Clarification on Annex 14 regarding strength of RESA and Runway strip as per Aerodrome Design Manual (ADM) Doc 9157 Part 3, Pavements (Third Edition, 2022)

Presented by Airports Authority of India

STRENGTH REQUIREMENT OF RUNWAY STRIP AND RESA AS PER ICAO ANNEX 14:

- As per ICAO Annex 14 Para 3.4.17 (strength of RWY strip) & Para 3.5.12 (Strength of RESA) Note: Reference is made to ICAO Aerodrome Design Manual, Part 1.
- Para 5.3.26 of ADM Part 1 regarding the strength of graded portion of strip & RESA which recommends that the soil at a depth of 15 cm below the finished strip surface be prepared to have a bearing strength of California Bearing Ratio (CBR) value of 15 to 20. This would prevent the nose gear from sinking more than 15 cm, thus preventing its collapsing. The top 15 cm may be of lesser strength which would facilitate deceleration of aircraft.
- The earlier version of ICAO Aerodrome Design Manual, Part 3 did not contain any guidance on design of unpaved surfaces and therefore the reference of only ADM Part 1 was included in Annex 14.

STRENGTH REQUIREMENT OF RUNWAY STRIP AND RESA AS PER AERODROME DESIGN MANUAL PART 3 PAVEMENTS - (Third Edition, 2022)

Chapter 9 of this Manual on "Structural criteria for natural ground" provides guidance on structural criteria for unpaved areas such as runway and taxiway shoulders, runway end safety areas (RESAs) and runway strips and the following are stated regarding its strength:

a) RESA (Para 9.3 & Para 9.4.2):

- The design methodology is conservatively assumed to be **ten passes of an aircraft**. The failure criteria is 8 cm of rutting and the following cover thickness with material of CBR 20 or higher is provided in Para 9.3.3 and Table 9-1 as per subgrade type and aircraft group.
- Group 1: Regional aircraft with less than 13,600 kg wheel loads
- Group 2: Narrow body aircrafts with wheel loads between 13,600 kg to 20, 410 kg
- Group 3: Wide body aircrafts with wheel loads greater than 22,680 kg

Aircraft group	Cover thickness required as per subgrade type			
	CBR 3	CBR 6	CBR 10	CBR 15
Group 1	10 cm	8 cm	none	none
(wheel load less than 13.6T)				
Group 2 (wheel load between 13.6T to 20.41T)	18 cm	13 cm	10 cm	8 cm
Group 3 (wheel load greater than 22.68T)	31 cm	20 cm	15 cm	13 cm

A layer of seeded top soil could be placed on the top of the cover layer, where needed, to provide protection against erosion and FOD risk.

b) Runway strips (Para 9.4.3)

■ The upper surface may be 15 cm of lesser strength material and the underlying natural soil of adequate strength to support the aircraft for one pass, such that structural damage does not occur.

DISCUSSION

- It can be understood that design methodology of RESA and Runway strip have been changed in ADM Part 3 (ver. 2022) and is based on aircraft group and 10 passes of aircraft for RESA and one pass of aircraft for Runway strip (without structural damage).
- However, as per present guidelines in ICAO Annex 14/ADM Part 1, design criteria of RESA & runway strip are the same and the design requirement is 15-20 CBR value at 15 cm below the top surface irrespective of aircraft type/group.
- It will be economical to adopt RESA/runway strip design as per the revised ADM Part 3, as the section depth requirement corresponding to aircraft group1/group 2 can be adopted for smaller aerodromes operating regional and narrow bodied aircraft with lower wheel loads.

ACTION BY THE MEETING

Meeting is invited to-

- Note the information contained in the presentation.
- Clarification may be provided on Note to Para 3.4.17 (strength of RWY strips) & 3.5.12 (Strength of Runway End Safety Areas) of Annex 14 wherein reference to ADM Part 1 is given whereas ADM Part 3 has come up with structural criteria for natural ground (i.e. unpaved areas) in Chapter 9.
- Discuss any relevant matter as appropriate.

Thank you!