

TRIPOLI EMERGENCY FUND

CONSOLIDATION OF BUILDING

Lot # 1974 - BT

Volume 3

PARTICULAR SPECIFICATION

June 2026

TECHNICAL SPECIFICATION

Rehabilitation of concrete surface.

1. SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, supervision, testing, temporary works, shoring, propping, scaffolding, and incidentals required for the rehabilitation of existing reinforced concrete columns, drop beams, ribbed and solid slabs through the rehabilitation of concrete surfaces as indicated in the BOQ and per specification. as indicated on the drawings.

The works shall include:

- Temporary shoring and propping.
- Removal of deteriorated, delaminated, and contaminated concrete.
- Exposure and treatment of corroded reinforcement.
- Supplementation or replacement of deteriorated reinforcement.
- Formwork and falsework.
- Curing.
- Testing and quality control.
- Final finishing and protection.

CONCRETE SURFACE REHABILITATION WORKS

1. SCOPE OF WORK

This specification covers all activities required for the rehabilitation and repair of deteriorated reinforced concrete surfaces, including:

- Removal of deteriorated concrete
- Cleaning of concrete surfaces
- Treatment of exposed reinforcement
- Crack preparation and repair
- Surface preparation
- Concrete patch repair
- Structural repair mortar application
- Surface profiling
- Finishing and curing
- Testing and quality control

The Contractor shall provide all labor, materials, equipment, supervision, temporary works, testing and incidentals required to complete the works.

2. REFERENCE STANDARDS

The works shall comply with the latest editions of:

- ACI 562 – Assessment, Repair and Rehabilitation of Existing Concrete Structures
 - ACI 546R – Concrete Repair Guide
 - ACI 364.1R – Guide for Evaluation of Concrete Structures
 - ACI 301 – Specifications for Structural Concrete
 - ICRI 310.2R – Selecting and Specifying Concrete Surface Preparation
 - ASTM C881 – Epoxy Resin Systems
 - ASTM C928 – Packaged Rapid-Hardening Cementitious Repair Materials
 - ASTM C1583 – Pull-Off Bond Strength
 - ASTM C42 – Concrete Core Testing
 - ASTM C39 – Compressive Strength
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3. PRELIMINARY CONDITION SURVEY

Prior to repair, the Contractor shall perform a detailed survey to identify:

- Cracks
- Delamination
- Honeycombing
- Concrete spalling
- Carbonation

- Chloride contamination
- Corroded reinforcement
- Water leakage
- Structural movement

The Engineer shall approve repair limits before commencement.

4. CONCRETE REMOVAL

Unsound concrete shall be removed until sound concrete is reached.

Removal methods may include:

- Light chipping hammers (maximum 5 kg)
- Hydro-demolition
- Scarification
- Grinding
- Saw cutting to define repair boundaries

Feather edges shall not be permitted.

Repair edges shall be saw-cut to a minimum depth of 10 mm.

5. SURFACE PREPARATION

Following concrete removal:

- Remove all dust and loose particles.
- Remove laitance.
- Remove oils and contaminants.
- Produce a roughened surface.

The substrate shall be clean and sound before repairs commence.

6. REINFORCEMENT TREATMENT

Exposed reinforcement shall be:

- Cleaned to bright metal by abrasive blasting or mechanical brushing.
- Assessed for section loss.
- Replaced where loss exceeds project limits.
- Coated with an approved cementitious corrosion protection system or zinc-rich primer where specified.

Additional reinforcement shall be installed where required by the Engineer.

7. CRACK REPAIR

Cracks shall be classified before repair.

Typical repair methods include:

- Epoxy injection for dormant structural cracks.
- Flexible polyurethane injection for active water-leaking cracks.
- Routing and sealing for non-structural cracks.

Repair methods shall be approved before execution.

8. PATCH REPAIR MATERIALS

Repair mortars shall:

- Be polymer-modified structural repair mortars.
- Have a compressive strength not less than 40 MPa at 28 days.
- Exhibit low shrinkage.
- Be compatible with the parent concrete.

Repair materials shall comply with EN 1504 or equivalent approved standards.

9. BONDING

Concrete repairs shall be bonded using either:

- Structural epoxy bonding agent; or
- Cementitious bonding slurry with approved polymer additive.

Bonding material shall be applied immediately before placement of repair mortar.

10. REPAIR APPLICATION

Repair mortar shall be placed in accordance with the manufacturer's instructions.

Large repairs shall be placed in multiple layers where necessary.

Each layer shall be compacted to eliminate voids.

Repairs shall be finished flush with surrounding concrete.

11. SURFACE REPROFILING

After repair, surfaces shall be restored to the original geometry.

Sharp edges and corners shall be reconstructed where required.

Finished surfaces shall match adjacent concrete in profile and texture.

12. CURING

Repair materials shall be cured in accordance with the manufacturer's recommendations.

Unless otherwise specified:

- Moist curing shall be maintained for a minimum of seven days; or
- Approved curing compounds may be used.

Repairs shall be protected from:

- Direct sunlight
- Wind
- Rain
- Vibration
- Early loading

13. QUALITY CONTROL

The Contractor shall implement a QA/QC system including:

Material Approval

- Manufacturer certificates
- Batch numbers
- Shelf-life verification

Inspection Hold Points

- Condition survey
- Concrete removal
- Surface preparation
- Reinforcement inspection
- Bond coat application
- Repair placement
- Final inspection

14. TESTING

Testing shall include:

- Compressive strength testing of repair materials.
- Pull-off bond strength testing in accordance with ASTM C1583.
- Hammer sounding for delamination.
- Visual inspection.
- Thickness verification.
- Surface flatness checks where applicable.

The minimum pull-off bond strength shall be **1.5 MPa**, unless a higher value is specified by the Engineer.

15. ACCEPTANCE CRITERIA

Completed repairs shall:

- Be free from cracking.
- Be free from delamination.
- Be free from honeycombing.
- Be fully bonded to the substrate.
- Match adjacent surfaces in geometry and finish.
- Meet the specified compressive strength and bond strength requirements.

16. MEASUREMENT

Concrete surface rehabilitation shall be measured by:

- Square meters (m²) for surface preparation and repair.