for a landing or take-off.

1.2 Declared distances are a combination of the runway (i.e. full strength pavement) with any provided stopway and/or clearway. The calculations discussed below assume that the runway strip and runway end safety area requirements are fully compliant with the relevant standards.

1.3 The following distances in meters must be determined for each runway direction:

i. Take-off run available (TORA)
ii. Take-off distance available (TODA)
iii. Accelerate-stop distance available (ASDA)
iv. Landing distance available (LDA)

1.4 The declared distances must be calculated in accordance with the following:

i. Take-off run available (TORA) is defined as the length of runway available for the ground run of an aeroplane taking off. This is normally the full length of the runway; neither the SWY nor CWY are involved.

TORA = Length of RWY

ii. Take-off distance available (TODA) is defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft. This will normally be the full length of the runway plus the length of any CWY. Where there is no designated CWY, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA.

TODA =TORA + CWY

iii. Accelerate-stop distance available (ASDA) is defined as the length of the take-off run available plus the length of any SWY. Any CWY is not involved.

ASDA = TORA + SWY

iv. Landing distance available (LDA) is defined as the length of runway available for the ground run of a landing aeroplane. The LDA commences at the runway threshold. Neither SWY nor CWY are involved.

LDA = Length of RW (if threshold is not displaced.)

1.5 Determine and record the gradient from the end of TODA to the top of the critical obstacle within the take-off climb area, expressed as a percent. Where there is no obstacle, a value of 1.2% must be recorded.

CHAPTER 2. DECLARED DISTANCES DIAGRAMS

2.1 Where a runway is not provided with a stopway (SWY) or clearway (CWY) and the threshold is located at the extremity of the runway, the four declared distances should normally be equal to the length of the runway, as shown in Figures 1 and 2.

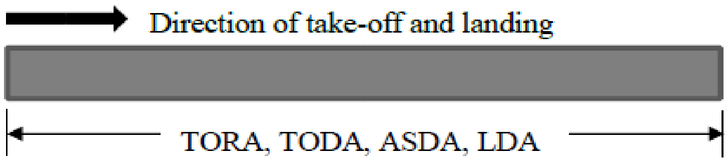


Figure 1

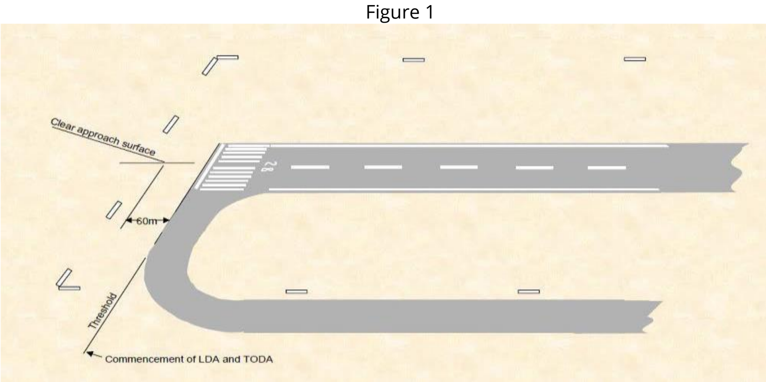


Figure 2

2.2 Where a runway is provided with a clearway (CWY), then the TODA will include the length of clearway, as shown in Figure 3.

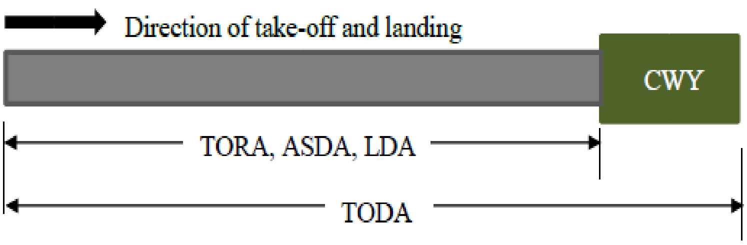


Figure 3

2.3 Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway (SWY), as shown in Figure 4.

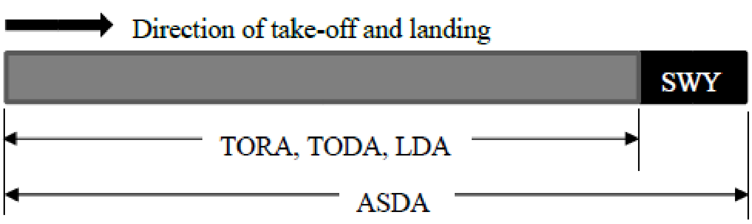


Figure 4

2.4 Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced, as shown in Figures 5-8. A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected.

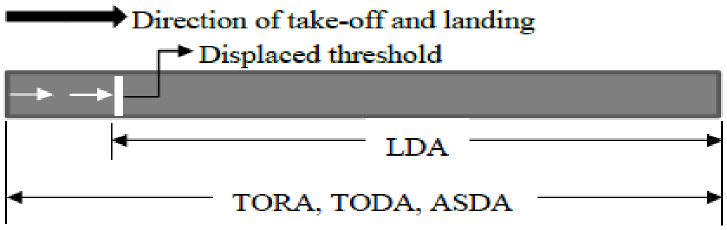


Figure 5

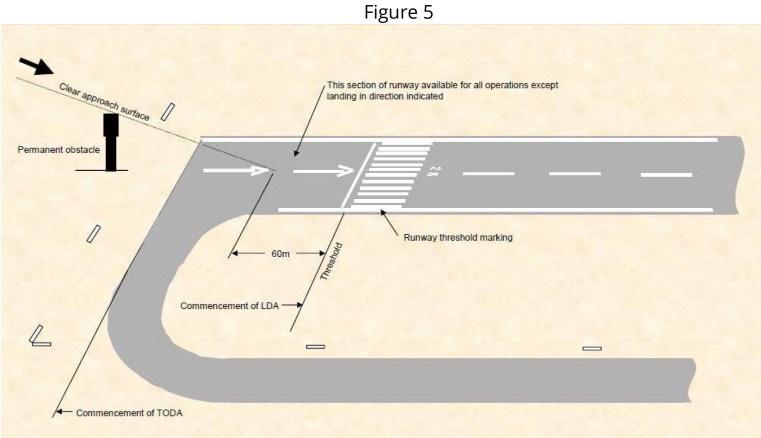


Figure 6

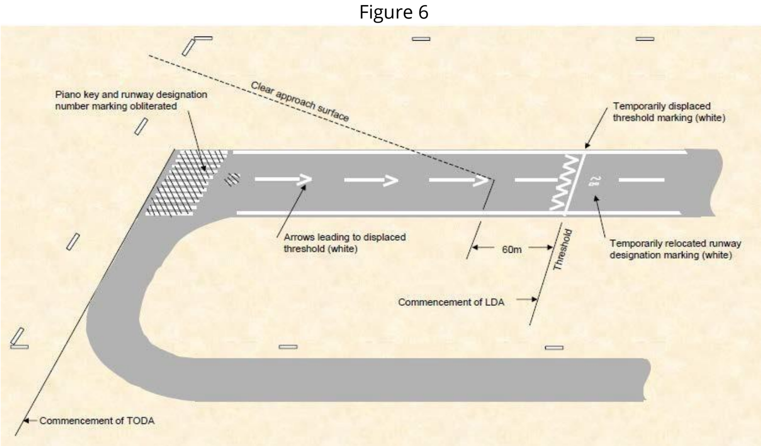


Figure 7

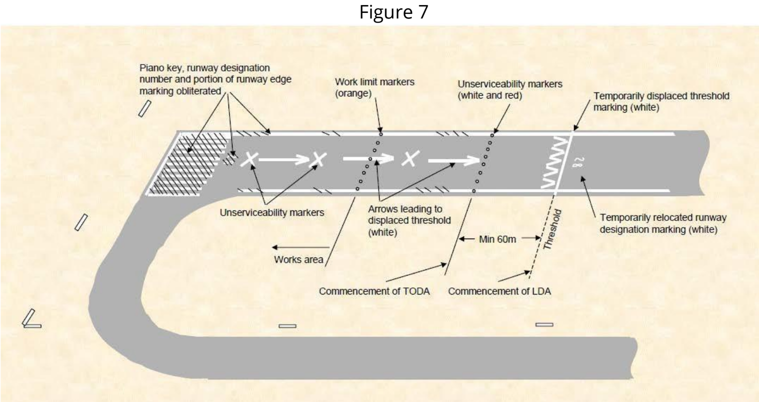


Figure 8

2.5 Figures 2 - 4 illustrate a runway provided with a clearway or a stopway or having a displaced threshold. Where more than one of these features exist, then more than one of the declared distances will be modified - but the modification will follow the same principle illustrated. An example showing a situation where all these features exist is shown in Figure 9.

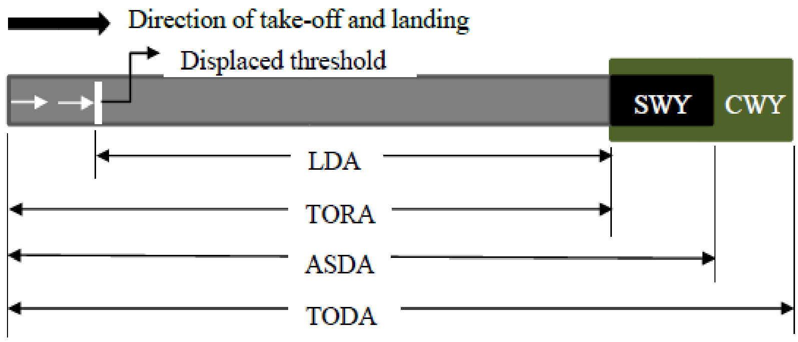


Figure 9

2.5.1 Taking into account that the purpose of the RESA is mitigating landing LDA and takeoff ASDA emergencies, a *special application of declared distances* may obtain full-standard RESAs for runways. This potential safety benefit is realized because the four declared distances, LDA, TORA, TODA, and ASDA, are independent of each other.

Note: This special application of declared distances is published by the ***United States Federal Aviation Administration in Advisory Circular AC 150/5300-13B, Airport Design****.*

2.5.2 In general, an analysis is done for each direction of operation for a runway to manipulate the eight independent declared distances, four in each direction, to obtain the longest possible RESA off each runway end. In this special application two circumstances are considered:

A. For landings, a RESA is located before the threshold for undershoots and located beyond the end of the runway for overruns. Therefore, the landing operation (LDA) requires two RESAs.

In some cases the threshold is displaced. Displaced thresholds are handled in the same manner except that the RESA, which starts before the displaced threshold, uses the existing paved runway. This paved runway before the displaced threshold continues to be available for takeoff operations.

B. For takeoffs, a RESA only exists at the end of the runway for the aborted emergencies (ASDA). Therefore the takeoff operation (ASDA) requires one RESA.

In some cases the operational runway is slightly reduced (ASDA) but not the physical pavement (TORA). In practice only LDA and ASDA require RESAs.

2.6 When intersection take-offs are performed the following diagrams illustrate the method of calculating the take-off distance available or take-off run available where departures are allowed from taxiway intersections (intersection departures) as shown in Figure 10.

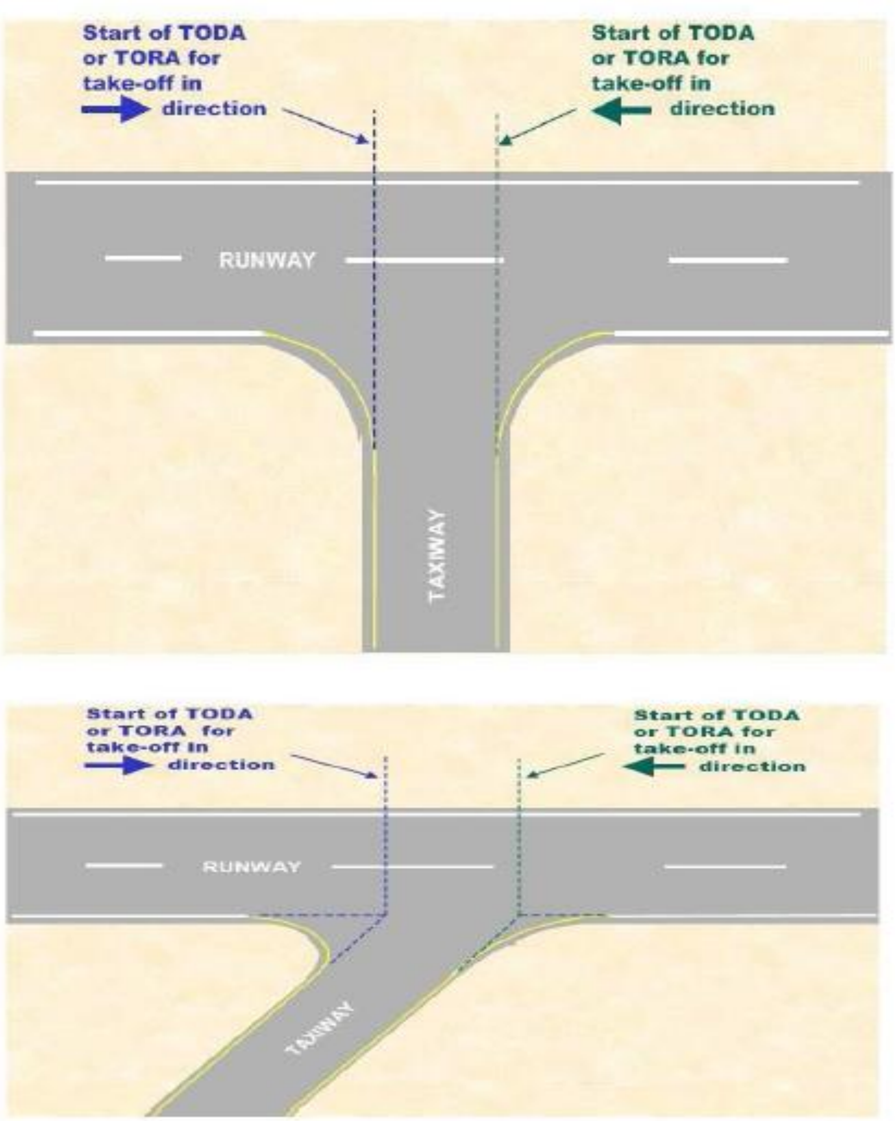


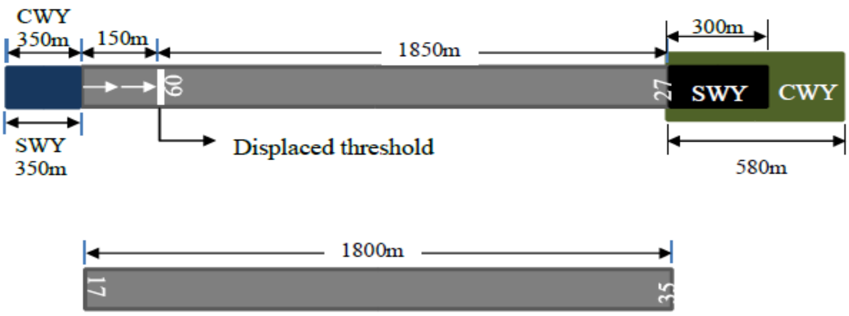
Figure 10

2.7 Intersection departure take-off distances available. At an aerodrome where air traffic procedures include runway/taxiway intersection departures, the take-off distances available from each relevant taxiway intersection must be determined and declared. The method of determining the take-off distances available at an intersection is similar to that used at a runway end. This is to ensure that the same performance parameters (for example, line-up allowance) may be consistently applied for the line-up maneuver, whether entering the runway at the runway end or from some other intersection.

2.8 Declared distances for an intersection must be measured from a perpendicular line commencing at the taxiway edge that is farther from the direction of take-off. Where take-offs may be conducted in either direction, the starting point of the declared distances for each direction will be the perpendicular line commencing from the respective edges of the taxiway farther from the direction of take-off. This is illustrated in MOS 5.2. An example format for notifying intersection departure information is as follows:

RWY 16 – TKOF from TWY E: RWY remaining 2345 reduce all DECL DIST by 1312.

2.9 A suggested format for providing information on declared distances is given in Figure 11. If a runway direction cannot be used for take-off or landing, or both, because it is operational forbidden, then this should be declared and the words “not usable” or the abbreviation “NU” entered.



Runway	TORA(m)	ASDA(m)	TODA(m)	LDA(m)
09	2000	2300	2580	1850
27	2000	2350	2350	2000
17	NU	NU	NU	1800
35	1800	1800	1800	NU

Figure 11

2.10 Under Section 5.1.4 Standards for determining Aerodrome Information of the MOS, the declared distances shall be calculated and reported by the aerodrome operator to Aeronautical Information Service Group (AISG). Such information should be subsequently made available to pilots via the Aeronautical Information Publication (AIP).

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