

#### [ Problem Statement ]

#### **Runway Excursion**

- Aviation's Number 1 –
   Safety Risk Category
- Among the top contributing factors are poor braking action due to contaminated runways combined with shortfalls in the accuracy and timeliness of assessment and reporting of the runway surface conditions.



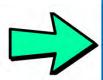


#### GLOBAL REPORTING FORMAT - RUNWAY CONDITION REPORT (GRF-RCR)

No.	Contents
1.	What is Runway Condition Report (RCR)?
2.	Objectives of Runway Condition Report (RCR)
3.	Benefits
4.	Why is the Runway Condition Report (RCR) important?
5.	The Main Agencies Roles
6.	Implementation Challenges
7.	Roles by Agencies (Airport Operator, Regulator & Airlines)
8.	ICAO Provision & Guidance Material



#### What is Runway Condition Report (RCR)?



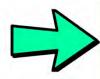
A Standard Reporting of Runway Surface Condition



Procedure: Reporting in one system/platform







Applicable: 5 November 2020



The related parties involved: Aerodrome operator, aircraft operators, pilots, ATC, AIM, MET & Aircraft Manufacturers









#### Objectives of Runway Condition Report (RCR)

### Objectives

1

Assessing and reporting the condition of the movement area

2

Providing the assessed information in the correct format

3

Reporting significant changes without delay



#### Benefits

#### Improved safety

- Better understanding of runway conditions.
- Fewer runway excursions.



#### Improved efficiency

- Flight crews can better correlate reported runway surface conditions to contaminated landing and take-off performance data
- Airport operators have an objective method of reporting runway surface conditions to flight crews.



#### Why is the Runway Condition Report (RCR) important?





Establish a <u>common language</u> between all related parties in airports with one system (AD Operator, Aircraft Operators, Pilots, ATC, AIM, MET, etc)



Allow pilots to <u>accurately</u> determine aeroplane take-off and landing performance



Improve aerodrome <u>safety</u> >> better understanding of RWY condition & fewer <u>RWY</u> excursion



5 Improved airport operations <u>efficiency</u> >> better decision making



Reduced environment impact >> better traffic management





#### The Main Agencies Roles



 Assess the RWY Condition and Report using RCR





Convey
 Information
 from RCR to
 Aircraft
 Operators







Use information with aircraft performance data to determine if landing or takeoff is safe

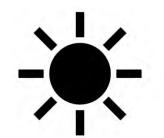


#### The Airport's Operator Roles





**AIRPORTS** 



2

Exposed to snow and ice



Need to use the full global reporting format

**Two Scenarios** 



Not exposed to snow and ice

Use only the section of the global reporting format related to water as contaminant



#### **Examples**



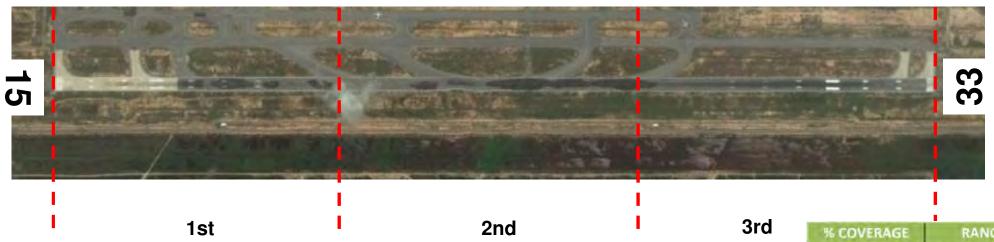
% Coverage of contaminant
Depth of contaminant
Type of contaminant

#### Step 2

% Coverage of contaminant Depth of contaminant Type of contaminant

#### Step 3

% Coverage of contaminant Depth of contaminant Type of contaminant



Runway 15/33, klia2

% COVERAGE	RANGE
Not Reported	Less than 10 %
25 %	10 % - 25 %
50 %	26 % - 50 %
75 %	51 % - 75 %
100 %	76 % - 100 %



#### The Airport's Operator Roles

## Sample Reporting Worksheet - ACI



Aerodrome Date/Time (ATC) of assessment (ANDORsoms) Lower Runway Designator Coutside Air Temperature Initials		Assess the % coverage RMYCC -6 for that third, No contaminant is reported	2 10% - 5 251 RMYCC - 6 fe Report cont 25% co	tamination for eac Scoverage or that thins uniners at arrage	> 25% coverage Assign RWYCC based on contaminant present & temperature considerations
1 of FRWY Third  For the right of the right Chief of the PATA of the RMY Third  Berling to the right of the right of the PATA of the RMY Third  Leading a contract of the Chief of the PATA of the RMY Third  Leading a contract of the Chief of the RMY Third  Berling a contract of the Chief of the RMY Third  Berling a contract of the RMY Third  B	City out required that HWY three has 2nd RWY This For the sign of the wint Cade 9 the sign or commence that indeed, more than 21 the sign or commence that indeed, more than 21 the sign of the sign of the sign of the sign of the think of the sign of the sign of the sign of the Popul the sign of the sign of the sign of the Popul the sign of the sign of the sign of the Popul the sign of the sign of the sign of the	TS or the THEFT SAME	For covering 25 to the will distribute continues for a month's covering	NWYCE	
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B	FRICK.	RWY Treatment Used?  Ches Treatment Pleased Set  Upper State	Time Applied:	Siste approved CFME finaling coeffic  Maind Dise transmit RWY Condition Rep	Adjusted RWYCC  Clent  Chart / Downgrade Ungade Australians and
☐ OEY	RCR	Contaminant Type 1st their	Contention Typ		Depth is non Continued Type for the



# Runway Condition Assessment Matrix (RCAM)

(For Dry, Wet & Standing Water only)

(1.1.3.14) An assigned RWYCC 5, 4, 3 or 2 shall not be upgraded. Only assigned RWYCC 1 & 0 can be upgraded.

Table II-1-5. Runway condition assessment matrix (RCAM)

	Runway condition assessment matri			
	Assessment criteria	Downgrade assessment cri	1	
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action	
6	• DRY		-	
5	WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	G000	
4		Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM	
3	WET ("slippery wet" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM	
2	More than 3 mm depth of water or slush:  • STANDING WATER	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR	
1		Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR	
0:		Braking deceleration is minimal to non- existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR	



# Runway Condition Assessment Matrix (RCAM)

(FULL VERSION)

Table II-1-5. Runway condition assessment matrix (RCAM)

	Assessment criteria	Downgrade assessment cri	teria	
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action	
O 6	○ • DRY	→	-	
<b>O</b> 5	FROST  WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)  Up to and including 3 mm depth:  SLUSH  DRY SNOW  WET SNOW	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD	
4	−15°C and Lower outside air temperature: • COMPACTED SNOW	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM	
O 3	WET ("slippery wet" runway)     DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW      More than 3 mm depth:     DRY SNOW     WET SNOW      Higher than -15°C outside air temperature¹:     COMPACTED SNOW	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM	



# Runway Condition Assessment Matrix (RCAM)

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O 2	More than 3 mm depth of water or slush:  STANDING WATER  SLUSH	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR		
1	• ICE 2	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR		
0	WET ICE 2 WATER ON TOP OF COMPACTED SNOW 2 DRY SNOW or WET SNOW ON TOP OF ICE 2	Braking deceleration is minimal to non- existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR		



#### Information Strings

#### **Information Strings**

The information to be reported shall be compliant with the RCR which consists of:

Aeroplane performance calculation (APC) section

2

Situational awareness (SA) section





#### Information Strings

The information to be reported shall be compliant with the RCR which consists of:

- a) Aeroplane performance calculation section (APC)
- b) Situational awareness section (SA)

- Example SNOWTAM 4 -

DOC 10066 - AIM

GG EADBZQZX EADNZQZX EADSZQZX
170350 EADDYNYX
SWEA0152 EADD 02170345
(SNOWTAM 0152
EADD
02170345 09L 5/5/5 100/100/100 NR/NR/03 WET/WET/SLUSH
02170134 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH
02170225 09C 2/3/3 75/100/100 06/12/12 SLUSH/WET SNOW/WET SNOW 35







DRIFTING SNOW, RWY 09L LOOSE SAND, RWY 09R CHEMICALLY TREATED, RWY 09C CHEMICALLY TREATED.)



#### **RCR Information Strings**



#### **AEROPLANE PERFORMANCE CALCULATION SECTION (8)**

1	aerodrome location indicator	M
2	date and time of assessment	M
3	lower runway designation number	M
4	RWYCC for each runway third	M
5	per cent coverage contaminant for each runway third (NR if dry/<10%)	С
6	depth of loose contaminant for each runway third (only if STANDING WATER)	С
7	condition description for each runway third; and	M
8	width of runway to which the RWYCCs apply if less than published width.	0



#### **RCR Information Strings**



#### SITUATIONAL AWARENESS SECTION (11)

1	reduced runway length (when NOTAM published with new declared distances affecting LDA)	С
2	drifting snow on the runway	0
3	loose sand on the runway	0
4	chemical treatment on the runway	М
5	snowbanks on the runway	0
6	snowbanks on the taxiway	0
7	snowbanks adjacent to the runway	0
8	taxiway conditions	0
9	apron conditions	0
10	State-approved, and published use of, measured friction coefficient; and	0
11	plain language remarks.	0



#### Information Strings (e.g.)

#### a) Aeroplane performance calculation section

1 - Aerodrome location indicator

2 - Date and time of assessment

4 - RWYCC for each runway third

6 - Depth of loose contaminant for each runway third

WMKK

09251400

\_ 5/5/2

50/50/50

**NR/NR/04** 

\* Refer next slide

VVIVINN (

3 - Lower runway designation number 5 - % coverage contaminant for each runway third \*



#### WET/WET/STANDING WATER

7 - Condition description for each runway third

8 – Width of cleared runway in metres to which the RWYCCs apply if less than published width



## WMKK 09251400 14L 5/5/2 50/50/50 NR/NR/04 WET/WET/STANDING WATER



#### 5 - Percentage Coverage of Contaminant (e.g)

Format: [n]nn/[n]nn/[n]nn

Example: 25/50/100

NR/50/100 if contaminant coverage is less than 10% in the first third 25/NR/100 if contaminant coverage is less than 10% in the middle third 25/50/NR if contaminant coverage is less than 10% in the last third

Table II 1 1



Assessed per cent	Reported per cent
10 – 25	25
26 - 50	50
51 – 75	75
76 - 100	100

Percentage of coverage for contaminants



WMKK 09251400 14L 5/5/2 50/50/50 NR/NR/04 WET/WET/STANDING WATER



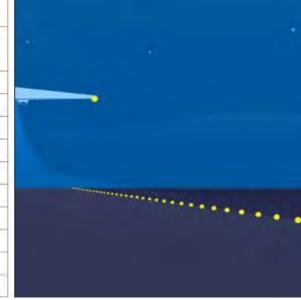
#### Information Strings

b) Situational awareness section (e.g.)

<sup>1</sup>RWY 22L LDA REDUCED TO 1450. DRIFTING SNOW. TWY B POOR. APRON NORTH POOR.



1	reduced runway length (when NOTAM published with new declared distances affecting LDA)	С
2	drifting snow on the runway	0
3	loose sand on the runway	0
4	chemical treatment on the runway	M
5	snowbanks on the runway	0
6	snowbanks on the taxiway	0
7	snowbanks adjacent to the runway	0
8	taxiway conditions 3	0
9	apron conditions	0
10	State-approved, and published use of, measured friction coefficient; and	0
11	plain language remarks.	0





#### New SNOWTAM Format (Doc 10066)

App 4-6

Procedures - Aeronautical Information Management

Doc 10066

#### Appendix 4. SNOWTAM FORMAT

(See Chapter 5, 5.2.5.1.4)

(applicable as of 5 November 2020)

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(Abbreviated heading)	s I w	WAA* SERI	AL NUM	BER)	T	4-	ATION ATOR)	1	DATE/T	IME OF	ASSES	MENT		(OPTIONA	L GROUP)
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			Aerop	lane p	erform	ance calcu	lation se	ction							
(AERODRON	IE LOCAT	ION INDICA	TOR)									M	A)		<=
(DATE/TIME	OF ASSES	SSMENT (TI	ime of co	mpleti	on of as	sessment	in UTC))					M	B)		$\rightarrow$
(LOWER RUI	WAY DE	SIGNATION	NUMBE	R)								M	(C)		$\rightarrow$
(RUNWAY O												М	D)	LI	$\rightarrow$
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#### New SNOWTAM Format (Doc 10066)

FROST ICE SLUSH STANDING WATER WATER ON TOP OF COMPACTED SNOW WET WET ICE WET SNOW WET SNOW WET SNOW ON TOP OF COMPACTED SNOW WET SNOW ON TOP OF ICE			<b>-</b>
(WIDTH OF RUNWAY TO WHICH THE RUNWAY CONDITION CODES APPLY, IF LESS THAN PUBLISHED WIDTH)	0	н)	<=
Situational awareness section			
(REDUCED RUNWAY LENGTH, IF LESS THAN PUBLISHED LENGTH (m))	0	.1)	$\rightarrow$
(DRIFTING SNOW ON THE RUNWAY)	0	J)	
(LOOSE SAND ON THE RUNWAY)	0	K)	$\rightarrow$
(CHEMICAL TREATMENT ON THE RUNWAY)	0	L)	$\rightarrow$
(SNOWBANKS ON THE RUNWAY) (If present, distance from runway centre line (m) followed by "L", "R" or "LR" as applicable)	0	M)	$\rightarrow$
(SNOWBANKS ON A TAXIWAY)	0	N)	<b>→</b>
(SNOWBANKS ADJACENT TO THE RUNWAY)	0	0)	-
(TAXIWAY CONDITIONS)	0	P)	$\rightarrow$
(APRON CONDITIONS)	0	R)	$\rightarrow$
(MEASURED FRICTION COEFFICIENT)	0	S)	
(PLAIN-LANGUAGE REMARKS)	0	T)	

#### NOTES

- \*Enter ICAO nationality letters as given in ICAO Doc 7910, Part 2 or otherwise applicable aerodrome identifier.
- 2. Information on other runways, repeat from B to H.
- 3. Information in the situational awareness section repeated for each runway, taxiway and apron. Repeat as applicable when reported
- Words in brackets ( ) not to be transmitted.
- For letters A) to T) refer to the Instructions for the completion of the SNOWTAM Format, paragraph 1, item b).

SIGNATURE OF ORIGINATOR (not for transmission)



#### Implementation Challenges

1

The RCR should contain all necessary information for the determination of relevant runway condition for the performance assessment of the flight crew/pilot

Aerodrome personnel should have the skill and knowledge to assess the condition of runway and produce accurate RWYCC

Coordination with relevant parties

4

The establishment of Malaysia
Standard Reporting
Format

5

#### >Training to related parties:

- ▶1- Different level of experience and exposure
- >2- Reluctant to give up methods and practices used for many years
- >3- Management of change
- ▶4- How to ensure accurate assessment at busy RWY





#### Roles by Agencies (Airport Operator, Regulator & Airlines)

#### **AERODROME OPERATORS**

- Assess the runway surface conditions, including contaminants, for each third of Runway length, and report them by means of a uniform Runway Condition Report (RCR)
- To deploy GRF for Runway surface condition
- To provide technical training



### AERONAUTICAL INFORMATION SERVICES (AIS)



Provide the information received in the RCR to end users







#### **AIR TRAFFIC SERVICES**



Convey the information received via the RCR and/or special air-reports (AIREP) to end users (voice communication, ATIS)



#### ICAO Provision & Guidance Material

#### Annex 6

Part 2 Aeroplane Performance

**Manual (Doc 10064)** 

 New assessment by the pilot-incommand of the landing performance and report for commercial air transport operations



#### **Annex 8**

 Nature of the information provided by the aircraft manufacturers



#### Annex 14, Vol. I

(Applicability 5 November 2020)

- Fundamental provisions for assessing and reporting runway surface conditions
- PANS-Aerodromes (Doc 9981)
- Assessment, Measurement and Reporting of

Runway Surface Conditions (Circular 355)—*Revised Circular 329* 

PANS-ATM (Doc 4444)





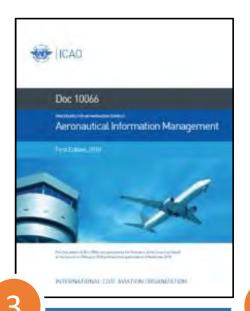
#### ICAO Provision & Guidance Material



ICAO Annex 14, Vol.1 Aerodrome Design and Operations



**ICAO Doc 9981** - PANS Aerodrome



**ICAO Doc 10066** Aeronautical

Information Management



**ICAO Circular 355** 

Assessment, Measurement and Reporting of Runway **Surface Conditions** 







## Objectives

The main objective is to ensure aerodrome personnel trained in the relevant fields of competence and their competence verified in a manner required by the State (CAAM) to ensure confidence and accuracy in their assessments.



#### **Table of Contents**



- (1) GRF-RCR Implementation Roadmap in Malaysia
  - **2** Certified Runway Inspector (CRI) Program
  - **3** Approved Training Module for GRF-RCR & CRI
  - Train the Trainer Session in Malaysia





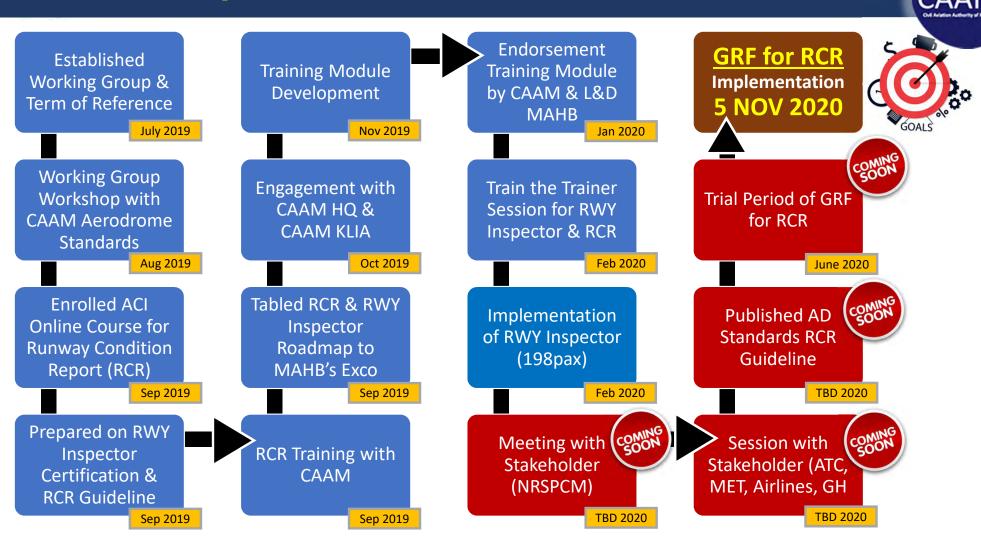
# GRF-RCR Implementation Roadmap







#### Malaysia Roadmap for GRF-RCR Implementation







# Certified Runway Inspector (CRI) Program









COMPETENT RUNWAY
INSPECTOR



APPROVED & CERTIFIED BY CAAM



#### How to become Certified Runway Inspector (CRI)?



## Mandatory Six (6) Training Modules you need to attend prior becoming Certified Runway Inspector (CRI)

Airport
Operations
Level 2

2 Days Course

ANNEX 14
Vol I
Aerodrome
(Every 3yrs)

5 Days Course

ANNEX 19 SMS (Every 3yrs) 4 Days Course

Aerodrome Inspection (Every 3yrs)

3 Days Course

Including GRF-RCR Training Module

RT Communication (Every 3yrs) 2 Days Course

AIP (Every 3yrs)

1 Day Course



## 3

# Training Modules for CRI & GRF-RCR







COMPREHENSIVE MODULES



COMPETENCY CHECK

### Overview of Annex 14 vol. I - Aerodrome Modules

Chapter	Contents	
1	Basic Aerodrome (Introduction)	
2	Annex 14 Amendment Chapters in Annex 14 Definition	
3	ICAO Doc. 9981 – Procedures for Air Navigation Services (PANS Aerodromes)	
4	Runway / Aerodrome Reference Code	
5	Runway End Safety Area Clearway & Stopway	
6	Specific Procedure for AD Operations / Holding Position/ Apron	
7	Taxiway	
8	AIP NOTAM	
9	AGL & Electrical System	

Chapter	Contents
10	Obstacle Limitation Surface (OLS)
11	Visual Aids Denoting Restricted use area
12	Markers Denoting Obstacle
13	Aerodrome Data / MEHT
14	Aerodrome Operations
15	Aerodrome Maintenance
16	Markings & Signs
17	Airport Emergency Plan
18	Rescue Fire Fighting
19	Examination - Knowledge Check

### Overview of Annex 19 - SMS Modules



Chapter	Contents
1	Safety Risk Management
2	HIRARC Template
3	HIRARC Template Exercise
4	Safety Assessment
5	Safety Assessment & Exercise
6	Acceptable Level of Safety Performance (ALoSP)

Chapter	Contents
7	Safety Investigation Report
8	Safety Promotion & Exercise
9	SMS Implementation Plan File & Exercise
10	Airside Safety Culture Survey
11	Knowledge Check
12	Aircraft Incident & Lesson learned

### Overview of AIP Modules



Chapter	Contents
1	Reference Document
2	Definition
3	AIRAC Cycle
4	AIP Content- GEN
5	AIP Content – ENR
6	AIP Content – AD
7	AIP Amendment & Supplements

### Overview of RT Modules



Chapter	Contents
1	Introduction to communication
2	Communication in ATS
3	Vocabulary and abbreviations
4	RT Procedures and Phraseologies
5	Group assignment
6	Individual Practical Assessment

#### **Overview of Aerodrome Inspection Modules Pavement** 3 **GRF-RCR** Surface Failure **SNOWTAM** Aerodrome Low Visibility **Assessment** Issuance + Operations / Inspection **AOM Procedure** (10 Chapters) Special Aerodrome Inspection Aerodrome **RWY Friction** Inspection **Case Study** 6 Modules Airside Safety Aerodrome **Briefing** Safety Requirements Airside Driving **Exercise Briefing** Rules & Regulations **Aerodrome Theory Test** Airside Briefing Manual for New **Practical Test Applicant**

## Contents of Aerodrome Inspection Modules

Chapter	Contents	Chapter	Contents
1.1	Standard Operating Procedure (SOP)	1.6	Taxiway Inspections
1.2	Runway Inspections	1.7	Taxiway Strip Inspections
1.3	Runway Strip Inspections	1.8	Apron Inspections
1.4	Runway End Safety Area (RESA) Inspections	1.9	Perimeter Road Inspections
1.5	Aeronautical Ground Lights (AGL) Inspections	1.10	Special Inspections

### **Contents of GRF-RCR Modules**



Chapter	Contents
1	Overview of Global Reporting Format - Introduction - Background
2	<ul> <li>Implementation of Global Reporting Format</li> <li>Runway Condition Report (RCR)</li> <li>Runway Condition Code (RWYCC)</li> <li>Runway Condition Matrix (RCAM)</li> </ul>
3	ICAO Provision and Guidance Material
4	Runway Condition Assessment
5	Reporting - Runway Condition Assessment Worksheet - SNOWTAM





# Train the Trainer Session in collaboration with MAHB







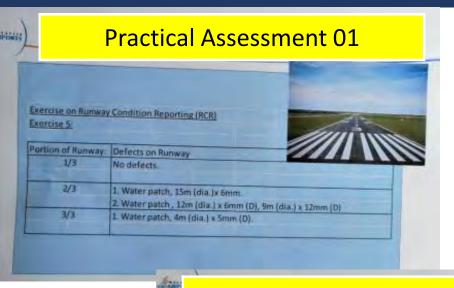




## Train the Trainer Session on 10-12 Feb 2020 at Malaysia Airports Training Centre (MATC)



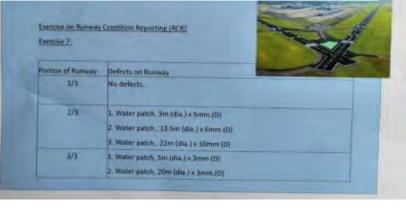
Site Preparation for Mock Up RWY & TWY at Training Centre



#### **Practical Assessment 02**

Exercise 6:		
Portion of Runway:	Defects on Runway	
1/3	1. Water patch, 8m (1) x 10mm (0) 2. Water patch , 12m (dia.) x 6mm (0)	
2/3	No defects.	
3/3	Water patch, 4m (dix.) x 5mm (D).     Water patch, 5m (L) x 45m (W) x 10mm (D)	

### **Practical Assessment 03**









CRI is requesting approval from ATC prior entering active RWY

Measuring "affected area" on the runway



CRI is "measuring the water depth" on the runway







## GRF-RCR implementation in Malaysia is a collaboration between CAAM & Airport Operator, MAHB



On 5 November 2020, THE GLOBAL REPORTING FORMAT for runway surface conditions, will become applicable worldwide.



