AGENDA ITEM NO 5:

INFORMATION PAPER (IP) ON

IMPLEMENTATION OF NEW PAVEMENT RATING SYSTEM (ACR-PCR) AT CERTIFIED AIRPORTS

(Presented by Pakistan)

Ninth Meeting of the Aerodromes Operations and Planning Sub-Group (AOP/SG/9)

Bangkok, Thailand, 30 June to 4 July 2025

CONTENTS OF THE PRESENTATION:

- **Brief Introduction**
- **Overview Of The Process** Of “Using Aircraft Experience” Method of ACR-PCR
- **Challenges Faced By Operators**
- **Road-Map towards** Adoption Of Using “ Technical Evaluation Method”
- **Discussion** And Questions!

BRIEF INTRODUCTION:

New Pavement Rating System (ACR-PCR)

- Introduced by ICAO in: **15th amendment to ICAO Annex-14, 3rd April, 2020.**
- Effective date: **20th July, 2020**
- Applicability date : **28th November, 2024**
- Adopted the amendment by Pakistan: **1st October,2020**

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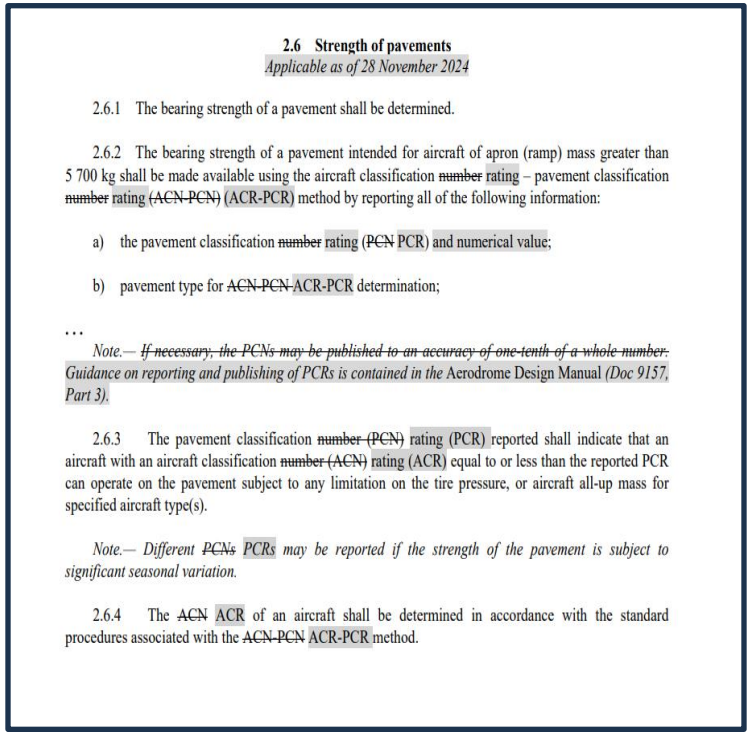
Ref.: AN 4/1.2.28-20/35 3 April 2020

Subject: Adoption of Amendment 15 to Annex 14, Volume I

Action required: a) Notify any disapproval before 20 July 2020; b) Notify any differences and compliance before 5 October 2020[1]; c) Consider the use of the Electronic Filing of Differences (EFOD) System for notification of differences and compliance

Sir/Madam,



2.6 Strength of pavements

Applicable as of 28 November 2024

2.6.1 The bearing strength of a pavement shall be determined.

2.6.2 The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg shall be made available using the aircraft classification ~~number~~ rating – pavement classification ~~number~~ rating ~~(ACN-PCN)~~ (ACR-PCR) method by reporting all of the following information:

a) the pavement classification ~~number~~ rating (~~PCN~~ PCR) and numerical value;

b) pavement type for ~~ACN-PCN~~ ACR-PCR determination;

...

Note.— ~~If necessary, the PCNs may be published to an accuracy of one-tenth of a whole number.~~ Guidance on reporting and publishing of PCRs is contained in the Aerodrome Design Manual *(Doc 9157, Part 3).*

2.6.3 The pavement classification ~~number (PCN)~~ rating (PCR) reported shall indicate that an aircraft with an aircraft classification ~~number (ACN)~~ rating (ACR) equal to or less than the reported PCR can operate on the pavement subject to any limitation on the tire pressure, or aircraft all-up mass for specified aircraft type(s).

Note.— Different ~~PCNs~~ PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

2.6.4 The ~~ACN~~ ACR of an aircraft shall be determined in accordance with the standard procedures associated with the ~~ACN-PCN~~ ACR-PCR method.

ACR-PCR COMPARISION

AIRCRAFT

Aircraft / Pavement Compatibility: A complex equation of paramount importance

Still comparing two numbers, but changing radically the way of determining them!

ACR

PAVEMENT

PCR

For **SUSTAINABLE** and **SAFE** **OPERATIONS** at optimized **COST**

If ACR ≤ PCR, the aircraft can operate on the pavement without restriction

If ACR > PCR, some restrictions (on operating weight and/or frequencies) may apply

New Provision on **OVERLOAD** operations

Courtesy: **Cyril Fabre**, ICAO APEG Rapporteur

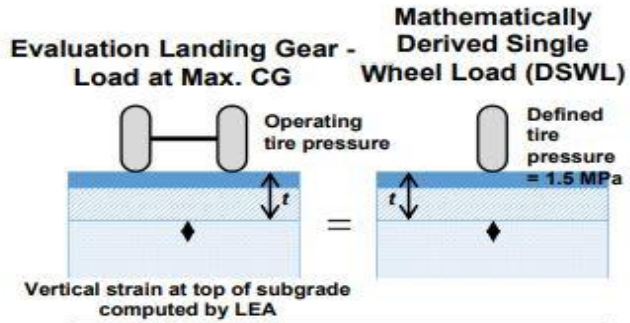
BRIEF INTRODUCTION:

Characteristics of (ACR-PCR)

- All structures (Flexible and Rigid) are **layered elastic**
- Retains four (4) standard subgrade categories, but **defined by modulus (E) not CBR or k.**
- Standard tire pressure 1.5 MPa. (218 psi)
- Standard coverages increased to 36,500 for flexible ACR.
- **DSWL expressed in 100's (not 1000's) of kg.**
- ACR numerical values are **approximately 10X higher than equivalent ACN.** (*may be sometimes misleading*)
- Overload allowance is increased to 10% for rigid pavement

BRIEF INTRODUCTION:

Characteristics of ACR-PCR



The ACR numerical value is defined as two times the DSWL (expressed in hundreds of kilograms)

ACR-PCR Subgrade Categories

Category	A	B	C	D
Strength	High	Medium	Low	Ultra-Low
E Value, MPa	200	120	80	50
Range, MPa	$E \geq 150$	$150 > E \geq 100$	$100 > E \geq 60$	$60 > E$

- Categories are defined by *E*, not CBR or *k*.
- Same categories for rigid and flexible pavements.
- All values are defined at top of subgrade.

ACR-PCR Tire Pressure Categories

Category	Code	Tire Pressure Range
Unlimited	W	No pressure limit
High	X	Up to 1.75 MPa (254 psi)
Medium	Y	Up to 1.25 MPa (181 psi)
Low	Z	Up to 0.5 MPa (73 psi)

Courtesy: Federal Aviation Administration

BRIEF INTRODUCTION:

KEY CHARACHTERISTICS OF THE ACR-PCR

- All Structures (Flexible and Rigid) are **layered elastic.**
- Retains four (4) standard subgrade categories, but **defined by modulus (E) not CBR or k.**
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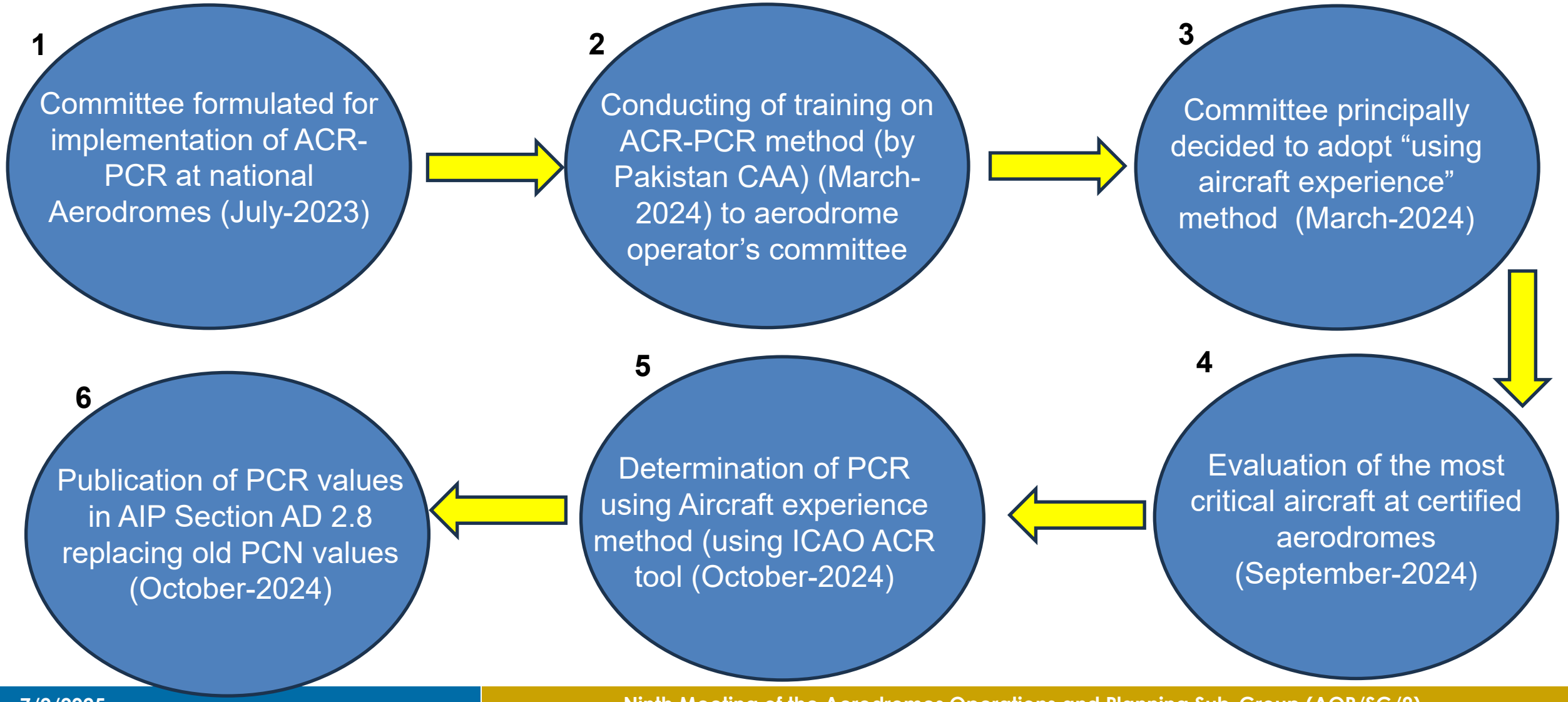
Overview of the process:

Timelines



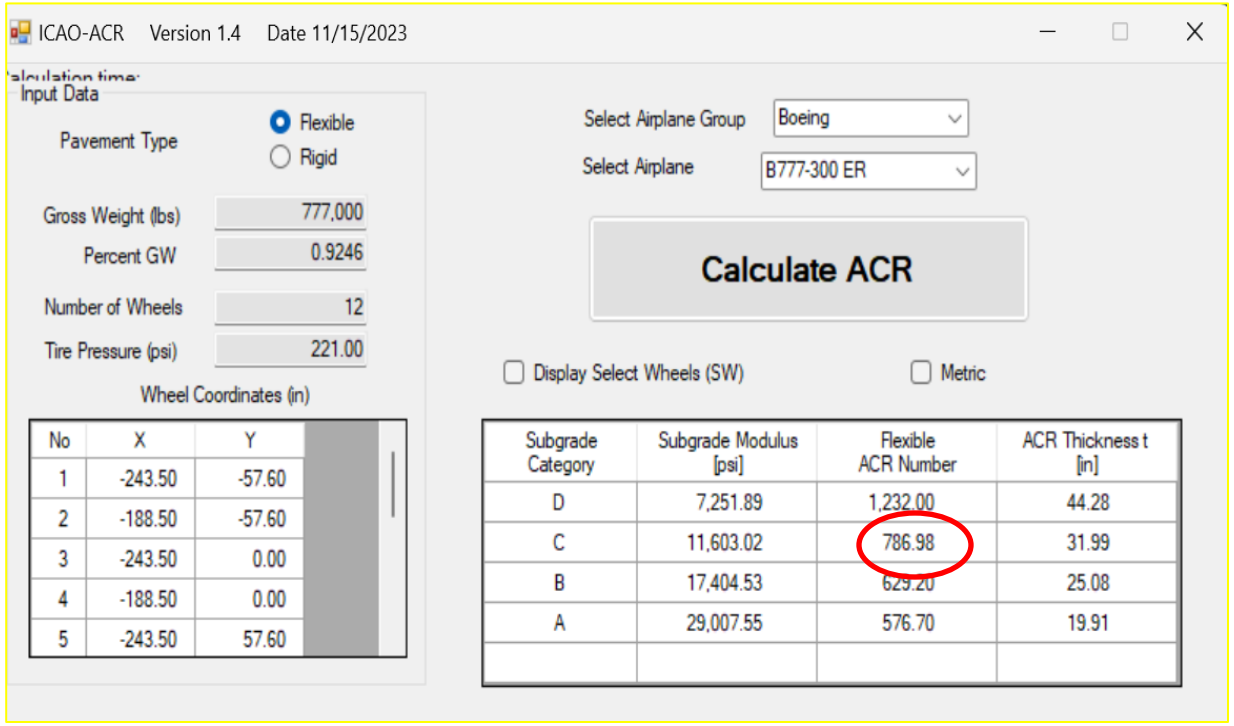
DESIGN EXAMPLE OF ISLAMABAD INTERNATIONAL AIRPORT

Visual Survey Of Pavement Surfaces for visible distresses and Determination of PCR Values

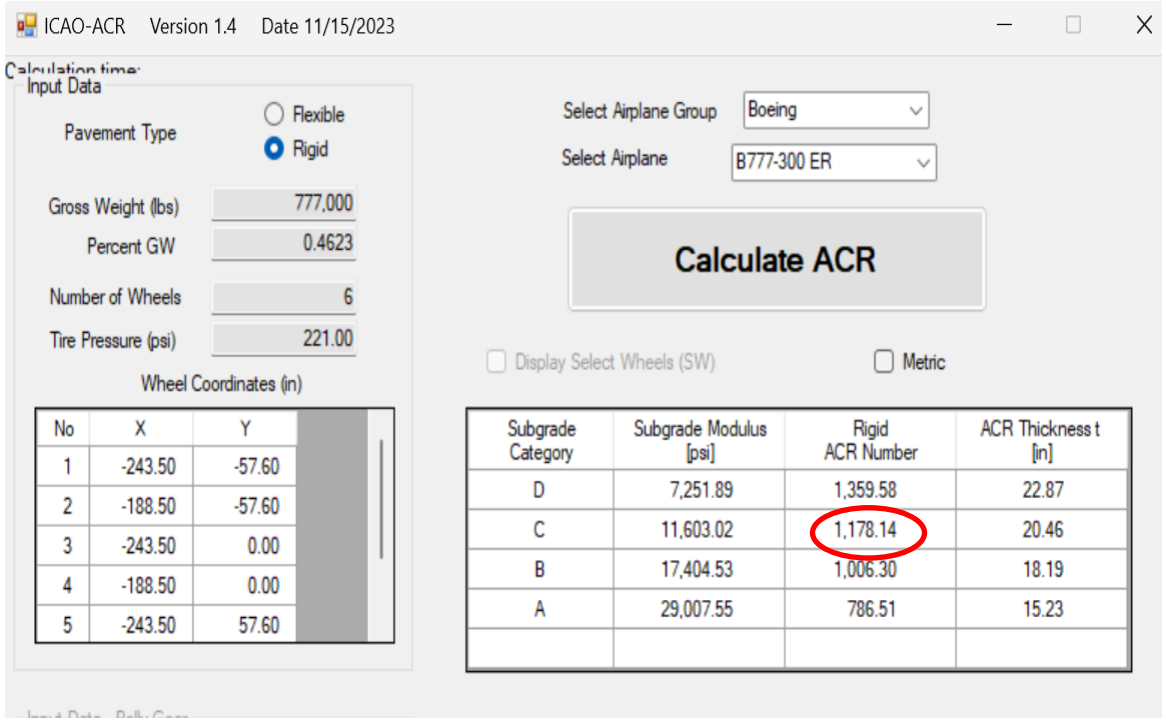
- The committee identified the most critical aircraft (having highest ACR on MTOW against given subgrade category) is Boeing 777-300ER
- The pavement surface were extensively studied and previous pavement classification index surveys of runway, taxiway and apron were consulted.
- The pavements (Runway, Taxiway and Apron) was exhibiting no significant signs of different asphaltic and concrete distresses like longitudinal, transverse, alligator, block cracking, settlements, raveling, polishing, etc.
- The committee taken the maximum take-off weight (MTOW) against given subgrade category and use ICAO ACR tool to determine ACR value at given weight against subgrade value.
- Publish ACR of the aircraft as PCR of the pavement using aircraft experience

DESIGN EXAMPLE OF ISLAMABAD INTERNATIONAL AIRPORT

Using ICAO ACR tool Version 1.4 for determination of PCR values



ACR for Flexible pavement on Cat C subgrade



ACR for Rigid pavement on Cat C subgrade

DESIGN EXAMPLE OF ISLAMABAD INTERNATIONAL AIRPORT

Publication of PCN data in AIP

OPIS AD 2.8 APRONS TAXIWAYS AND CHECK LOCATIONS DATA

1. Apron surface and strength	Maintenance Apron: OTHER PCR 426/F/C/X/U
	NW Apron: Concrete PCR 1178/R/C/M/U
	SE Apron: Concrete PCR 1178/R/C/M/U
	State Apron: OTHER PCR 426/F/C/X/U
	Cargo Apron: Concrete PCR 1178/R/C/M/U
2. Taxiway width, surface and strength	Taxiway A : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway B : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway C : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway D : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway E : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway F : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway G : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway H : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway J : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway K : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway L : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway M : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway N : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway P : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway Q : 25 M ASPH, PCR 786/F/C/X/U.
	Taxiway R : 23 M ASPH, PCR 786/F/C/X/U.
	Taxiway S : 32 M ASPH, PCR 786/F/C/X/U.
	Taxiway T : 25 M ASPH, PCR 786/F/C/X/U.

OPIS AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWY NR	True bearing	Dimensions of RWY (M)	Strength (PCR) and surface of RWY and SWY	THR coordinates	THR elevation and highest elevation of TDZ of precision APP RWY	Slope of RWY/SWY
1	2	3	4	5	6	7
10R	100.58°	3658 x 60	786/F/C/X/U ASPH Flexible	333304.28N 0724821.81E	THR 528.06 M / 1732.49 FT	0.12% UP
28L	280.60°	3658 x 60	786/F/C/X/U ASPH Flexible	333242.42N 0725041.37E	THR 532.53 M / 1747.14 FT	0.12% DOWN
10L	100.58°	3658 x 45	786/F/C/X/U ASPH Flexible	333310.98N 0724823.30E	THR 529.03 M / 1735.67 FT	0.12% UP
28R	280.60°	3658 x 45	786/F/C/X/U ASPH Flexible	333249.12N 0725042.87E	THR 533.41 M / 1750.04 FT	0.12% DOWN

CHALLENGES FACED BY AERODROME OPERATORS

- Training for Aerodrome Operators
- Lack of inadequate PCI data at smaller airports
- Faulty selection of Critical aircraft
- Associated Costs with adoption of new Pavement Rating system

PLAN TOWARDS “TECHNICAL EVALUATION METHOD”

- The true potential of ACR-PCR method can only be explored in “technical evaluation method” rather than “using aircraft experience” method.

- Para 1.4.6.3 of ICAO Doc 9157, Part 3, explicitly states that "whenever possible, ***reported pavement strength should be based on a technical evaluation***. When, for economic or other reasons, a technical evaluation is not feasible, evaluation can be based on experience with using aircraft.

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PLAN TOWARDS "TECHNICAL EVALUATION METHOD"

- Presently PCR data for New Gawadar International Airport is published using technical evaluation method.
- Pakistan CAA has given timeline of January, 2028 to publish all certified aerodrome pavement rating data using technical evaluation method.

- For Technical Evaluation, determination of modulus of elasticity (E) values for subgrade, sub-base, base course and wearing course is crucial and in this regard, aerodrome operators are conducting non-destructive testing to ascertain these values and process will be completed by June-2026.

CONCLUSION AND SUMMARY:

Pakistan has adopted using aircraft experience method as "**short-term arrangement**" for compliance with ICAO requirement, For better utilization of ACR-PCR framework, transition to technical evaluation method is underway and will be completed by June-2028.

DISCUSSION:

OTHER STATES ARE ENCOURAGED **TO SHARE THEIR EXPERIENCE** AND UPDATE ON THE MATTER.

THANK YOU!