ICAO/FAA Comprehensive Aerodrome Certification Inspector Workshop

Paved Areas: Standards and Maintenance Program

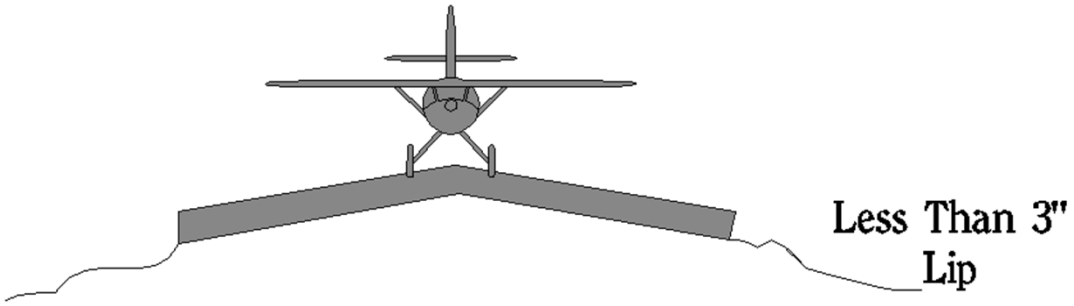
Presented To: Caribbean Aviation Professionals

By: FAA Office of Airports

Presentation outline

- **Part 139 versus ICAO Doc 9157 Part 3**
- **Three types of pavement information**
- **Pavement Classification Number (PCI)**
- **Pavement Surface Evaluation (PASER)**
- **Pavement Condition Index (PCI)**
- **Reporting condition to users**

Regulation requirements - 309.305(a)(1)



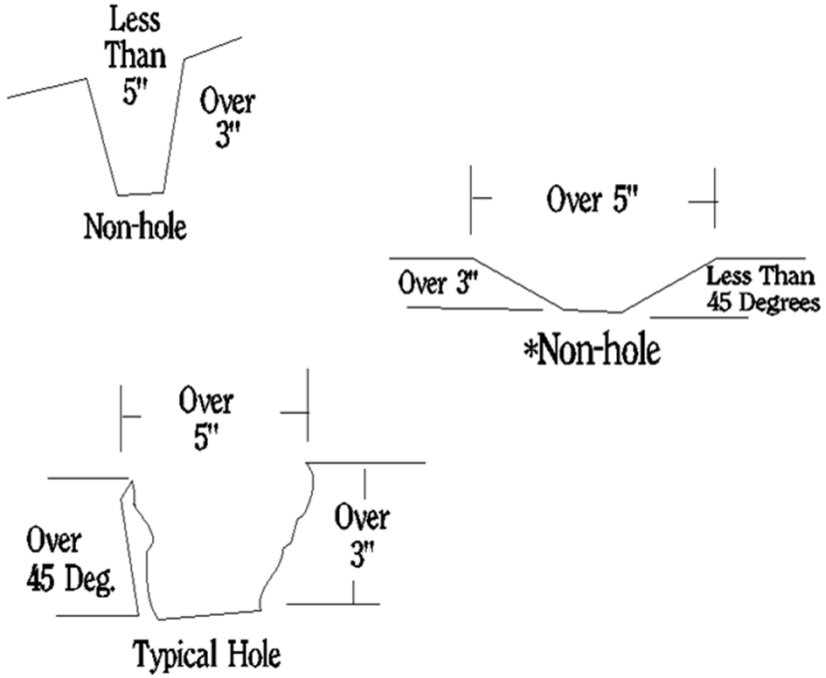
Pavement edges must not exceed 3” between

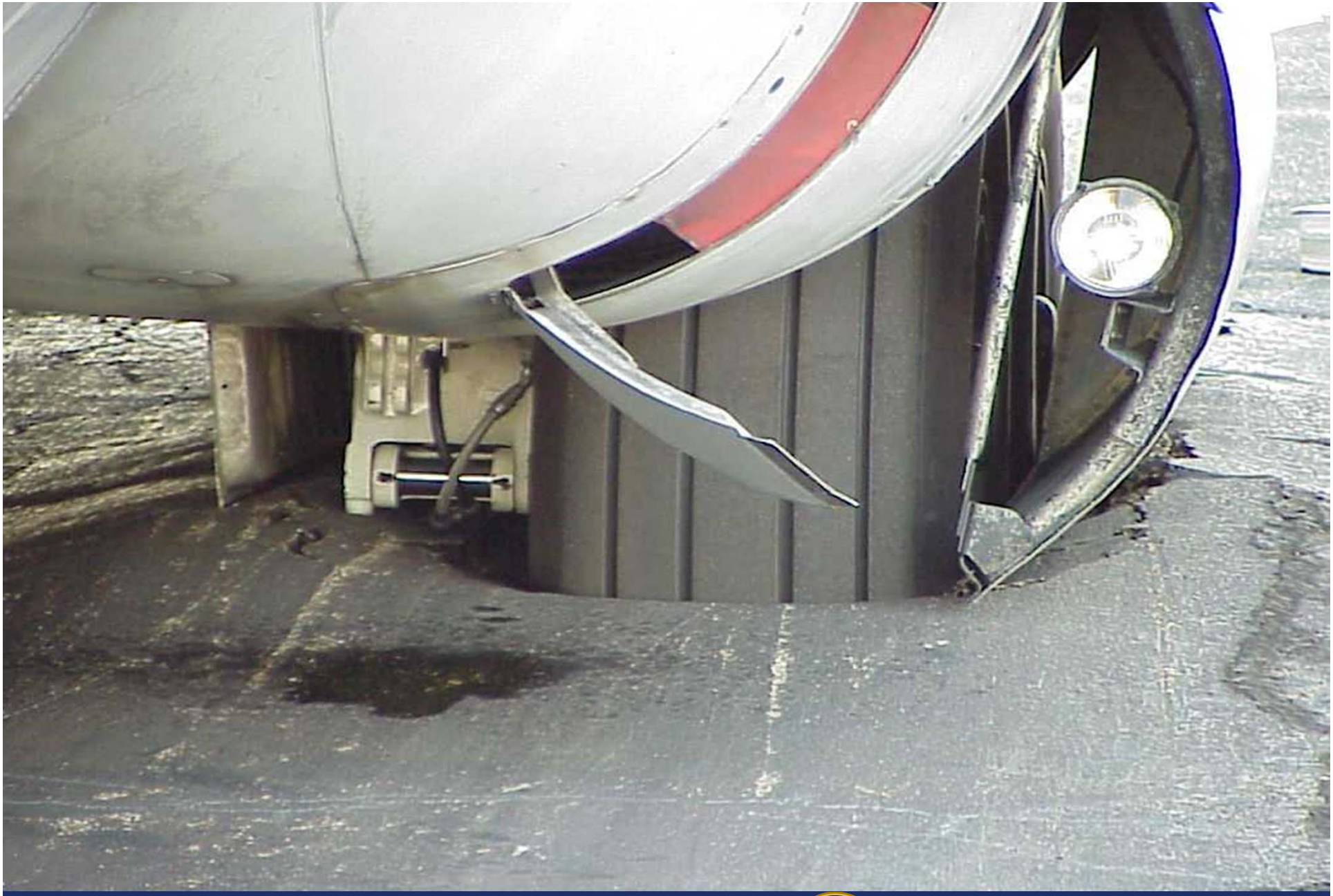
- Pavement and abutting areas
- Abutting pavement sections

SECTION 139.305(a)(2)

Holes over 5” across may not

- Exceed 3” depth
- Slope 45° or more





Regulation requirements – 309.305(a)(3)

- **Pavement must be free of cracks and surface variations that could impair air carrier aircraft directional control**
- **Any crack or surface deterioration that produces loose aggregate or other contaminants must be repaired immediately**

Regulation requirements –309.305

- **Airport Certification Manual**
- **Maintenance and prompt repair**
- **(a)(1): Maximum 3 inches lips (edges)**
- **(a)(2): No holes**
- **(a)(3): Cracks and surface variation**
- **(a)(4): Foreign Object Debris (FOD)**
- **(a)(5): Chemicals**
- **(a)(6): Drained, water accumulation**

Pavement crack

Regulation requirements – 309.305(a)(4)

- Remove promptly and as completely as possible all
  - ✓ Mud
  - ✓ Dirt
  - ✓ Sand
  - ✓ Debris
  - ✓ Loose aggregate
  - ✓ Foreign objects
  - ✓ Rubber deposits
  - ✓ Other contaminants
- Does not apply to snow, ice, deicing materials (139.305(b))


RUBBER
BUILDUP


Foreign
Object Debris
FOD

Regulation requirements – 309.305(a)(6)

- Pavement shall be sufficiently drained and free of depressions to prevent ponding that

  ✓ Obscures marking

  ✓ Impairs safe aircraft operations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Regulation requirements – 309.305(a)(5)

- Remove as soon as possible chemical solvents used to clean any movement area
- Does not apply to snow, ice, deicing materials (139.305(b))

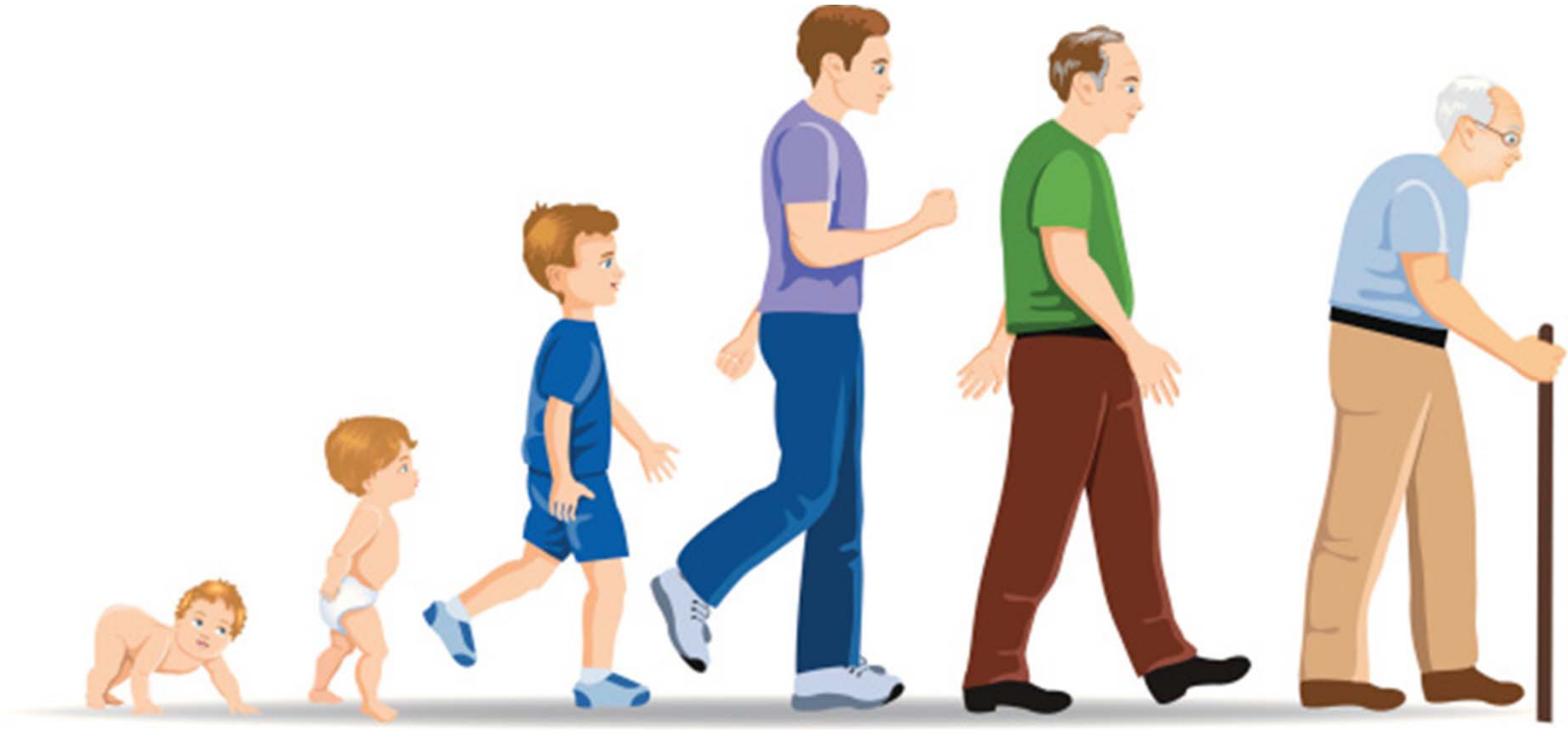
Types of pavement

- **Flexible pavement: transmit the load from granular contact. It is made of asphalt concrete surface.**
- **Rigid pavement: transmit the load like a beam, It is made of Portland Cement Concrete**

Types of Pavement

- **Pavement is the structure we build over a supporting surface (soil) to transmit the traffic load (aircraft). The load at the soil must be less than what the soil is capable to support.**
- **Pavement structure consist on a series of layer being the surface layer the highest quality and the bottom one the lowest quality**

Pavement stages of life



Types of pavement

- **Flexible = Asphalt**
- **Rigid = Portland cement**
- **Asphalt over concrete**
- **Concrete over asphalt (asphalt is basically a base course)**
- **Resurfacing (asphalt over asphalt)**
- **Thin layer (concrete)**

Causes of pavement deterioration

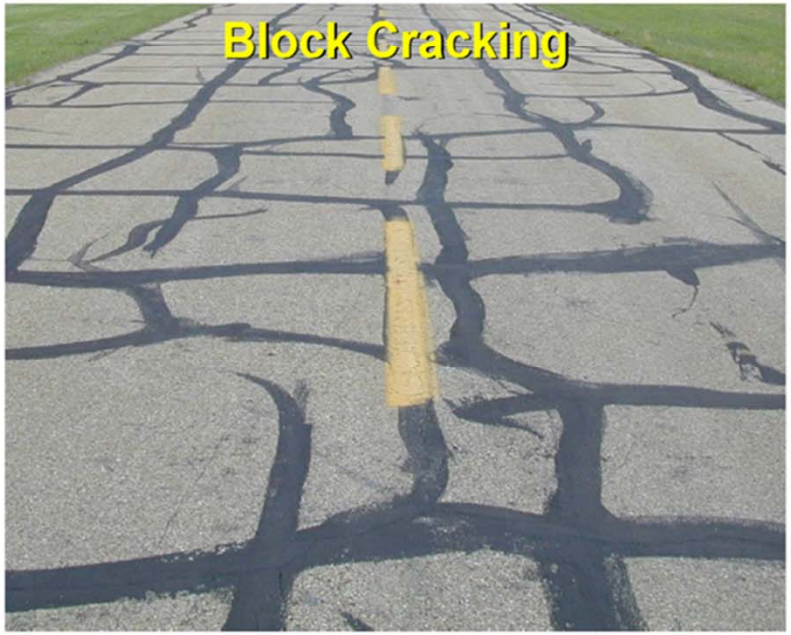
- **Loading: passages of loads (aircraft)**
- **Climate: pavement expansion and contraction due to temperature**
- **Environment: snow, rain etc.**
- **Natural deterioration**

Pavement distresses

- **Cracking**
- **Joint seal damage (rigid pavement)**
- **Distortion**
- **Disintegration**
- **Loss of skid resistance**

Fatigue [Alligator] Cracking

- Possible Causes
  - Weak base/subgrade
  - Thin pavement
  - Poor Drainage
  - Overloading
- Bottom-up cracking
- Typically with Rutting



Rutting

- In Subgrade/Base
  - Design Problem
  - Later Stages Will Develop Fatigue Cracking
- In the AC Layer
  - Plastic Flow--Material/ Mix Design
  - Consolidation--Compaction

Pavement Information reporting method - How to express the pavement condition

- **PASER: National method to report comfort**
- **PCI: Pavement Condition Index – Standard method to report used pavement life**
- **PCN: Pavement Classification Number- ICAO method to report strength**

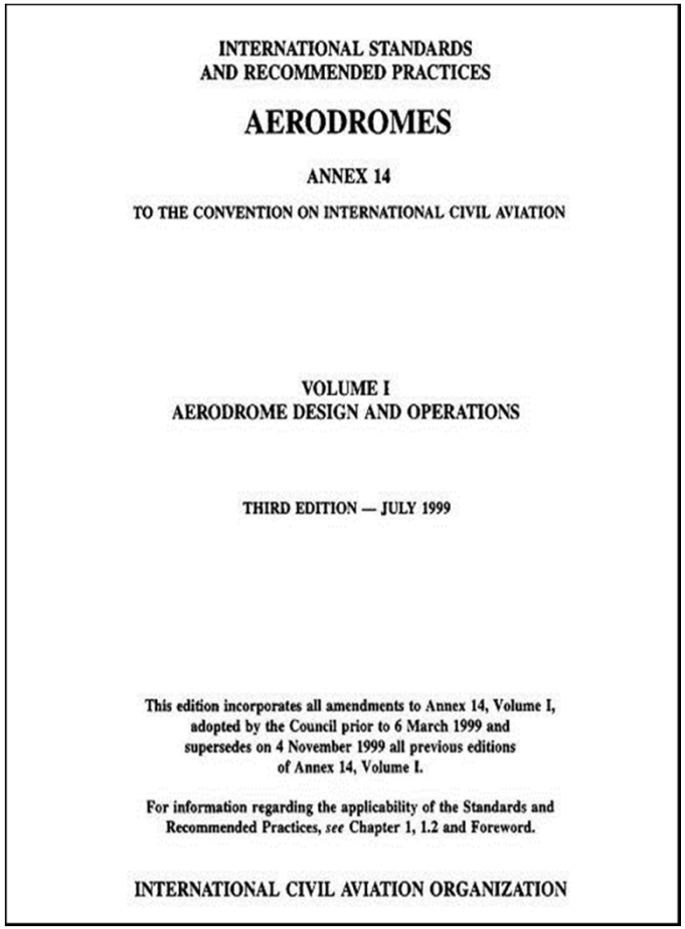
Pavement Strength – Current Method and Pavement Classification Number

- **Define the size and weight of aircraft that can operate on the runway without restrictions**
- **Current FAA methodology in 5010 elements**
- **ICAO method to report pavement loading capacity**
- **Where do airports report that number?**
- **Who use PCN: airlines/ airport operators**

The ACN-PCN System

- **Aircraft Classification Number (ACN) is precisely specified as a standard by ICAO in Annex 14.**

- **Aircraft manufacturers are required to publish properly computed ACN values for all of their aircraft.**



INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERODROMES

ANNEX 14

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME I
AERODROME DESIGN AND OPERATIONS

THIRD EDITION — JULY 1999

This edition incorporates all amendments to Annex 14, Volume I, adopted by the Council prior to 6 March 1999 and supersedes on 4 November 1999 all previous editions of Annex 14, Volume I.

For information regarding the applicability of the Standards and Recommended Practices, *see* Chapter 1, 1.2 and Foreword.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ACN/PCN Definitions

- **ACN**
- **“A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade strength.”**

- **PCN**
- **“A number expressing the bearing strength of a pavement for unrestricted operations.”**

- **Aerodrome Design Manual, Part 3 Pavements, Chapter 1**

ACN/PCN System - Limitations

- **Only intended as a method for airport operators to evaluate acceptable operations of airplanes**
- **It provides a load, or damage rating relative to a specified reference load.**
- **ACN is not a pavement design procedure.**

ACN/PCN System – Official ACN

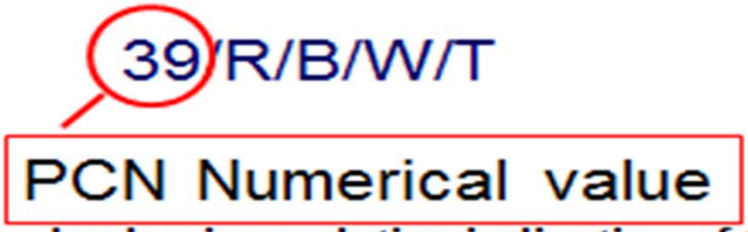
- **Official ACN values are provided by the Aircraft Manufacturer**
- **Airplane Characteristics for Airport Planning**

ACN-PCN SYSTEM – PCN Values

- **PCN values are reported in a coded format using 5 parts separated by "/"**
- **Sample 39/R/B/W/T**

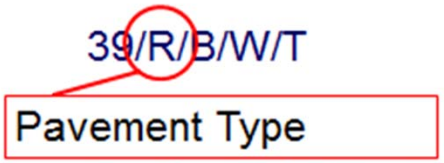
- **Information includes:**
- **Numerical PCN Value**
- **Pavement Type**
- **Subgrade Category**
- **Allowable Tire pressure**
- **Method used to determine the PCN value**

ACN-PCN SYSTEM



- PCN Numerical value is a relative indication of the load carrying capacity of a pavement in terms of a standard single wheel load 181 psi (1.25 MPa)
- PCN value derived from the ACN value of the most demanding airplane.
- PCN values can be determined in two ways
  - Using Aircraft
  - Technical Evaluation

ACN-PCN SYSTEM



- **Pavement may be either Rigid (R) or Flexible (F)**
  - Rigid – Single Stiff Layer to support and distribute load
  - Flexible – Multiple flexible layers to distribute load
- **Composite pavements (overlays etc.) are reported as the type which most accurately reflects the structural action**

ACN-PCN SYSTEM

39/R/B/W/T

Allowable Tire Pressure

Category	Code	Tire Pressure Range
High	W	No pressure limit
Medium	X	Pressure limited to 218 psi (1.5 MPa)
Low	Y	Pressure limited to 145 psi (1.00 MPa)
Very Low	Z	Pressure limited to 73 psi (0.50 MPa)

Recent request to ICAO have proposed modifying this table to increase allowable tire pressures

ACN-PCN SYSTEM

39/R/B/W/T

Method used to determine PCN

PCN values can be determined in two ways

- **U =Using Aircraft**
  - Simply select highest ACN from all airplanes using facility
- **T = Technical Evaluation**
  - PCN based on technical study of pavement structure and traffic data.

•Pavement Program Management

- Airport Pavement Management Program (PMP)
- *AC 150/5380-7B*
  - Historic & current information
  - Surface & subsurface degradation/analysis
  - Scheduling & maintenance planning

Questions?