

Excursion Hazards and Mitigation Strategies – Airport Operator’s Perspective

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What is Runway Excursion?

- **ICAO Definitions:** An incident or accident involving only a single aircraft, where it makes an inappropriate exit from the runway.
- Two types of runway excursion accidents:
 - ➔ runway overruns, in which the aircraft goes off the runway end
 - ➔ and runway veer-offs, in which the aircraft goes off the side of the runway.



Fundamental of Runway Excursions

- Runway excursions during takeoff and landing continue to be the highest category of aircraft accidents and often exceed 25%



- 67% of runway excursions occurred in daylight vs. 24% in darkness
- 17% of runway excursions occurred during takeoff vs 83% during landing



- Runway excursions were almost equally divided, with 54% veer-off and 46% overrun

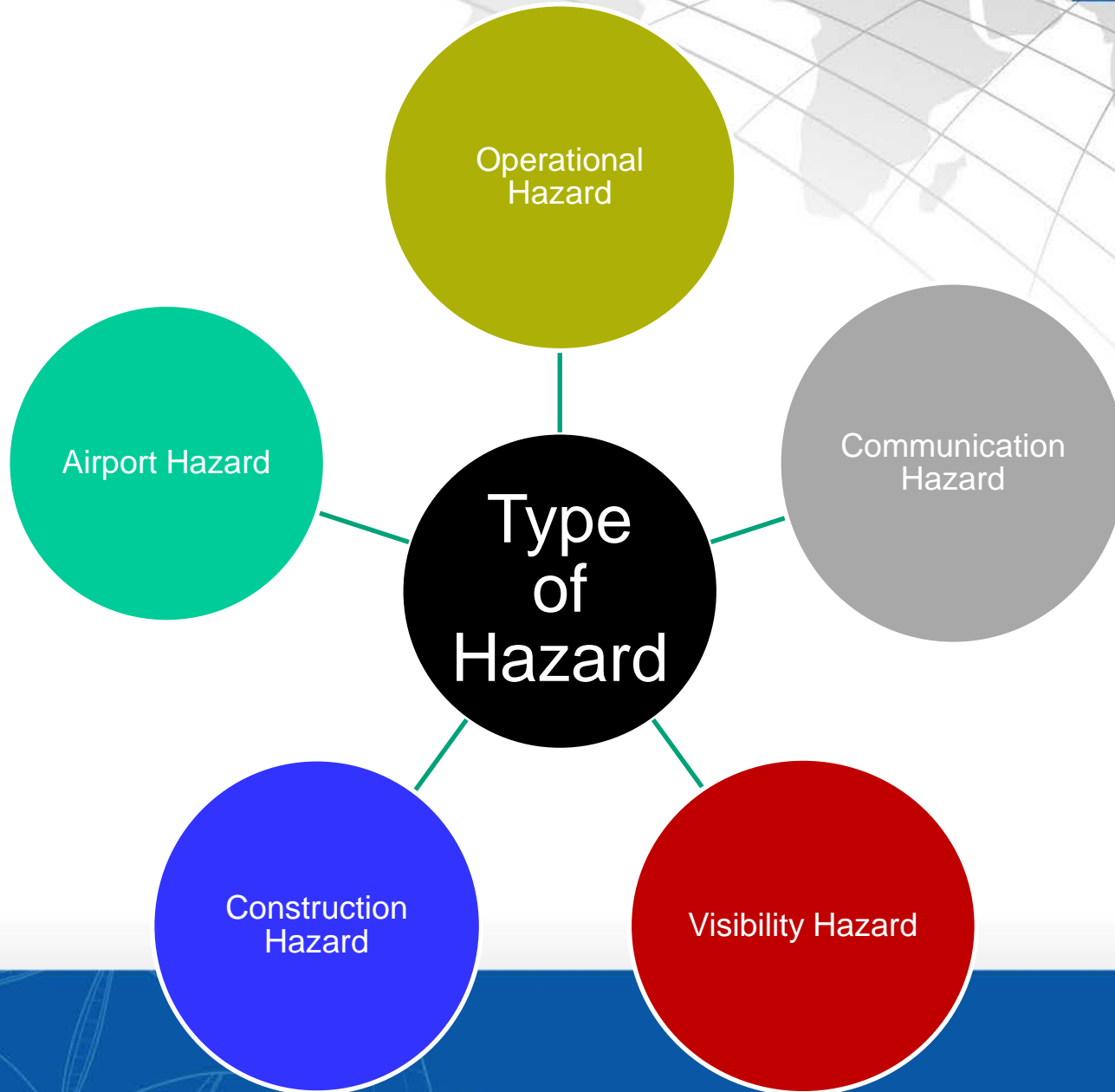


Impact of Runway Excursions

IATA Safety Report for 2009 showed a continued high number of runway excursions, costing 19 lives and an estimated US\$900 million in 2009 alone

- Loss of life
- Property Loss
- Flight Diversion
- Runway Closed
- Airport Closed
- Loss of business
- Legal Issue
- Inconvenience to Pax
- Loss of Revenue
- Damage to the reputation
- Loss of staff productivity
- Insurance deductibles

Type of Excursion Hazards

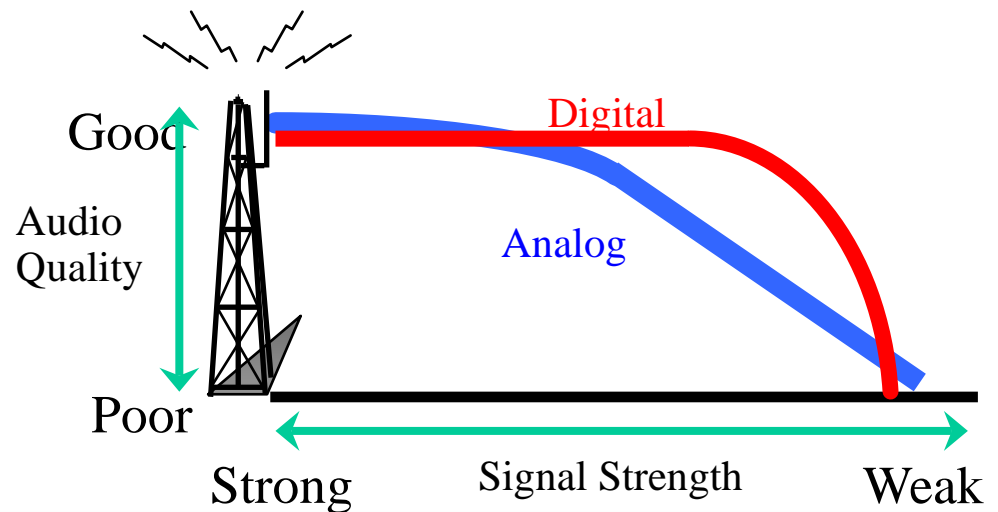


Communication Hazards

- Non effective Radio Communications
 - Standard phraseology, reception not clear, frequency congestion
- Non effective relay of runway conditions
 - Status report of runway condition
 - Lack of competency
- Failure/Late notification on closure of maneuvering area
 - NOTAM issued but pilot may not read it
- Information published on the new development/changes
 - AIP Supplement issued but it was overlook

Mitigation Strategy 1

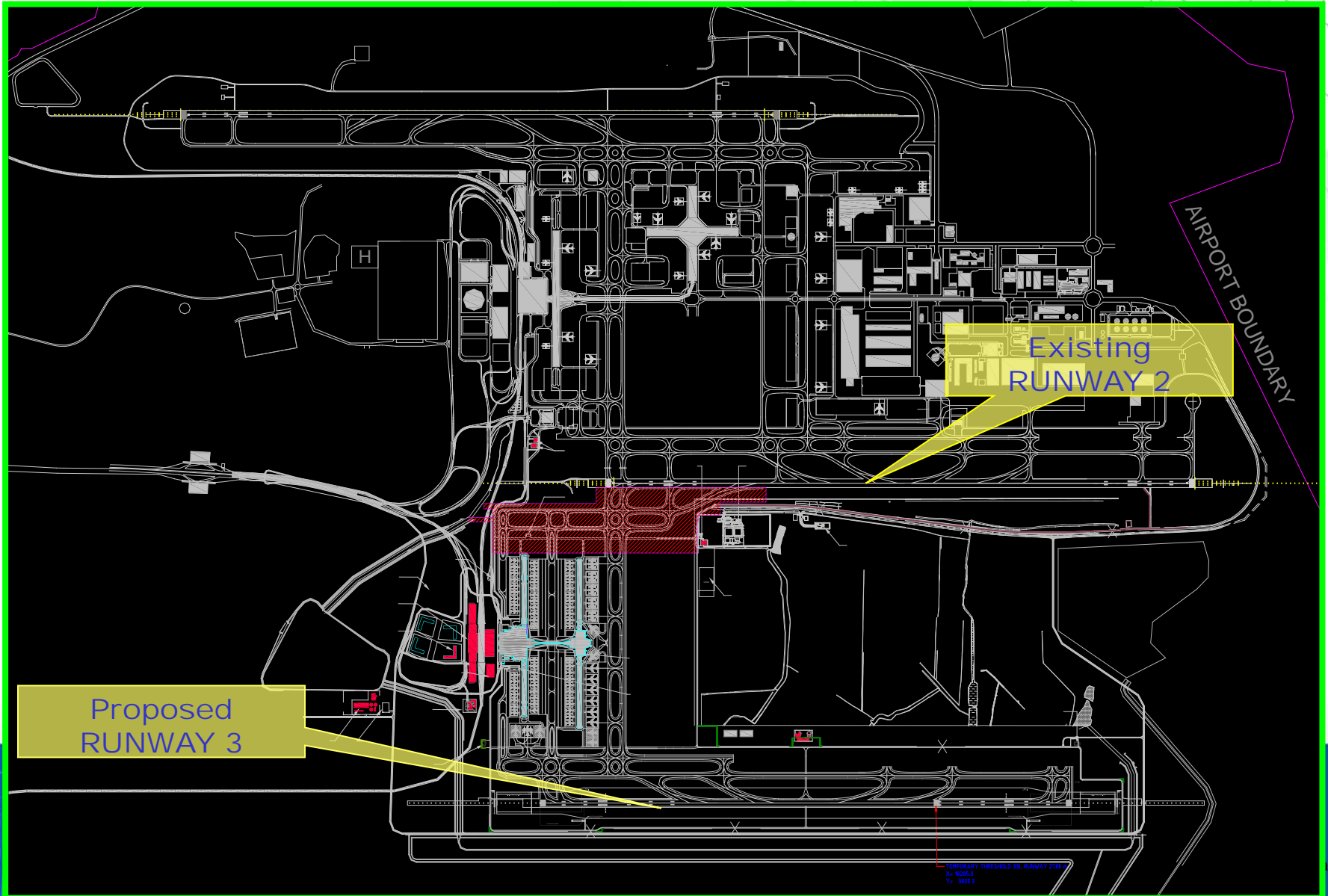
- Runway condition reports minimum 4 times a day (immediate report via TRS & reports)
- Improve radio communication - Introduction of digital trunk radio system, TETRA



Construction Hazards

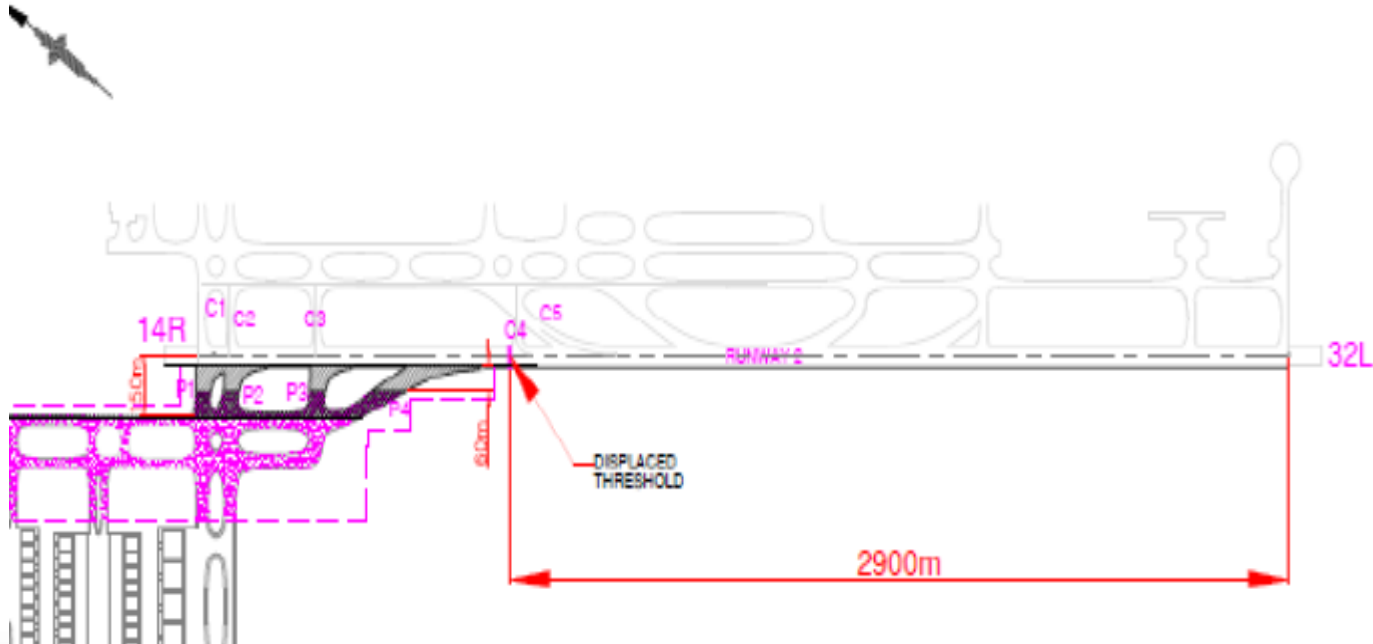
- Information of effective runway length data is not accurately published
 - Displaced threshold with calculation of TORA, TODA, ASDA, LDA by airport operator
 - Closure of maneuvering area i.e taxiway, runway
 - Weather conditions
- Non effective indication of closure area
 - Marker boards & lightings
- Construction equipment within the safety area may impact severity of excursion event

KLIA Layout Plan



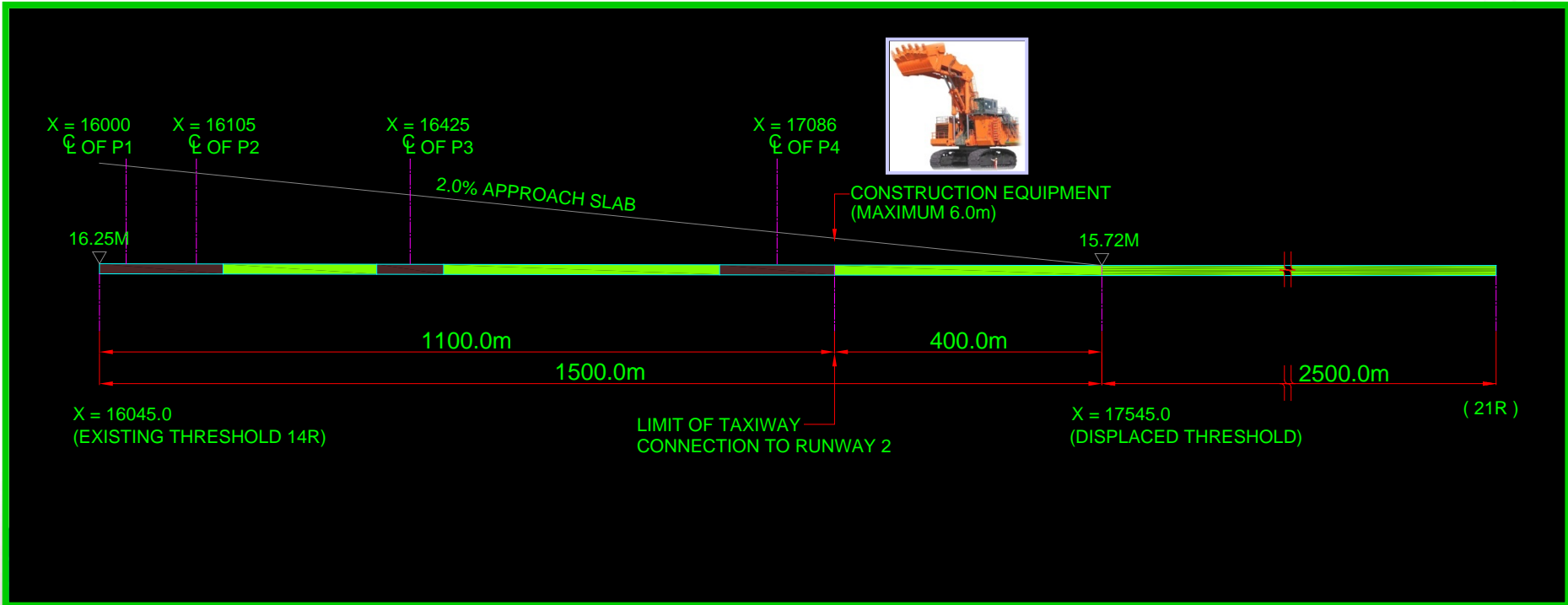
Temporary Displaced Threshold – Works Area

PROPOSED DEVELOPMENT OF NEW LCC TERMINAL (KLIA2) AND ASSOCIATED
WORKS AT KUALA LUMPUR INTERNATIONAL AIRPORT



Mitigation Strategy 2

- Briefing to airlines, ATC, airport community at every stages of development
- Provide safe distance of construction equipment & frequent briefing to contractor



Mitigation Strategy 3

- Proper signs and lightings for close area and displaced threshold



Mitigation Strategy 4

- Proper indication of temporary unserviceable area



Visibility Hazard

- Heavy fog on ground level
- Bad weathers- Heavy thunderstorm
- unclear sighting
 - ✈ low visibility
 - ✈ Reflection of sun
- Mitigation 5: Declaration of Aerodrome Operating Minima

4. BASIC PROCEDURAL REQUIREMENTS

22. Procedures are an important and integral in the application of aerodrome operating minima. The required procedures shall be implemented partly by the aerodrome operator, partly by the air traffic control units, and partly by the pilots.

23. The procedures to be employed at a particular aerodrome will be dictated by both traffic density and visibility conditions.

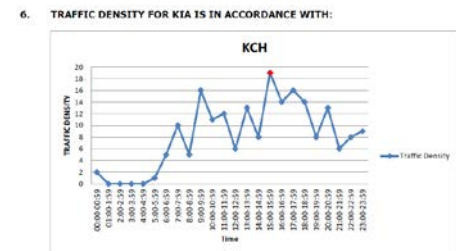
24. The required procedures on the part of aerodrome operator listed in Appendix B.

5. VISIBILITY CONDITION FOR KIA IS IN ACCORDANCE WITH:

Visibility Condition 1

Horizontal visibility sufficient for pilot to taxi and to avoid collision with other traffic on the taxiways and at intersections by visual reference, and for personnel of an traffic control units to exercise control over all traffic on the basis of visual surveillance. The visibility shall not be less than 800 m or 550 FVR.

WBGG Runway 25 is comply and declared as Precision Approach Category 1.



32. Traffic density to be considered as Medium if of the order of 16 to 25 movements per runway or between 20 to 35 total aerodrome movements in the mean busy hour.

7. BASIC INFRASTRUCTURE AND FACILITIES REQUIREMENT are as in (APPENDIX 'A').

Legends: ■ Available at WBGG ■ Additional at WBGG

(APPENDIX 'A')

Aids	Traffic density Visibility Condition	Light			Medium			Heavy			
		1	2	3	1	2	3	1	2	3	
MARKINGS											
Aircraft stand Markings		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Apron safety lines		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Runway designation marking		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Runway threshold marking		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Runway centre line marking		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Touchdown zone marking [for precision runway Code 2, 3 or 4]		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aiming point marking [for instrument runway Code 2, 3 or 4]		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Runway turn pad markings [where runway turn pad is provided]		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taxiway centre line marking		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Runway holding position marking		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Intermediate holding position marking [where applicable]		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Road-holding position marking [where applicable]		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Mitigation Strategy 6

- Additional lightings for Cat I Operation
 - ➔ Runway Centerline light for Runway 60 m width
 - ➔ Taxiway Centerline light
 - ➔ Stopbar light, guard light
 - ➔ Intermediate Holding position
- Improve runway marking with standardized colour /chromaticity & reflective type-glass beads



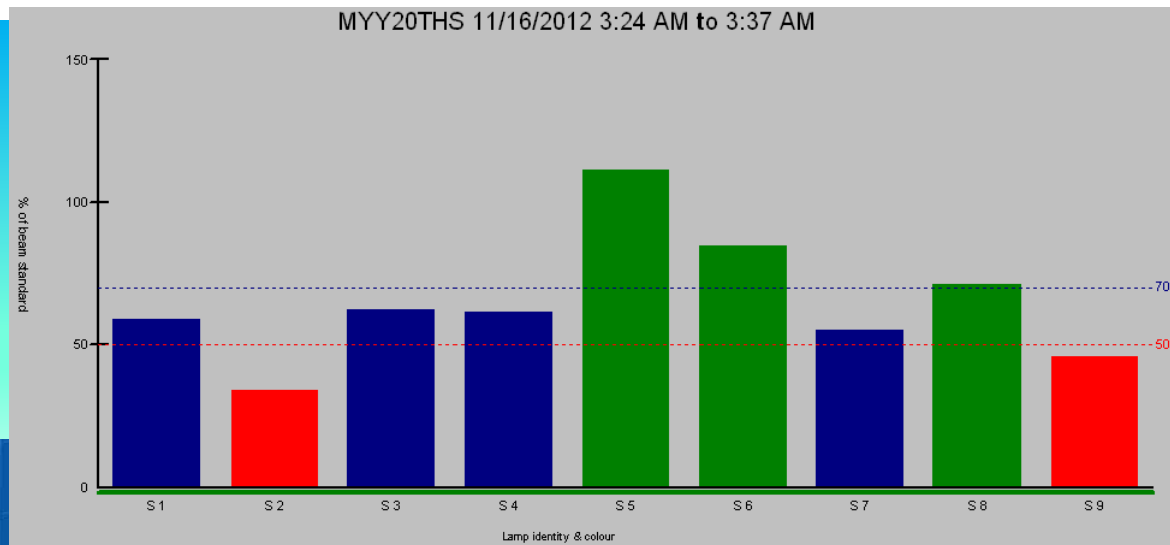
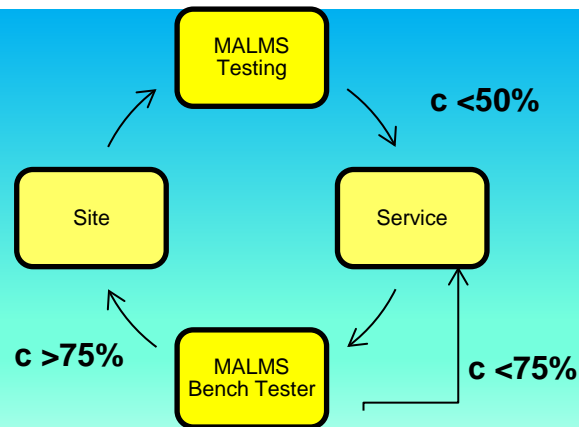
Operational Hazard

- Markings
 - ➔ Markings on Runway faded/not clear
- Airfield Ground Lightings
 - ➔ Lighting performance degradation
- Runway surface conditions
 - ➔ Aqua planning/drainage
 - ➔ Rubber deposit
- Proper graded runway strip
 - ➔ pavement lip not flush
- Runway pavement performance deterioration



Mitigation Strategy 7

- Ensure intensity of AGL – MALMS
 - photometric measurement of both inset and elevated AGL quarterly
 - pinpoint lighting degradation problems



Mitigation Strategy 8

- Monitor & maintain Runway friction level
 - ➔ Weekly friction test using Saab surface friction tester
 - ➔ Maintenance level (0.47mu) vs ICAO (0.34mu)
 - ➔ Derubberize when it reaches 0.47mu
 - ➔ Grip Tester at other airport with maintenance level (0.53mu) vs ICAO (0.34mu)
- Standardize paint marking – Colour, chromaticity, material, application

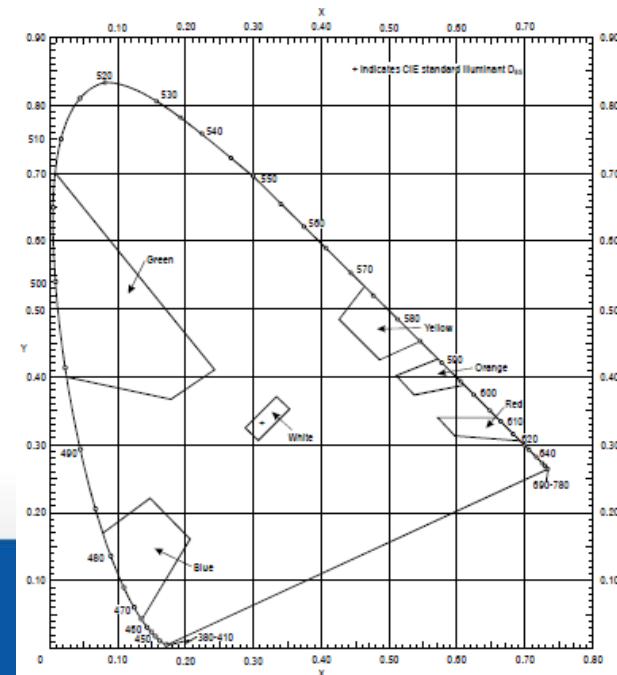


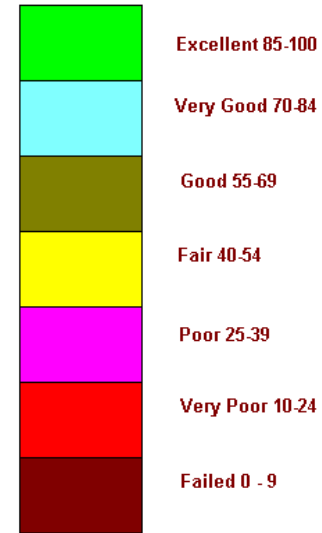
Figure A1-3. Colours of retroreflective material: for markings, signs and panels

Mitigation strategy 9

Airport Pavement Management System

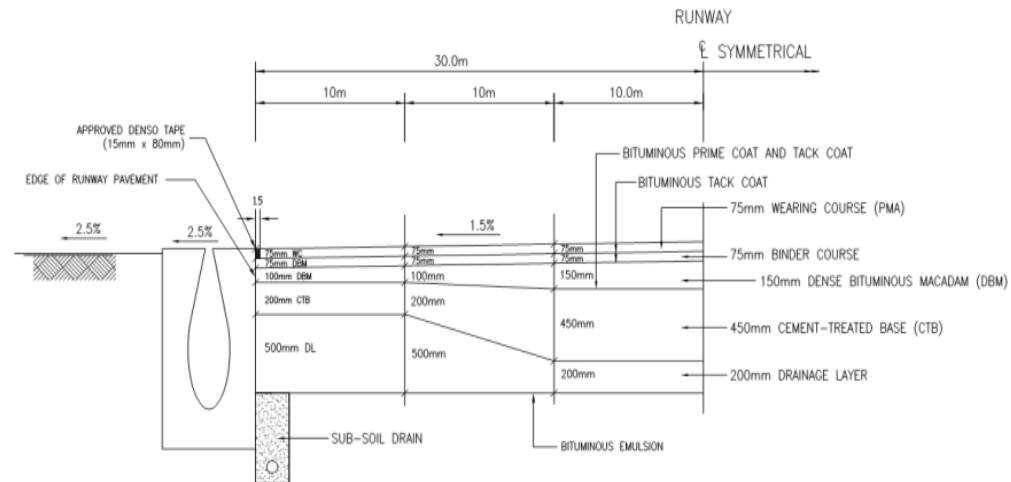
- systematically assess and evaluate pavement conditions & performance every 2 years
 - Longitudinal surface profile
 - Bump index
 - Remaining Life
 - Strengths-PCN, ACN
 - PCI
- predict pavements performance-historical & present visual, structural and functional data in a structured approach
- strategize on operational maintenance & rehabilitation, budgeting, financial planning and evaluation of future pavement designs

Pavement Condition Index Scale



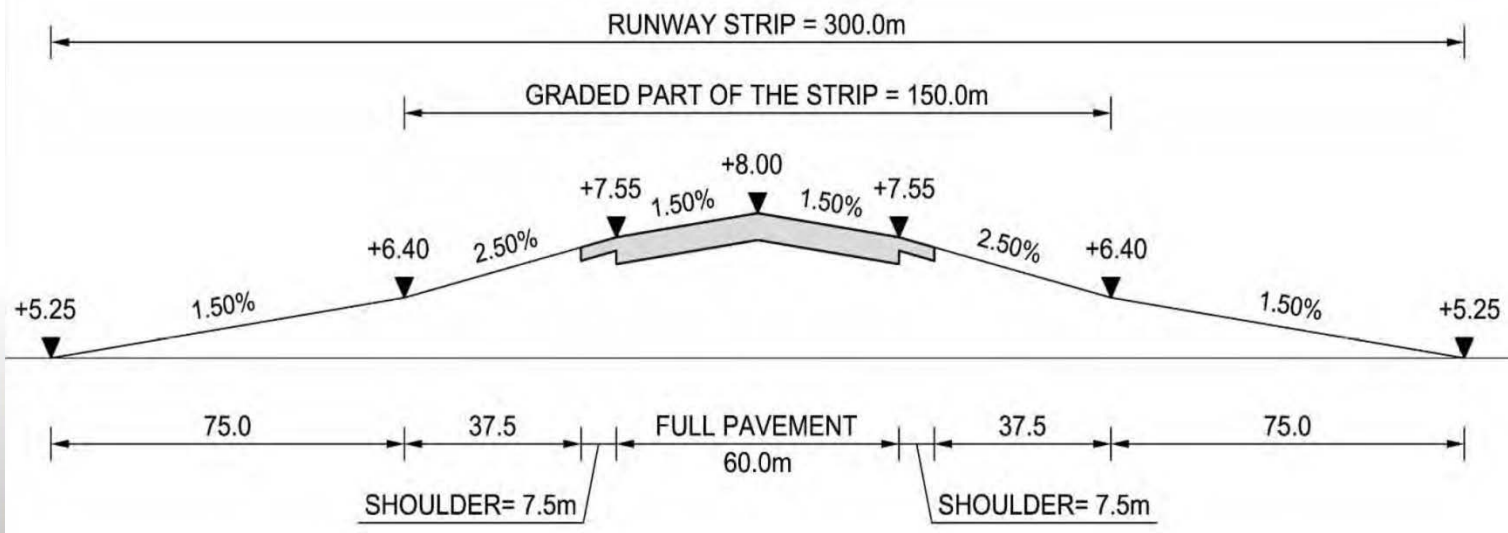
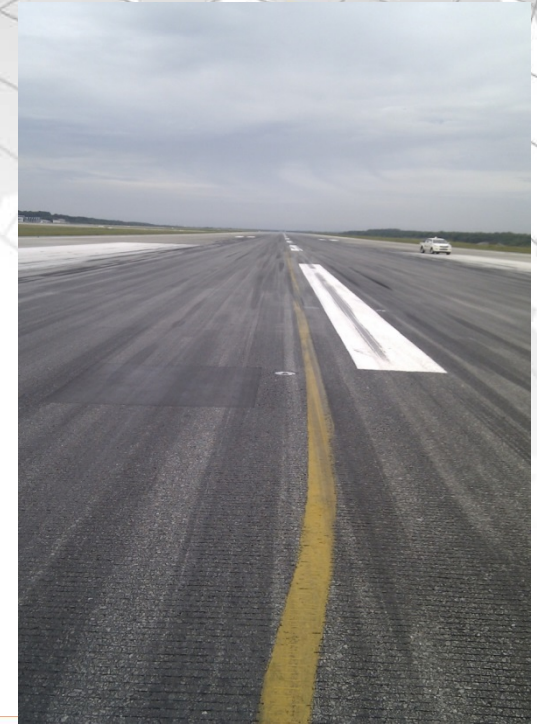
Airport Hazards

- Design of Runway
 - Curvature-single crossfall vs camber
 - Drainage/aquaplaning
- Unavailability of Runway End Safety Area (RESA) or Engineered Material Arrestor System (EMAS)



Mitigation Strategy 10

- Design of runway shall consider
 - Single crossfall vs camber
 - Groove to increase aqua planning & friction level (6mm x 6mm @45mm)
 - Proper drainage system
- Provide RESA at minimum 90 metres
 - Expansion/New development
 - No EMAS been installed in Malaysia



**Thank you
Terima kasih**