

APRAST/25 — State / Industry / ICAO
Presentation

SCHEDULE-OPTIMIZED RUNWAY RECONSTRUCTION WITH SAFETY ASSURANCE UNDER OPERATIONAL AERODROME CONDITIONS



Jinnah International Airport, Karachi



SCHEDULE
OPTIMIZED



SAFETY
ASSURED



OPERATIONS
CONTINUED

Bangkok, Thailand | 22–26 June 2026 | Presented by PAA



From infrastructure delivery to a reusable safety assurance
model for runway works under live aerodrome operations

Agenda



Project Context & Need

Why a Code 4F reconstruction was required



Project Scope

Runway, taxiways, lighting, navigation aids



Operational & Environmental Constraints

Single-runway working at a live aerodrome



Major Risks Identified & Controlled

Incursion, FOD, utilities, obstruction, HSE



Construction Record

Photographic evidence from the field



Integrated Safety Assurance Framework

The three-stage SMS lifecycle



Stage 1 — Pre-Construction Planning

Translating risk into executable controls



Stage 2 — Construction Safety Assurance

Managing the construction–operations interface



Stage 3 — Operational Readiness

Validation, certification & restoration



Coordination & Schedule Optimization

Governance, monitoring and delivery



AIRAC Synchronization & Commissioning

Procedures, flight validation and go-live



Outcomes, Lessons & Action

Results and the invitation to the Meeting



The Need for Reconstruction

**1961**

Original construction — design life exceeded

**4E → 4F**

Aerodrome reference code upgrade

**+300 m**

Extension: 3,200 m to 3,500 m

**2 Runways**

Parallel runways, ~305 m apart

**Infrastructure Need**

Jinnah International is Pakistan's primary international gateway. Runway 07L/25R had exceeded its design life and required complete reconstruction.

**Operational Imperative**

An upgrade to Code 4F standards was needed to accommodate the largest aircraft and to support sustained future traffic demand.

**Safety Positioning**

PAA, the State aerodrome operator, framed the works as an aerodrome-safety undertaking — not merely a civil-engineering contract.



Core message: a major runway reconstruction can be delivered under live aerodrome conditions when scope, safety assurance and operational continuity are treated as one integrated system.

Project Scope at a Glance



Karachi (JIAP) — two-runway configuration. 07L/25R reconstructed and extended; operations sustained on 07R/25L.



Runway Works

Full reconstruction and 300 m extension (3,200 → 3,500 m) to Code 4F.



Taxiway Works

Reconstruction and realignment of taxiways Golf, Quebec and Foxtrot.



Airfield Lighting

Replacement of airfield ground lighting (AGL) systems and circuits.



Navigation Aids

Relocation and re-installation of the Runway 25R localizer.



Flight Procedures

Redesign, validation and AIRAC promulgation of instrument flight procedures.

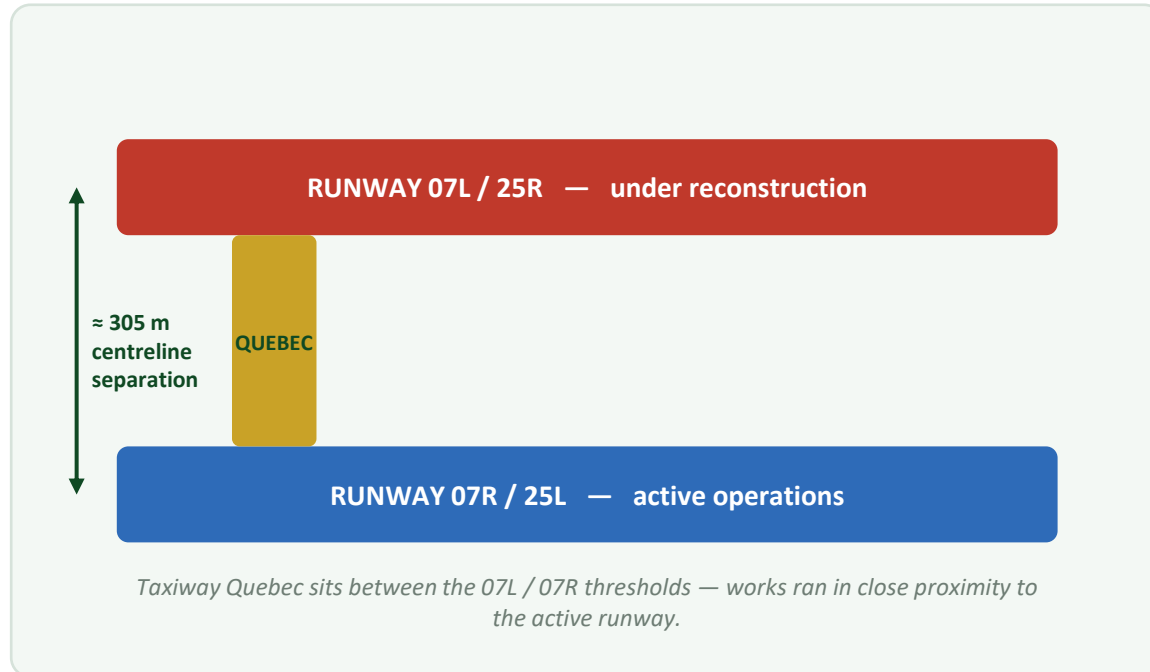
Scope = Runway + Taxiways + Airfield Lighting + Localizer + Flight Procedures — a full operational upgrade, not pavement works alone as per ICAO Annex 14, Volume I – Aerodrome Design and Operations; ICAO Doc 9157 Aerodrome Design Manual..

A Regional Challenge; A Transferable Safety Solution

- ✓ Major runway works are increasing globally.
- ✓ Many airports cannot fully close.
- ✓ Construction–operations interfaces create significant safety risks
- ✓ The Karachi experience demonstrates a practical SMS-based approach
- ✓ The framework is scalable and transferable to other ICAO States.



Operational & Environmental Constraints



Single-Runway Operation

All traffic carried on one runway for ~18 months.



Movement-Area Interfaces

Quebec, Golf & Foxtrot tied to the live runway.



Climatic Constraints

Peak summer heat forced night-time paving and double shifts.

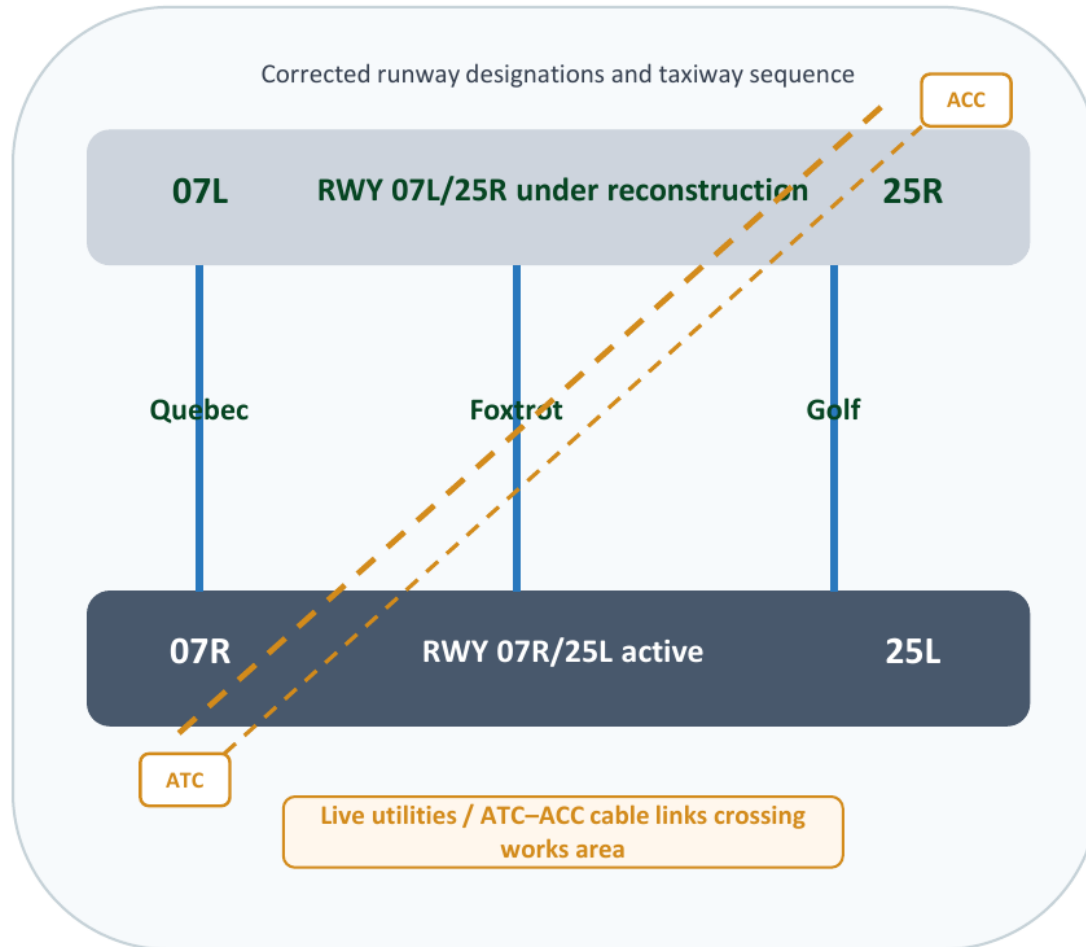


FOD & Utilities

Debris control plus protected underground services.

conditions of a working international airport — **the constraints were designed around, not waited out.**

Operational & Environmental Constraints



Single-runway configuration

Operations continued using 07R/25L while 07L/25R and linked infrastructure were reconstructed.

Movement-area interfaces

Taxiways Quebec, Foxtrot and Golf required tight control due to proximity and connectivity with the active runway.

Live utilities / ATC-ACC links

Live utilities crossed the construction site, including critical ATC-ACC service/cable links requiring tracing, protection and controlled diversion.

Environmental constraints

Karachi summer conditions required night works and double shifts during critical pavement phases.

Major Risks Identified & Controlled



Runway Incursion

Controlled access, authorization, security verification and RT-fitted inspection vehicles.



Foreign Object Debris

Routine FOD walks, post-rainfall inspections and water sprinkling on machinery routes.



Operational Disruption

NOTAM-governed sequencing and continuous ATC coordination to protect movements.



Live Utility / Cable Conflicts

CNS and power cables jointly identified and re-routed before execution; cable detection.



Obstruction / OLS

Obstacle limitation surfaces maintained per Annex 14, with obstruction lighting and clearances.



Workforce HSE

Permit-to-work, toolbox talks, PPE discipline and emergency-response arrangements.

Risk framing: construction hazards were managed as operational aerodrome risks within the SMS — not only as contractor HSE matters.

STAGE 1

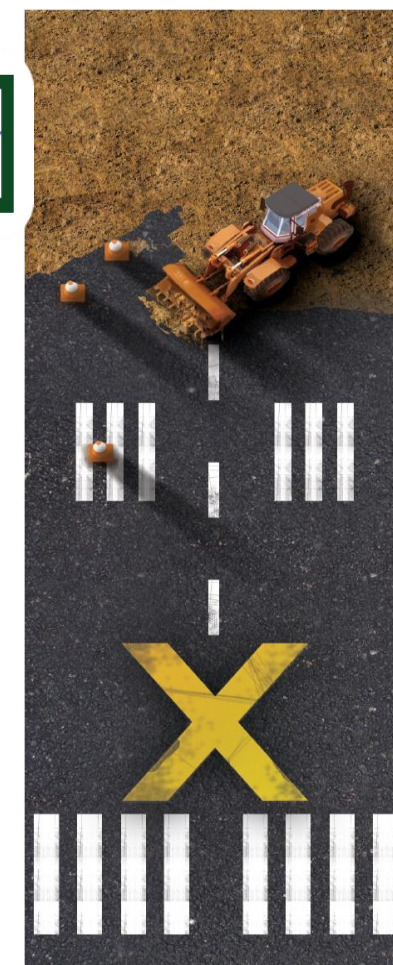
PRE-CONSTRUCTION SAFETY PLANNING



Objective: Identify hazards, define operational constraints, and integrate mitigation measures into project planning and contractual framework.

- | | |
|---|--|
| <ul style="list-style-type: none"> Multidisciplinary Safety Risk Assessment Hazard Identification Operational Continuity Planning Construction-Operations Interface Review Mitigation Measures Planning | <ul style="list-style-type: none"> Regulatory Coordination (ICAO SARPs, CAA requirements) Emergency Preparedness Planning Integration of Safety Requirements into Contract Scope Definition of Roles and Responsibilities Operational Feasibility Assessment |
|---|--|

KEY OUTPUT: Safety-driven project scope and implementation framework (Safety Plan as the Project "Bible").



STAGE 2

CONSTRUCTION / IMPLEMENTATION SAFETY ASSURANCE



Objective: Implement and continuously monitor mitigation measures during construction activities while maintaining safe air operations.

- | | |
|--|--|
| <ul style="list-style-type: none"> Implementation of Approved Mitigation Measures Continuous Safety Monitoring and Hazard Surveillance Coordination with ATC and Aerodrome Operations FOD Control and Housekeeping | <ul style="list-style-type: none"> Access Control and Movement Area Protection Permit-to-Work System Inspections, Audits and Safety Performance Monitoring Corrective Actions and Continuous Improvement |
|--|--|

KEY OUTPUT: Safe continuity of aerodrome operations during construction.

- ICAO Annex 19
- ICAO Doc 9859
- Aerodrome SMS Requirement

Three-stage Safety Assurance Framework

STAGE 3

POST-CONSTRUCTION OPERATIONAL READINESS & SAFETY VALIDATION



Objective: Ensure safe operational restoration and regulatory compliance prior to commissioning the runway.

- | | |
|--|--|
| <ul style="list-style-type: none"> Post-Construction Safety Assessment Flight Procedure Design / Re-design Flight Validation and Trials Calibration of Navigation Aids and Airfield Lighting | <ul style="list-style-type: none"> AIRAC Synchronization and Data Publication Regulatory Inspections and Certification Operational Readiness Verification Operational Commissioning Approval |
|--|--|

KEY OUTPUT: Safe, compliant and timely operationalization of the upgraded runway and allied infrastructure.

STAGE 1

Pre-Construction Safety Planning

How risks were translated into executable controls before any site works began.



Multidisciplinary SRA

Hazard identification, risk analysis and evaluation across all disciplines.



Scope & Interface Identification

Works, construction–operations interfaces and operational impacts mapped.



Contract Integration

Safety requirements, roles and SMS alignment written into the contract.



Mitigation Planning

Risk treatment, controls, permits and the NOTAM strategy defined up front.

SUPPORTING DOCUMENTATION DEVELOPED

Environmental Plan

Health & Safety Plan

Safeguard Docs

Emergency Response

Work Methodology

Maintenance & Training



Operational Continuity

Single-runway working planned and de-risked in advance.



Runway Safety

Movement-area interfaces and clearances pre-defined.



Regulatory Readiness

Approvals and compliance pathways established early.

Pre-Construction Safety Planning



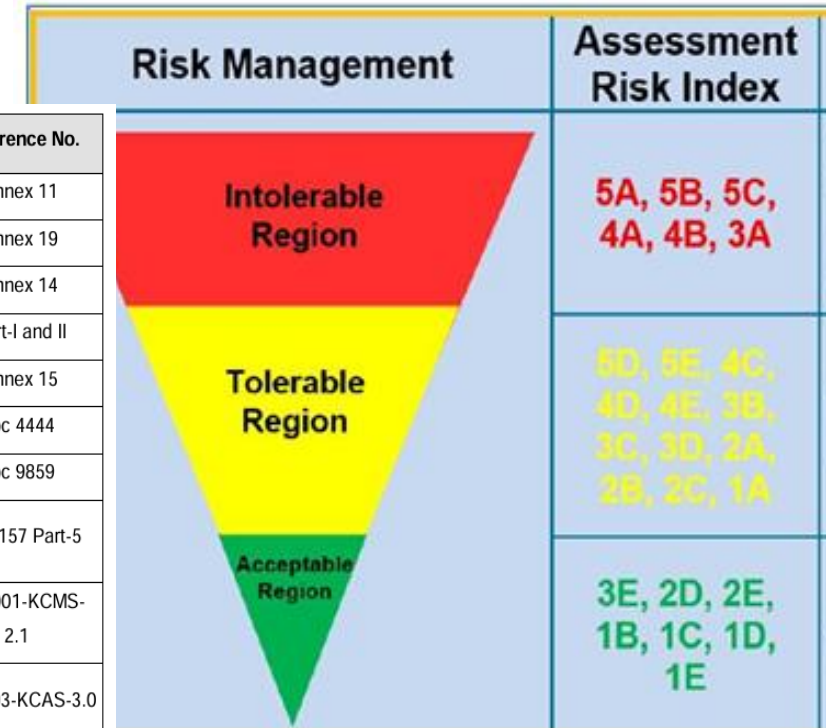
**SAFETY ASSESSMENT OF
OPERATIONS ON PROPOSED SCOPE AND
CONSTRUCTION WORK AND CONTINUITY OF
OPERATIONS ON PARALLEL RUNWAY (07R/25L)
JIAP, KARACHI**

SAFETY RISK ASSESSMENT REPORT

Safety Risk		Severity				
Probability		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely Improbable	1	1A	1B	1C	1D	1E

Table D7-2: Safety Risk / Impact Matrix

S No.	Name of Document	Reference No.
1.	Air Traffic Services	Annex 11
2.	Safety Management System	Annex 19
3.	ICAO Aerodrome design & operation – volume I	Annex 14
4.	ICAO doc 9157 aerodrome design manual	Part-I and II
5.	Aeronautical information Service	Annex 15
6.	PANS Air Traffic Management	Doc 4444
7.	Safety Management Manual	Doc 9859
8.	ICAO Aerodrome Design Manual Part-5 Electrical Systems	Doc 9157 Part-5
9.	Aerodrome Safety Management System JIAP Karachi	MNL-001-KCMS-2.1
10.	Operation of personnel and vehicles on the movement area at airside	SOP-003-KCAS-3.0
11.	Aeronautical Information Publication Pakistan	7 th Edition
12.	Aeronautical Telecommunications	Annex 10 Volume 1
13.	Aeronautical Telecommunications	Annex 10 Volume 3
14.	Aeronautical Telecommunications	Annex 10 Volume 4

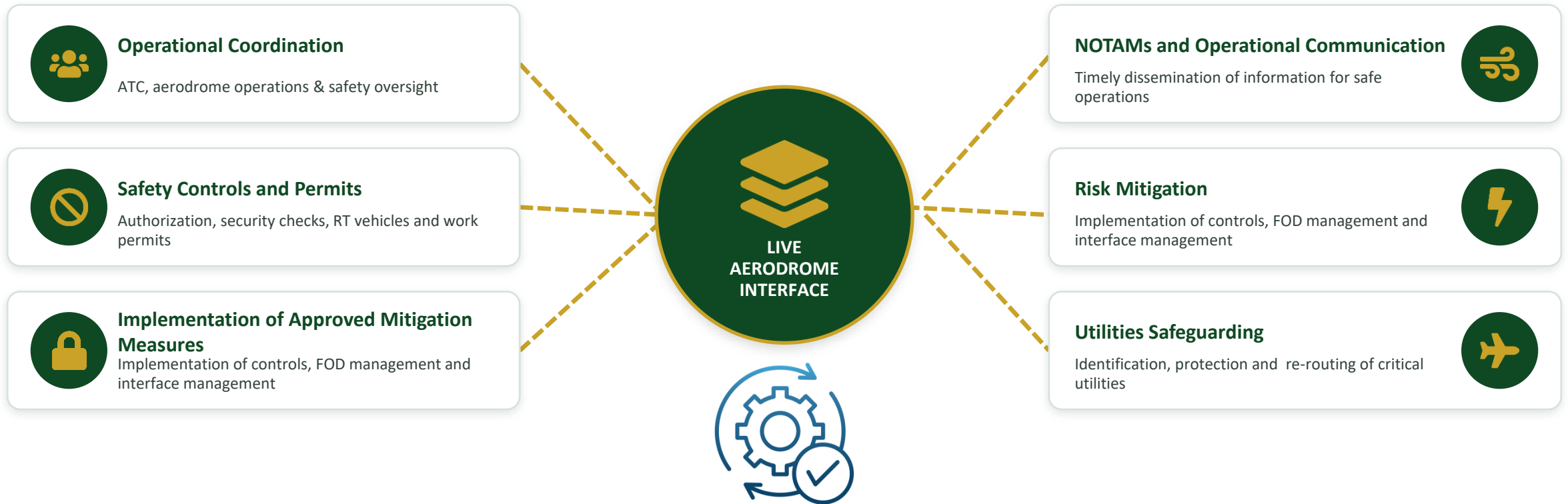


STAGE 2

Construction / Implementation Safety Assurance



Construction controls were operated as aerodrome operational-risk controls, around a single live interface.



STAGE 3

Post-Construction Operational Readiness & Validation



WHY READINESS WAS COMPLEX



-  **300 m extension**
Runway 07L threshold displaced
-  **Localizer relocated**
Runway 25R localizer & shelters re-installed
-  **Procedures redesigned**
Previously published 07L/25R procedures revised
-  **Survey of Pakistan**
Engaged ~5 months early for updated aerodrome data

READINESS WORKSTREAMS



Post-Construction SRA

Re-validation of operational readiness, risks and controls.



Flight Procedure Design & Validation

Revised procedures developed and validated by the Flight Inspection Unit.



Calibration of Navigational Aids and Airfield Lighting

ILS (Localizer and GP) and AFL calibration



Certification & Approvals

Regulatory inspection, certification and operational clearances.



AIRAC Synchronization

Promulgation in the AIP, synchronized to the applicable AIRAC cycle.

Updated operational characteristics and revised procedures were validated before regulatory approval — **readiness was engineered, not assumed.**



**SAFETY ASSESSMENT FOR RESTORATION OF FLIGHT
OPERATION FROM MAIN RUNWAY (07L/25R) AFTER
COMPLETION OF RE-CONSTRUCTION AND
UPGRADATION WORKS AT JIAP KARACHI**

REPORT PART-I

**PAA Test Flight for validation of Flight procedures, cal-
ibration of ILS & PAPIs on RWY 07L/25R**

OFFICE OF PRIME INTEREST: SQMS Directorate HQPAA, Karachi.

Date of Assessment: 22-12-25 to 29-12-25

**Post-
Construction
Operational
Readiness &
Validation**



**SAFETY ASSESSMENT FOR RESTORATION OF FLIGHT
OPERATIONS FROM MAIN RUNWAY (07L/25R) AFTER
COMPLETION OF RE-CONSTRUCTION AND
UPGRADATION WORKS AT JIAP KARACHI**

REPORT STAGE- II

**Complete Restoration of Commercial Flights from Up-
graded Runway (07L/25R)**

DATE OF ASSESSMENT: 22-12-25 to 07-01-26
OFFICE OF PRIME INTEREST: SQMS Directorate HQPAA, Karachi.

STAKEHOLDER ENGAGEMENT



Multiple stakeholder interfaces were converted into controlled governance loop.



STAKEHOLDER ENGAGEMENT MODEL : SMS PRINCIPLE (ANNEX 19)



Air Traffic Control

Movement protection & clearances



Aerodrome Operations

Live airside management



Construction Teams

Sequencing & execution



CAA Regulator

Oversight, approval & certification



Survey of Pakistan

Aerodrome data & coordinates



CNS / OEM Specialists

Nav aids & systems re-installation



Airlines & Ground Handling

Familiarization & joint FOD walks



AIS / NOTAM

Information promulgation

Scheduled site reporting fed consolidated reviews — a single governance rhythm across every interface

Schedule Optimization & Progress Monitoring



18 months

Reconstruction & Code 4F upgrade



Double shifts

Night paving on critical phases



D / W / M

Daily, weekly & monthly reviews



Multi-source

Long-lead procurement & buffer stock

KEY SCHEDULE CONTROLS

- Baseline programme defining activity sequencing, milestones and delivery benchmarks
- Planned-versus-actual progress assessed continuously against the baseline
- Long-lead imported items ordered early through multiple approved sources
- Customs and regulatory clearances coordinated to guarantee on-site availability
- Manufacturing verified through periodic coordination and production-facility visits
- Critical-path activities protected; flexible activities advanced to hold momentum

CONTINUOUS DELIVERY CYCLE



Plan



Monitor



Correct

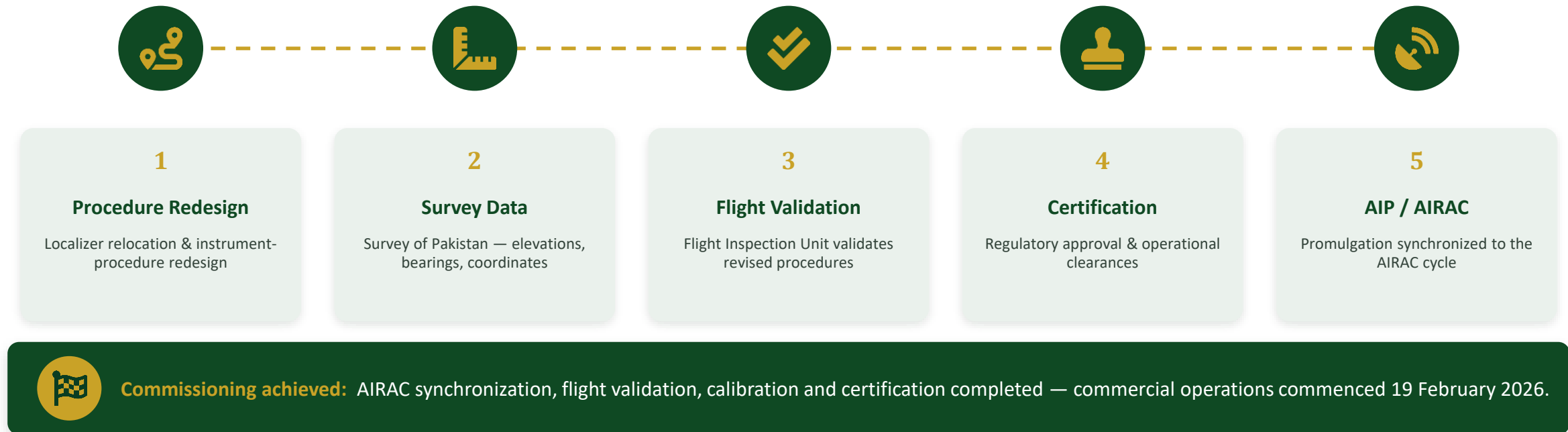


Optimize

A pre-emptive cycle: planned and actual progress compared continuously, with work re-sequenced early to keep the critical path on time.

AIRAC Synchronization & Commissioning

The promulgation sequence that carried the upgraded runway from validation to live commercial operations in line with ICAO Annex 14 and Annex 15





Quantifiable Results



18 months

reconstruction & Code 4F upgrade in stipulated contract timeframe



~60k aircraft movements

handled safely



~10M passengers

facilitated during works



0.99M man-hours

worked with zero LTI



0 LTI

lost-time injuries



0 occurrences

operational safety events



4 Jul 2024

Works commenced



3 Jan 2026

Reconstruction completed



19 Feb 2026

Commercial operations

Operational Safety Result No incursion, no operational disruption and no reportable safety occurrence across the works.

Capacity Restoration Full runway capacity restored through schedule adherence and coordinated commissioning.

Site Conditions During Reconstruction

Selected field evidence — pavement dismantling, high-temperature working, and the reconstructed running surface.



Pavement dismantling & reconstruction interface



High-temperature field condition ($\approx 27^{\circ}\text{C}$ surface)



Reconstructed runway surface



Final surface — markings & lighting (25R)

Safety, Training & Systems Interface

Coordination meetings, HSE training, and the vault / airfield-lighting systems interface.



Safety & health coordination meeting



Vault-room briefing — airfield lighting systems



Vault station equipment / CCR room

Flight Validation, FOD Walk & Commissioning

From pavement reconstruction to Code 4F operational capability

PAVEMENT REMOVAL / RECONSTRUCTION PHASE



UPGRADED RUNWAY INFRASTRUCTURE



1961 pavement



New rigid pavement

ICAO Code 4E



ICAO Code 4F

3,200 m



3,500 m

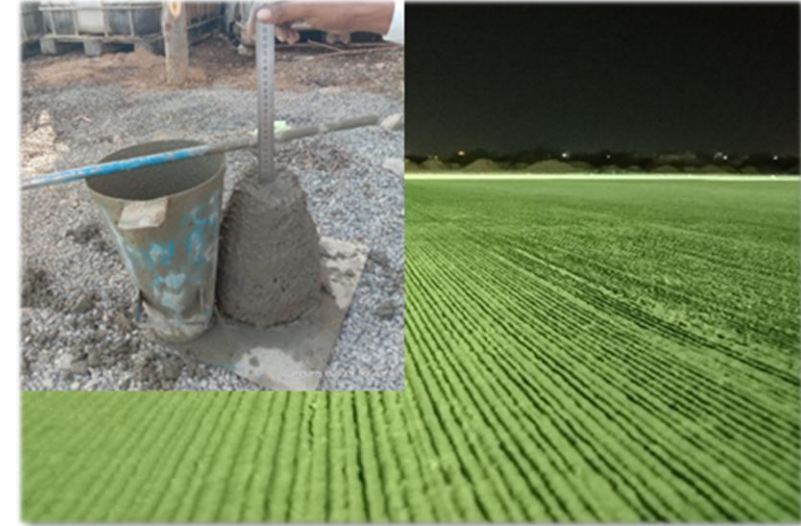
Aging AFL / systems



Upgraded AFL, localizer & systems (CAT-1 systems)

Impact: scope upgrade converted a decades-old runway into a certified Code 4F operational asset while airport operations continued.

PAVEMENT QUALITY CONCRETE WORK WITH SLIP FORM PAVER



RUNWAY PQC MILESTONE – ONE MONTH EARLIER TO PLANNED



Pakistan Airports Authority

4 August · 🌐

🏗️ Major Milestone Achieved at Jinnah International Airport - PQC Completed Ahead of Schedule! 🎉

Pakistan Airports Authority (PAA) has completed the Pavement Quality Concrete (PQC) works on the main runway (07L/25R) of Jinnah International Airport, Karachi - a full month ahead of schedule! ✅

This milestone marks a big leap forward in the airport's ongoing upgradation project. Executed using advanced slipform paving technology, the PQC phase ran round the clock with seamless coordination and precision.

🛩️ Meanwhile, the new Airfield Lighting (AFL) system - including imported lights, cables, and guidance signs - has been fully delivered and is currently being installed.

🔴 Final touches like runway centerline painting and taxiway markings are now underway.

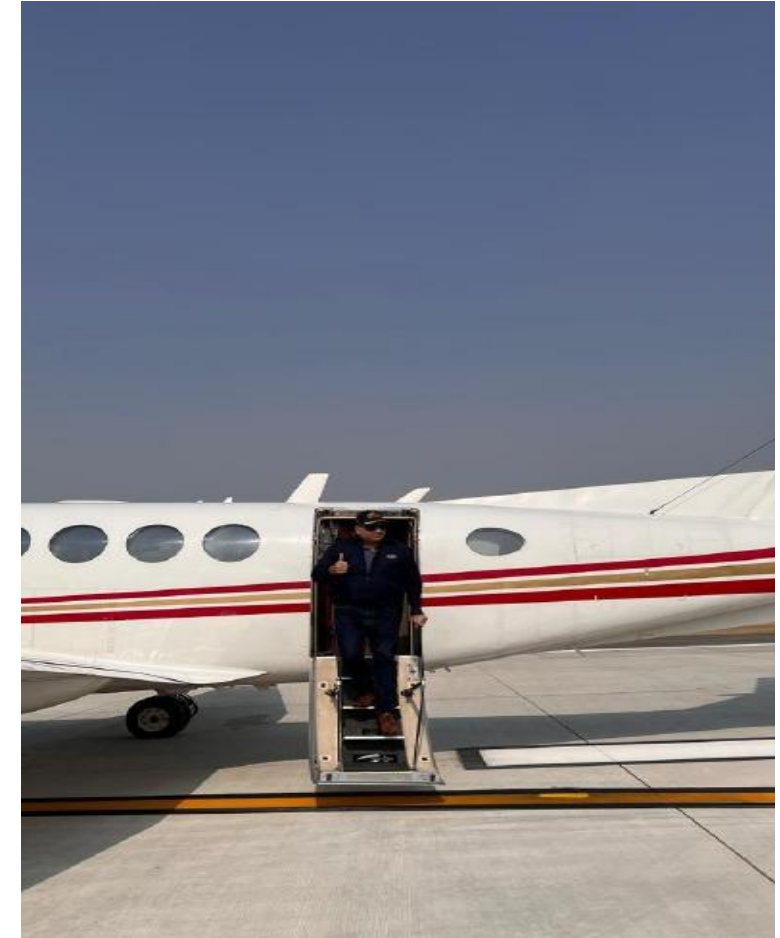
🔧 While the project continues, this achievement sets a strong foundation for modernizing Pakistan's aviation infrastructure.

#PAA #JinnahInternational #RunwayUpgrade #KarachiAirport #AviationPakistan

#InfrastructureProgress #AirfieldLighting #EngineeringExcellence #PQC #PakistanAirportsAuthority



FOD WALK BEFORE TEST FLIGHT

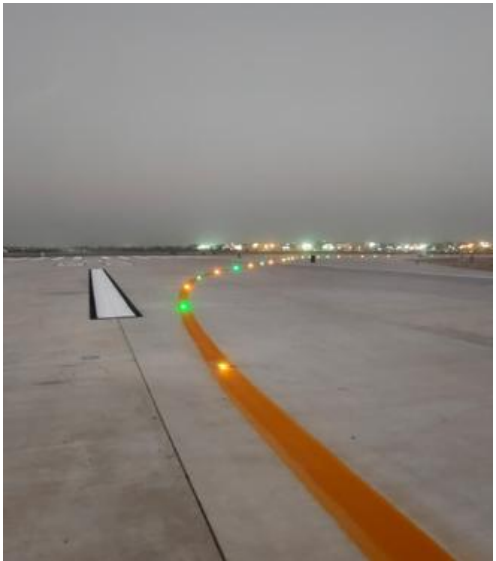


Flight testing / validation day

PROJECT COMPLETION - RUNWAY



PROJECT COMPLETION - RUNWAY



PROJECT COMPLETION - VAULT ROOM



PROJECT COMPLETION – VAULT ROOM, PAF TAXIWAYS AND ACC RADAR ROAD



Transferable Lessons



For ICAO Member States



01

Integrate Safety Across All Stages

Embed risk management in planning, execution and operationalization within the aerodrome SMS –[**Three-stage safety assurance framework**]



02

Assess Early & Multidisciplinary

Early SRA supports continuity planning and reduces implementation uncertainty.



03

Build Mitigations into Contracts

Contractual and operational integration improves consistency and governance.



04

Coordinate Continuously

ATC, aerodrome operations, safety and construction must stay aligned throughout.



05

Operational Readiness prior to commissioning

AIRAC synchronization and regulatory coordination should precede commissioning.



06

Govern the Interface

Risk-based runway-safety and interface governance enable delivery under constraints.

Positioning for APRAST: a practical regional transferable safety model for major airside infrastructure upgrades under active aerodrome conditions.



The Meeting is Invited To

a

Note

Note the information contained in this paper.

b

Recognize

Recognize the importance of integrated safety management and operational coordination during major airside works in live aerodrome environments.

c

Encourage

Encourage Member States and aerodrome operators to share similar experiences and best practices on construction–operations interface risks and SMS-based mitigation measures

d

Consider

Consider a focused APRAST discussion on operational safety management during airside infrastructure upgrades — coordination mechanisms, mitigation and lessons learned.

Thank You

Pakistan Airports Authority · Jinnah International Airport, Karachi

Presented by Pakistan · APRAST/25, Bangkok · 22–26 June 2026