Immediate Airfield Rehabilitation at René Mouawad Airport

Contractor's Scope of Work

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Immediate “Short-Term” Airfield Rehabilitation at René Mouawad Airport

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The Lebanese Civil Aviation Authority (LCAA) has initiated a program to reactivate Kleyat Airport and commence civil and commercial flight operations by November 2026. To support this objective, Dar Al-Handasah has been appointed to provide consultancy services for the assessment and design of the immediate airfield rehabilitation works required to restore the airport's operational capability.

The project focuses on identifying and developing the minimum airfield infrastructure interventions necessary to enable the safe and efficient operation of commercial aircraft within the planned timeframe. The proposed rehabilitation works are intended to address existing airside deficiencies, improve operational safety, and ensure that the airport infrastructure meets the requirements of the applicable Lebanese Aviation Regulations (LARs) and the International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs). The ultimate objective is to prepare the airport for the introduction of scheduled civil and commercial services through a practical and targeted upgrade of essential airfield facilities.

Exhibit 1: Kleyat Airport Existing Airfield (Source: Google Earth Maps)



Kleyat Airport is an existing military airbase located in the Akkar Governorate in northern Lebanon and operated by the Lebanese Air Force. The airport currently accommodates light aircraft operations and comprises a single visual runway (RWY 06/24), a parallel taxiway system, connecting exit taxiways, and an apron area. As part of the planned transition to civil and commercial operations, the project involves the assessment of the existing airfield infrastructure and the development of rehabilitation designs for the runway, taxiways, aprons, airfield lighting, markings and signage. The proposed works are limited to the essential improvements required to achieve a safe and operationally compliant airport capable of supporting the anticipated commencement of commercial services.

Following a review of the existing airport infrastructure, the current airside configuration of Kleyat Airport was identified as the basis for the development of the proposed rehabilitation measures. The following scope of work is based on a reduced runway length of 2,100m to support E175&E195 aircraft takeoff and landing operations with minimal cost. E175&E195 are considered the critical design aircraft. It is assumed that protective asphalt pavement for runway edges and taxiways flexible shoulders will be conducted by others. Grading and drainage works are not part of this SOW and maintained as per existing levels/conditions. The scope includes site clearance and preparation of subgrade layers as specified. Existing Bunkers penetration to OLS is subject to the verification of their 7m height as provided by LAF. The apron is planned as taxi-in taxi-out configuration, with preference to taxi-in pull-out configuration to minimize jet blast impact. Coordination shall take place with Lebanese Air Force during all operations.

The Contractor's scope of work comprises on the following items to be read in conjunction with the design drawings, project specifications and bills.

- **Short-Term** Rectification and Repair of the existing rigid pavement slabs of the runway (length of 2,100m), the apron, and the taxiways that are intended to be operational at the opening day of the airport (taxiway Alpha connecting apron to runway). The areas intended to be operational at the opening day are provided in the design drawings and Contractor's Scope of Work Sketch. This includes but not limited to:
    - Replacement and/or repair of the damaged concrete slabs (slab repair works include crack sealing, slab grinding, partial of full depth patch repairs, etc…) as per design drawings
    - Joint Cleaning and Resealing
- Preparation and clearing of runway and taxiways strips and RESAs
- Removal of existing airfield marking and provision of new airfield marking
- Installation of airfield guidance signs
- Installation of airfield ground lighting (AGL) with respective power supply equipment, cabling, associated accessories, and earthing/counterpoise.

The Contractor shall provide all labour, supervision, materials, plant, equipment, tools, temporary works, testing, protection, transportation, and incidentals required to complete the short-term rigid pavement repair and concrete slab replacement in accordance with the Drawings, Specifications, approved method statements, and Engineer's instructions. The scope of work shall cover the following major items:

- Review the Drawings and relevant Specification sections and verify existing site conditions, repair limits, joint locations, cracks, faulting, deteriorated areas, and slabs requiring replacement.

- Verification of existing rigid pavement conditions of all slabs of the airfield elements included with the scope of work to define the detailed repair measure in line with the relevant Project Drawings.

- Submit detailed method statements for rigid pavement repair and concrete pavement slab replacement for approval before commencing the works. All method statements shall be submitted with the Tender for the Engineer's early review and approval prior to Contract Award as required in the Conditions of Tender.

- Provide the necessary measures for the protection of adjacent pavement and existing services.

The Contractor shall execute the following repairs:

- Remove existing joint sealant, clean and prepare the joints, and reseal them with approved joint sealant complying with Section 321373.

- Repair cracks by removing existing sealant (where it exists), routing and cleaning the cracks, and installing approved sealant in accordance with Sections 321373, 320129, and 321313.
- Grind and level faulted concrete pavement surfaces in accordance with Section 320129.
- Carry out partial and full-depth concrete pavement patching in accordance with Section 320129 and the approved repair details.

For existing rigid pavement slabs to be replaced entirely to full depth or to be partially replaced to full depth, the Contractor shall execute the following:

- Saw-cut, break out, remove, transport, and dispose of designated concrete slabs using methods that minimize disturbance to the subgrade and adjoining slabs.
- Inspect and reinstate disturbed founding subgrade/bound materials as required before placing of new lean concrete base.
- Drill the existing pavement, clean the holes, install approved epoxy, and fix dowel bars or tie-bars at the locations and to the dimensions indicated on the Drawings.
- Prepare forms and joints; place, compact, finish, texture, and cure the new concrete slabs in accordance with Section 321313 and the approved method statement.
- Protect newly placed concrete until the specified strength and curing requirements are achieved, then complete joint sealing and reinstate the area for service.

The Contractor shall prepare the following material submittals to obtain the needed approvals before incorporation into the works:

- Joint and crack sealant product data complying with Specification Section 321373.
- Epoxy resin grout for concrete patching repairs, as indicated on the Drawings.
- Dowel bars for connecting new slabs to existing slabs.
- Concrete mix design demonstrating compliance with Specification Section 321313, including flexural strength, compressive strength, water-cement ratio, slump, and test results for cement, water, fine aggregates, and coarse aggregates.

Also, all material submittals shall be submitted with the Tender for the Engineer's early review and approval prior to Contract Award as required in the Conditions of Tender.

In addition, the Contractor shall protect existing facilities and completed work, maintain the work area in a safe and orderly condition, and legally dispose of removed materials and debris. Also, they should clean the site, reinstate affected areas, submit required records and approvals, and hand over the completed works in an acceptable condition.

The Contractor shall refurbish (as applicable and as per the BOQ), supply (as applicable and as per the BOQ), install, connect, test and commission the complete Airfield Ground Lighting (AGL) systems in accordance with the approved drawings, applicable aviation regulations and standards, and the requirements of the Airport Operator and relevant Civil Aviation Authority.
The works shall cover runway threshold lighting, runway end lighting, Precision Approach Path Indicator (PAPI) systems, and runway guard lights, including all associated equipment, accessories, electrical cabling, power supply components (UPS, panelboard, CCR and isolating transformers), earthing/counterpoise system, airfield lighting control & monitoring functions, LV cabling and protection works and ancillary works necessary for complete and operational installations.

The Contractor shall re-furbish/supply (as applicable) and install all AGL light fittings in the locations, configurations, quantities and patterns indicated on the drawings with respective mounting accessories (shallow bases/base plates), including:

- Runway threshold lights, equally spaced along the width of the runway.
- Runway end lights, equally spaced along the width of the runway.
- PAPI units at both approach sides, including complete mounting assemblies, aiming and adjustment arrangements, and associated control equipment where applicable. Each PAPI system shall include four units at the left-hand side of each approach direction.
- Runway guard lights at designated entry points.

All fixtures shall be suitable for the intended airfield application, compatible with the specified AGL series circuit configuration and supplied complete with the necessary lamps, optical assemblies, connectors, gaskets, seals, shallow bases, mounting hardware and other manufacturer-required accessories.

In this regard, the Contractor shall refurbish and use/install available compatible existing AGL installations (obtained from BRHIA airport) as per the BOQ.

The Contractor shall re-furbish/supply (as applicable) and install all required light shallow bases, base plates, frangible couplings, mounting brackets, accessories for elevated lights and PAPI units, bolts, earthing connections and other accessories required for the proper installation of the specified fittings including foundations for guidance signs.
The works shall include positioning, levelling, alignment, orientation, setting and securing of the fixtures, ensuring that their installed elevations and photometric orientations comply with the approved drawings and applicable requirements.
The Contractor shall coordinate the installation with the associated civil works and pavement levels. All installations shall be completed without compromising pavement integrity, equipment frangibility, water ingress protection or the maintainability of the equipment. Where needed, pavement re-instatement to be provided.

The Contractor shall supply, install, terminate, and test all AGL primary series-circuit cables, secondary cables, connectors and associated accessories required to connect the lighting fixtures to their respective circuits.

The scope shall include series isolating transformers of the required ratings and configurations, complete with suitable enclosures, primary and secondary connectors, leads and accessories. Each transformer shall be compatible with the associated light fitting in terms of rating, constant current regulator (CCR) output and specified circuit loading.

The works shall include trenching works, cable pulling, routing, dressing, jointing where permitted, termination, circuit identification, continuity checks, insulation-resistance testing and verification of circuit integrity. Cables shall be installed through the designated trench routes, with appropriate overfill.

The Contractor shall verify the installed circuit arrangements, cable lengths, transformer ratings and electrical loading against the approved design before installation.

The Contractor shall supply, install, connect and test all required low-voltage (LV) power cables, feeders, distribution cables, panelboards, and associated accessories necessary to supply the AGL electrical infrastructure included in the Contract.

The works shall include cable containment and routing where specified, cable glands, lugs, terminations, identification labels, protective devices and earthing and bonding connections. All LV cables and associated equipment shall be appropriately rated for the connected loads, installation conditions, fault levels and applicable protection requirements.

The Contractor shall coordinate the LV power supply arrangements with the existing generator (by others), UPS, distribution boards, AGL control equipment and other associated loads included in the approved design.

The scope shall include needed panelboard within the ATC to provide power supply to AGL CCRs as well as other ATC loads. In addition, ON/OFF control switch to the CCR from the ATC shall be arranged.

The Contractor shall supply, install, connect, test and commission redundant uninterruptible power supply (UPS) systems indicated in the project documents, complete with the necessary accessories and ancillary equipment. LV power supply source shall be from a local generator installed by others.

The UPS installation shall include the UPS unit, battery bank, battery racks or cabinets, battery protection and isolation, interconnecting cables, monitoring and alarm interfaces, and associated input and output distribution equipment as specified.

The Contractor shall verify the required ratings, autonomy, load capacity, redundancy and changeover arrangements against the approved electrical design and project requirements. The UPS shall be integrated with the designated LV distribution and AGL power supply systems without introducing unintended single points of failure or compromising the specified operational requirements.

The Contractor shall provide all earthing and bonding connections required for the supplied equipment, metallic enclosures, distribution equipment, generator, UPS and other applicable components. Surge protection shall be provided wherever specified by the approved design and applicable equipment requirements.
All earthing and bonding works shall comply with the project earthing design and applicable standards. The Contractor shall perform and record the required electrical safety and earth-resistance tests.

The Contractor shall undertake all inspections, testing and commissioning necessary to demonstrate that the complete installation is safe, functional and compliant with the approved design.
Photometric measurements and flight inspection or flight validation shall be undertaken where required by the relevant authority. All tests shall be conducted using suitable calibrated instruments and documented in formal test reports.

The Contractor shall submit equipment data sheets, manufacturer certificates, installation and maintenance manuals, cable schedules, circuit diagrams, test certificates, commissioning records, warranty documentation and as-built drawings.
The Contractor shall rectify defects identified during inspection, testing and commissioning and shall demonstrate the satisfactory operation of all installed systems before handover.
The scope shall be deemed to include all major and minor components, consumables, connections, terminations and incidental works necessary to complete the installations, whether or not individually itemised in the BOQ, provided that such items fall within the defined scope and approved design.

The airfield marking and signage works comprise the provision and installation of the visual guidance systems required to support the safe and efficient movement of aircraft and airside vehicles within the operational areas of Kleyat Airport. This work shall be implemented in accordance with the applicable ICAO standard requirements and integrated with the overall airfield operational layout.
The pavement marking works include (1) the removal of all existing airfield marking, and (2) the application of the markings necessary for the operation of the runway, taxiways, and aprons as per design drawings and details. The application of new markings include:

1- Runway marking: which comprises of runway designation markings, threshold markings, centerline markings, aiming point markings, edge markings, pre-threshold marking… as indicated on the design drawings
2- Taxiway marking: which comprises of centerline markings and runway holding position markings, taxiway edges, taxiway edge stripes, closure marking
3- Apron marking: which will define aircraft stand positions, aircraft lead-in lines, equipment restrain lines, helicopter stands, GSE roads and pedestrian walkways.
4- Temporary Marking: The Contractor shall provide temporary marking based on the adopted construction phasing plan as deemed necessary. Temporary taxiways closure marking, barricades, no entry markings.. shall be provided in accordance with ICAO and to be coordinated with the Engineer to ensure safe aircraft operations while construction works are carried out.

The airfield signage package will include the installation of non-illuminated airfield guidance signs strategically located throughout the airfield movement area, limited to the operational area. The proposed signage system will provide pilots and airside operators with clear information regarding runway access, taxiway identification, routing directions, destinations, and mandatory instructions, thereby enhancing situational awareness and operational safety. Airfield signs shall be located as indicated on the design drawings.

The combined implementation of the airfield marking and signage systems will provide a coherent visual guidance framework, supporting the safe conduct of aircraft and vehicle movements and contributing to the overall operational readiness of the airport.