



**LYCÉE LOUIS
MASSIGNON**
لیسیه لوی مسینیون

ÉTABLISSEMENT
EN GESTION DIRECTE



aefe
Agence pour
l'enseignement français
à l'étranger

RENOVATION OF BLOCK B' FOR FRENCH SCHOOL (LYCEE LOUIS MASSIGNON)

CONCRETE REPAIRS AND STRUCTURAL REINFORCEMENT

**PLOT (26_27), SECTOR (E40)
ABU DHABI ISLAND
EMIRATE OF ABU DHABI
UNITED ARAB EMIRATES**

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M/s eForce Inspection Consultancies
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**VISUAL INSPECTION OF THE GYMNASIUM, SWIMMING POOL AND
AUDITORIUM LYCÉE LOUIS MASSIGNON SCHOOL, ABU DHABI, UAE
(Preliminary report)**

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|-----------------------|----------------------------------|
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Preliminary note

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1 INTRODUCTION

1.1 General

eFORCE Inspection Consultancies (Center for Engineering Studies and Consultancy Services) was requested by M/s Al Hilal Consulting Engineering to inspect and assess the Gymnasium, Swimming Pool and Auditorium and propose the required remedial/strengthening work.

A WORKING TEAM from eFORCE has carried out visual inspection of building, assess the quality of concrete, and conduct concrete tests to investigate the current situation.

1.2 Scope of the Consultancy Work

The scope of work includes the following tasks required to complete the structural assessment of the existing structures:

- Visual inspection of the accessible structural elements to identify the defected elements under consideration.
- Conduct semi destructive and non destructive tests to study the concrete and steel of the different elements.
- Analyze the test results along with the visual inspection observations to conclude the overall condition of the floor under consideration.
- Propose the required remedial works required.
- Provide a technical report covering all the findings.

2 THE STRUCTURES DESCRIPTION

For the Auditorium and Playing Area

The auditorium consists of a wooden roof based on columns and the playing area (Dojo) building consists of hordi slab based on hidden beams and ribs on columns.

For the Gymnasium

The Gymnasium consists of wooden roof on concrete columns.

For the Swimming pool

The swimming pool consists of wooden roof on concrete columns.

3 INVESTIGATION AND TESTS

3.1 Approach to Inspection

The inspection program targets studying the existing reinforced concrete elements in terms of performance and durability of its materials. This is achieved by

- Initial Site Survey
- Investigation, Sampling and Testing
- Final Site Investigation

3.2 Initial Site Survey

An initial site survey was made to carry out visual inspection, data and information collection on the condition of the buildings. Detailed planning, including structural consideration, was undertaken prior to the full survey in order to optimize all aspects of the work. Accordingly, the scope of work for overall site concrete sampling and testing works was prepared.

3.3 Investigation, Sampling and Testing

To determine the physical and mechanical properties of concrete, a comprehensive in-situ and laboratory test program will be prepared. Samples for physical, mechanical and chemical analysis will be obtained from representative structural elements to cover the area under investigation. Also, non-destructive testing will be performed. Sampling and testing will be carried out. This sampling and site testing work include:

- a) Drilling of concrete cores.
- b) Determining concrete cover to reinforcement as obtained from the Cover Meter surveys carried out using a digital cover meter.
- c) Measuring the depth of Carbonation on freshly broken surfaces of the concrete.
- d) Conduct the half-cell potential tests to provide the probability of steel corrosion.
- e) Conduct the resistivity test of concrete to provide the rate of steel corrosion.
- f) Extract samples from the concrete for chloride content.

Samples collected on site will be subsequently taken for further analysis to establish the following:

- Visual examination and description of the core samples.
- Compressive strength and density of concrete in the existing structural members as obtained from the tested core samples.
- Chloride level inside the concrete from the laboratory tests on the concrete.

3.4 Final Site Investigation

In addition to the sampling and testing works, the WORKING TEAM carried out further visual inspection to confirm the outcome of the testing results. A summary of the WORKING TEAM's detailed survey observations and test results will be incorporated in section 4.

4 EVALUATION OF INVESTIGATION & TEST RESULTS

4.1 Visual Inspection

A visual inspection of the structure under consideration was carried out to determine the extent of visible cracking, Delamination or other damages and defects in the area. The visual inspection observations can be summarized as follows:

- For the Gymnasium
 - 1- Delamination in Columns , retaining wall below stands and in stands soffits
 - 2- Cracks between block walls and concrete elements
 - 3- Cracks in retaining wall below stands and in stands soffits
 - 4- Dampness in block walls
 - 5- Dampness in concrete walls below stands
 - 6- Previous leakage in some columns and wooden roof
 - 7- Cracks in block wall
 - 8- Cracks in tiles in toilets
 - 9- Cracks in screed flooring below stands

- For the swimming pool
 - 1- Previous leakage in roof slab soffit and stands soffit
 - 2- Dampness in concrete elements and block walls
 - 3- Damage and previous leakage in expansion joints
 - 4- Delamination in ground slab, columns, beams, stands soffit and stairs below stands
 - 5- Cracks in block walls
 - 6- Cracks in concrete walls below stands, and cracks in stands
 - 7- Cracks between block wall and concrete elements

- For the Auditorium
 - 1- Cracks in slab soffit and ground beams
 - 2- Exposed corroded steel in slab soffit
 - 3- Previous leakage in slab soffit
 - 4- Delamination in columns and ground beam
 - 5- Dampness in block walls and concrete elements
 - 6- Cracks in block walls
 - 7- Cracks between block walls and concrete elements

- For the auditorium



- Figure 4-1 Delamination in column



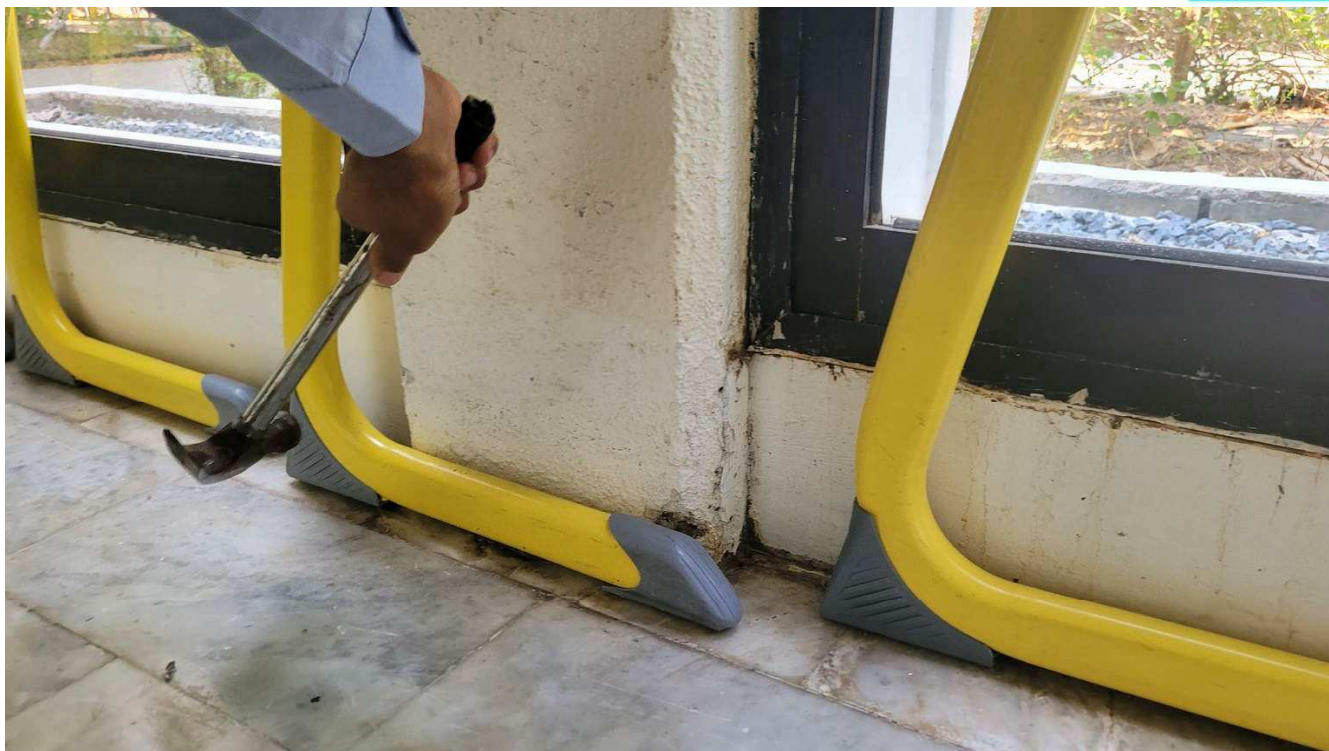
- Figure 4-2 Delamination in column



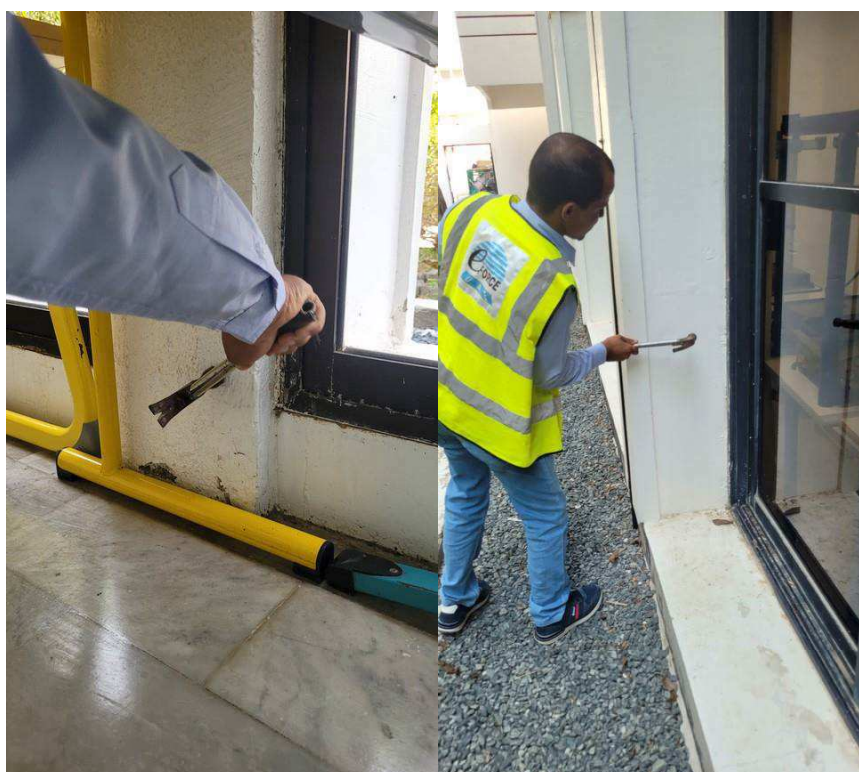
- Figure 4-3 Dampness and cracks in ground beam



- Figure 4-4 previous leakage in column



- Figure 4-5 Hollow sound while hammer testing



- Figure 4-6 Hollow sound while hammer testing



Figure 4-7 Cracks in slab soffit



Figure 4-8 Cracks in slab soffit



Figure 4-9 Cracks in slab soffit



Figure 4-10 Steel exposure with corrosion in slab soffit



Figure 4-11 Steel exposure with corrosion in slab soffit



Figure 4-12 Crack between block wall and concrete element

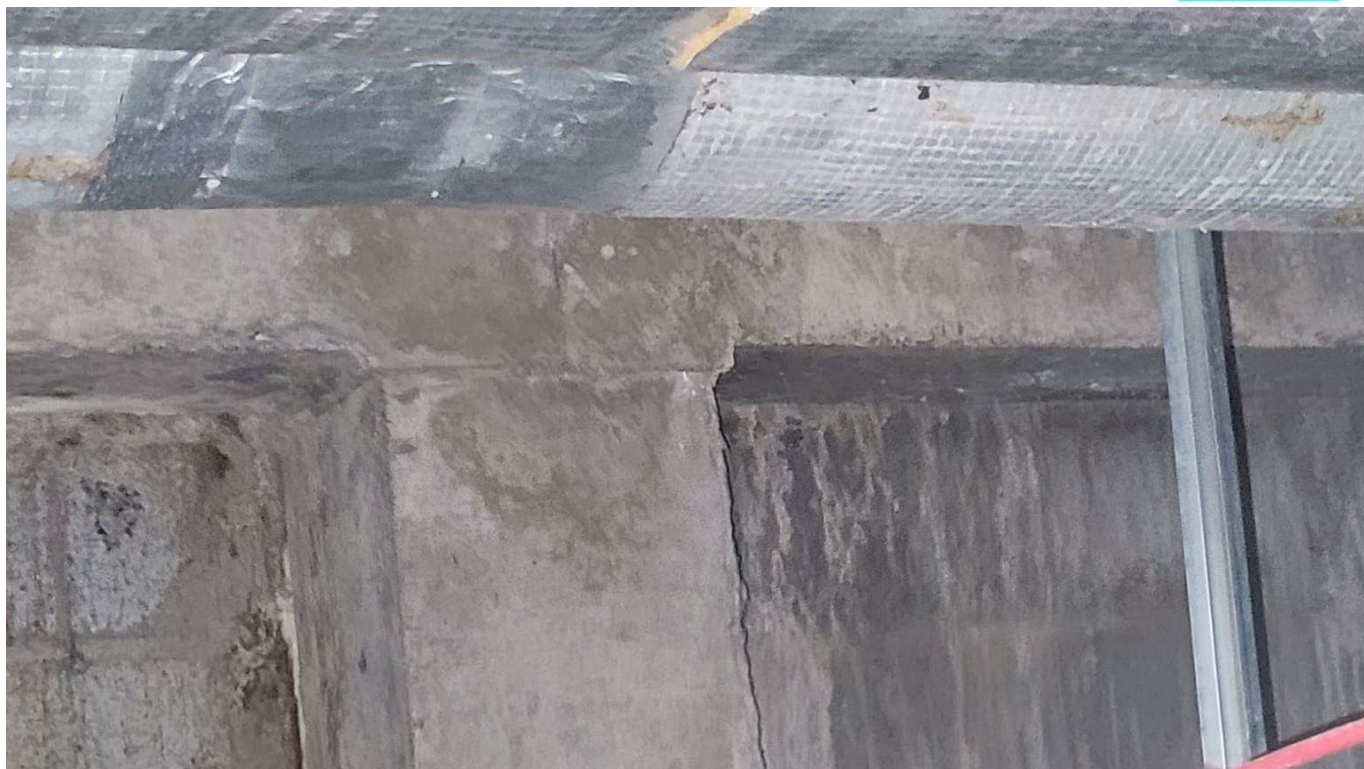


Figure 4-13 Previous leakage in beam and block wall



Figure 4-14 Delamination in beam



Figure 4-15 Crack in beam



Figure 4-16 Previous leakage in beam and slab



Figure 4-17 Previous leakage and cracks in roof walls and ceiling

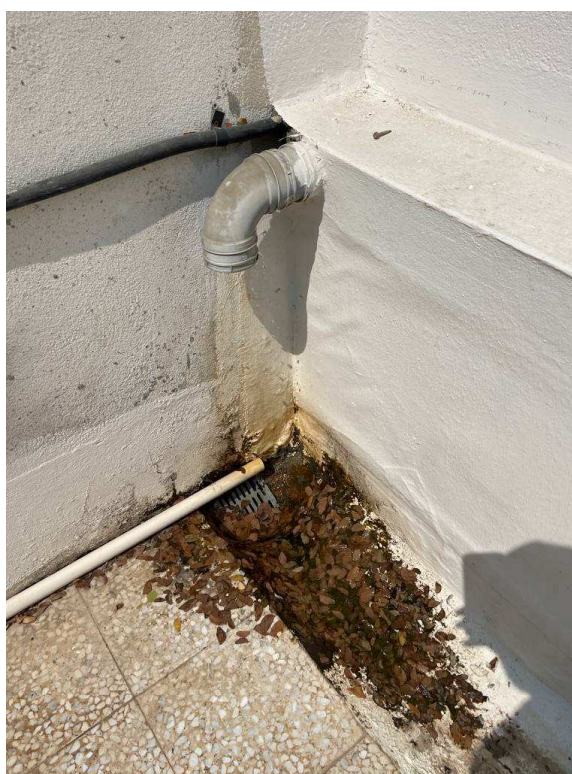


Figure 4-18 Sign of previous leakage in walls

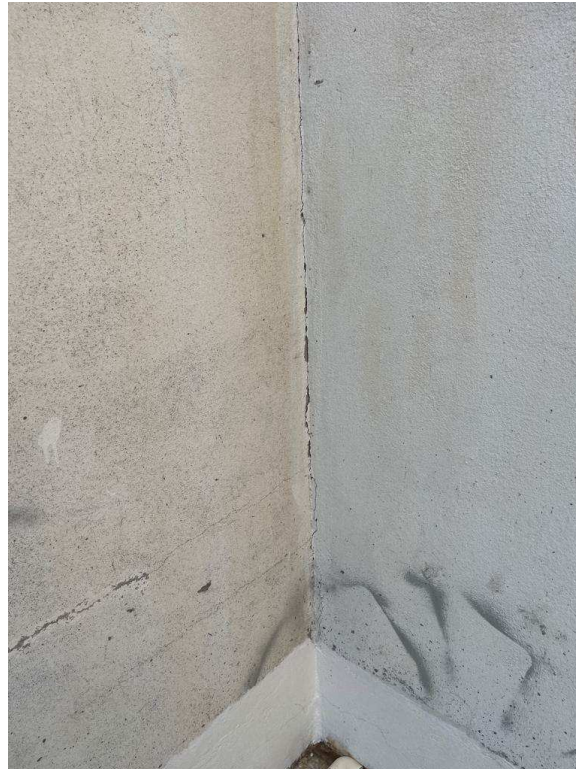


Figure 4-19 Cracks between block walls



Figure 4-20 Cracks between block walls and concrete elements

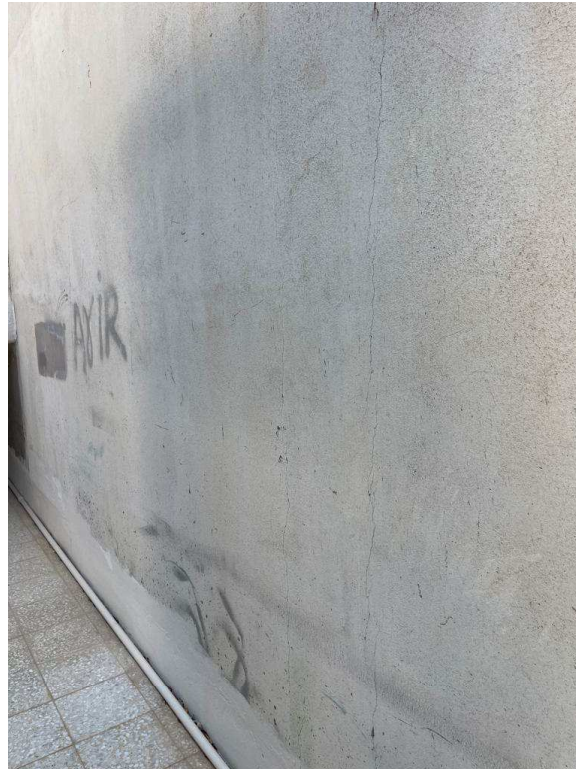


Figure 4-21 Cracks between block wall and concrete elements



Figure 4-22 Dampness in block wall



Figure 4-23 Crack between block wall and concrete element



Figure 4-24 Crack between block wall and slab



Figure 4-25 Crack between block wall

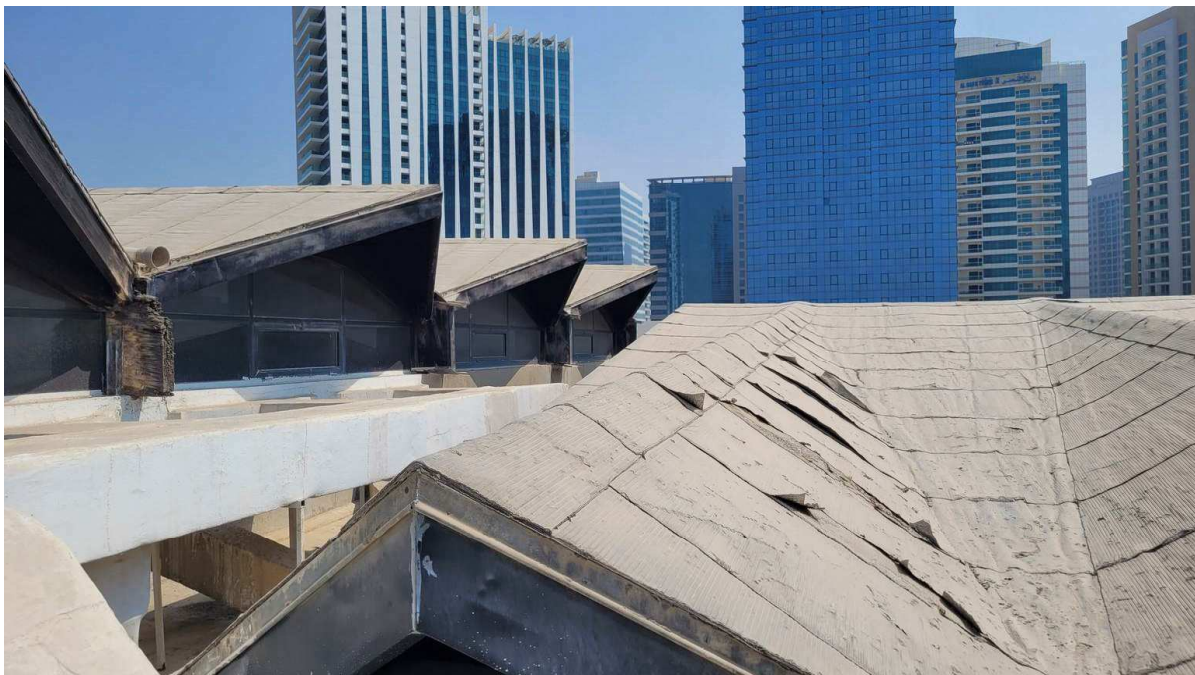


Figure 4-26 Dampness in wooden roof

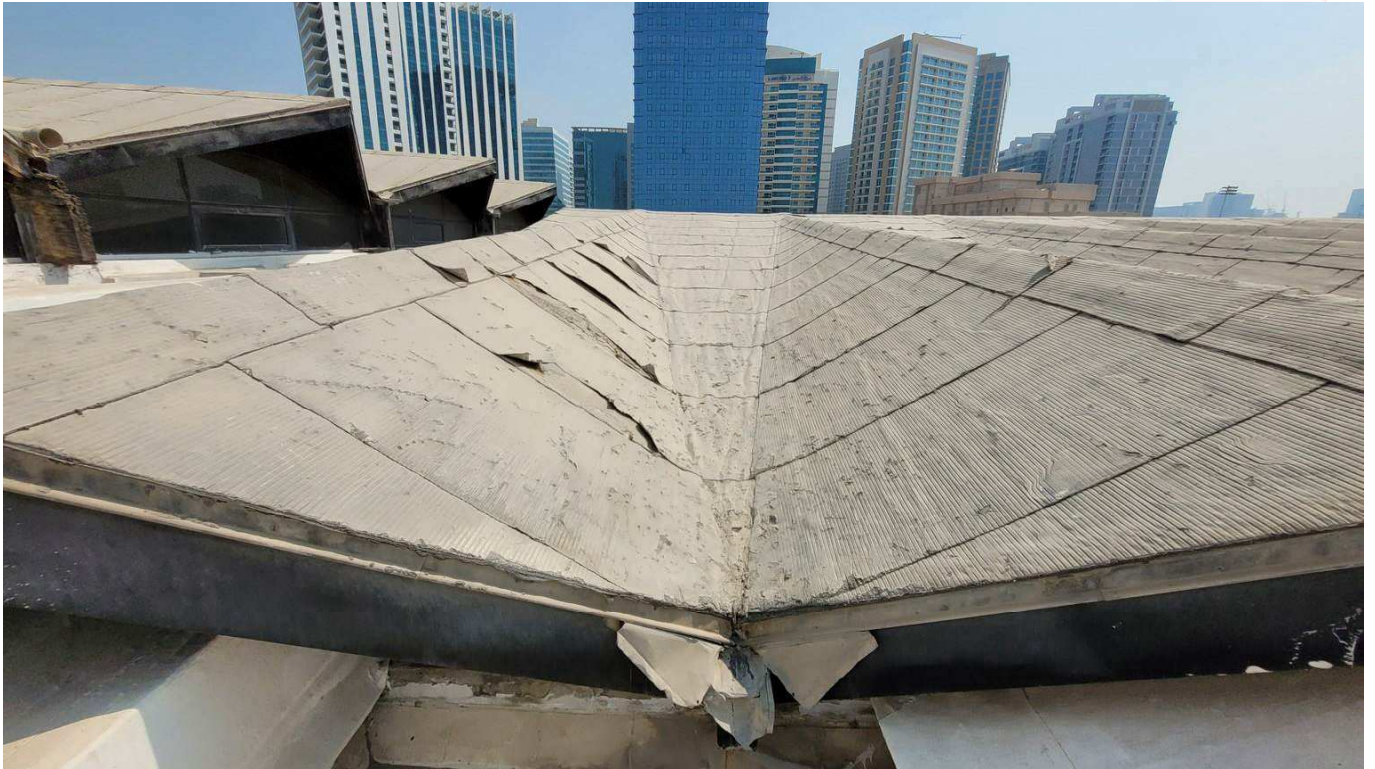


Figure 4-27 Dampness in wooden roof

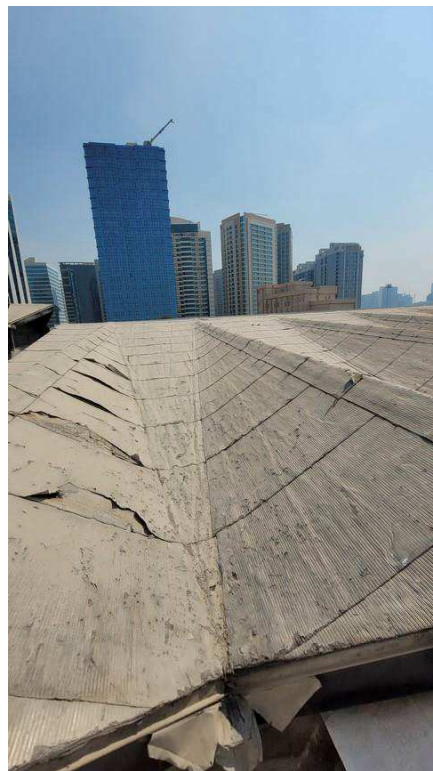


Figure 4-28 Dampness in wooden roof

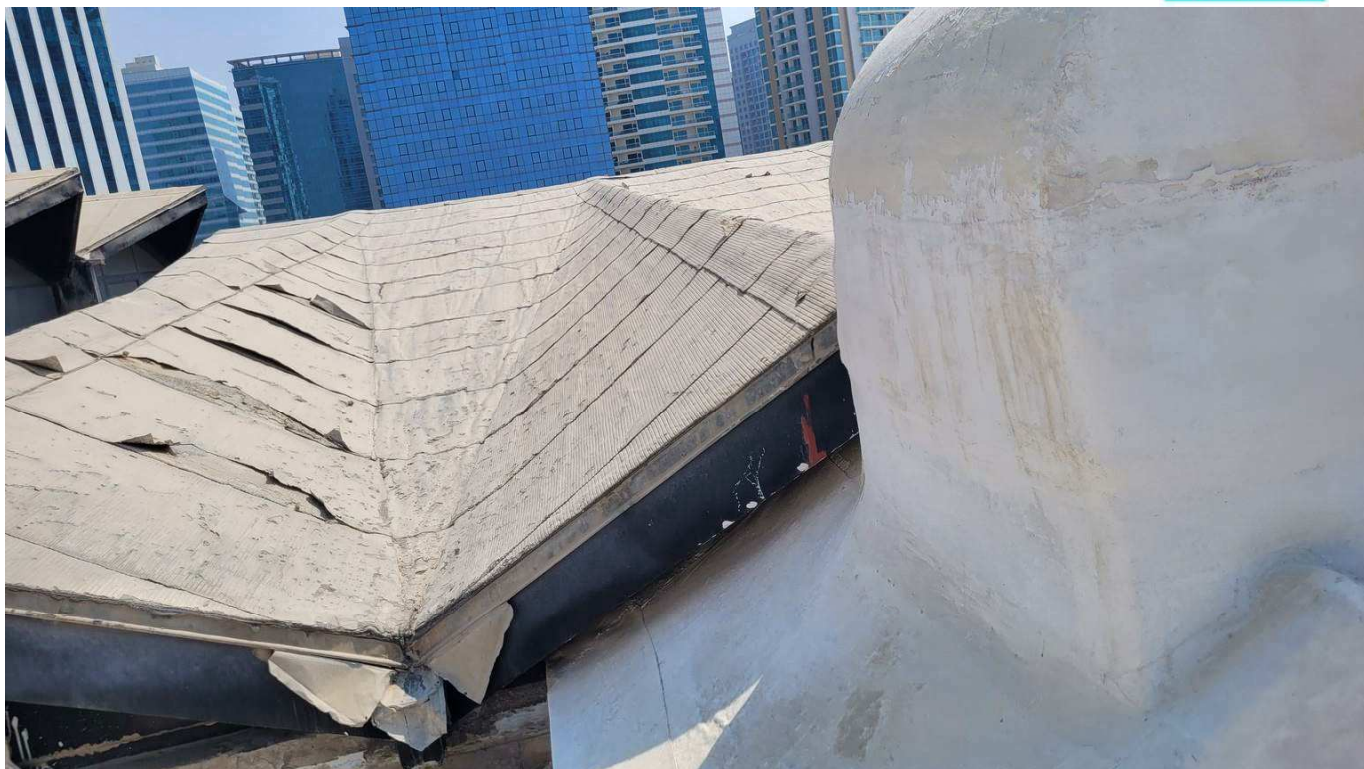


Figure 4-29 Dampness in wooden roof



Figure 4-30 delamination in beam of the roof



Figure 4-31 Crack in slab soffit



Figure 4-32 cracks in slab soffit



Figure 4-33 Delamination in column



Figure 4-34 previous leakage in wooden roof



Figure 4-35 cracks between block wall and concrete element

- For the swimming pool and Gymnasium



Figure 4-36 previous leakage in column and wooden roof



Figure 4-37 delamination in column



Figure 4-38 delamination in column



Figure 4-39 Dampness and cracks in block walls



Figure 4-40 Dampness and cracks in block walls



Figure 4-41 crack between block wall and concrete element



Figure 4-42 cracks in block wall



Figure 4-43 cracks in block wall



Figure 4-44 Dampness and delamination in ground beam



Figure 4-45 Dampness and delamination in ground beam

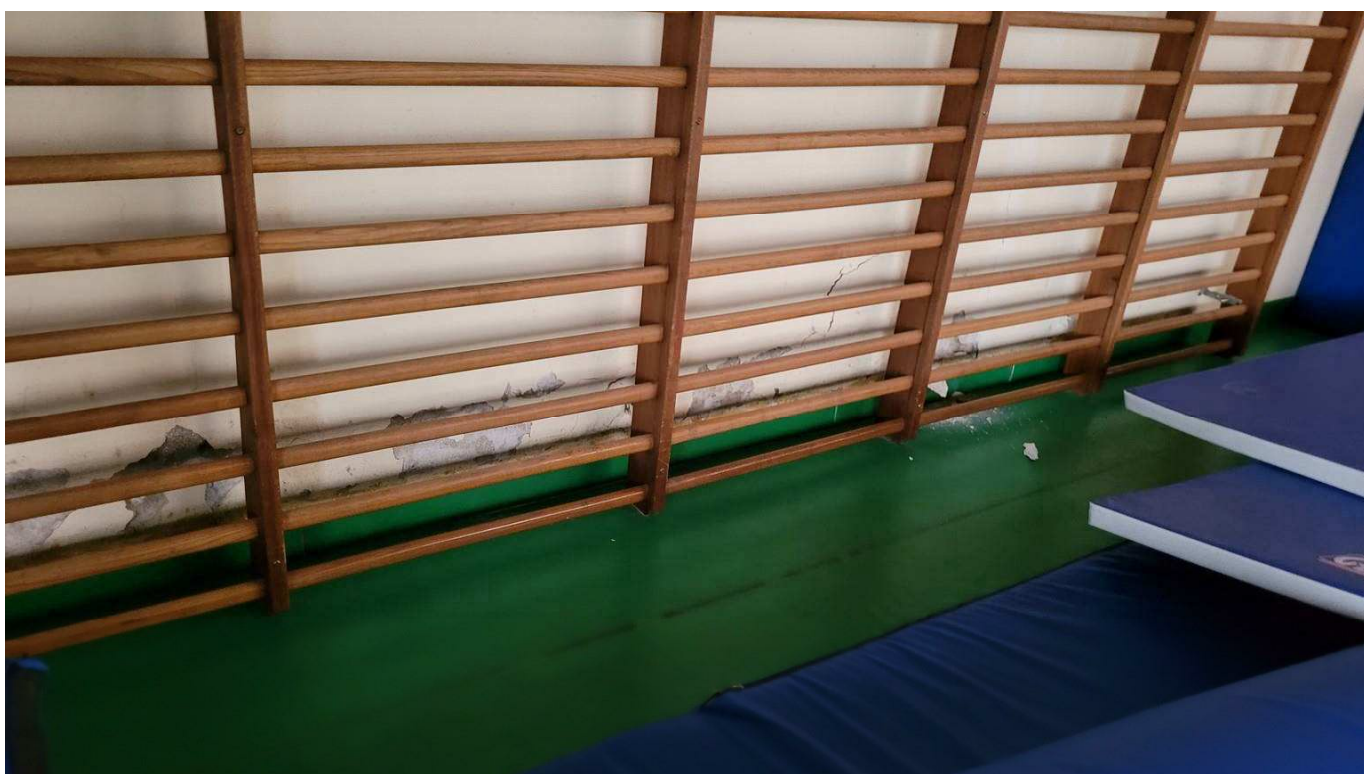


Figure 4-46 Dampness and delamination in ground beam



Figure 4-47 cracks in tiles in toilets in gym



Figure 4-48 Crack in concrete wall



Figure 4-49 Crack in concrete wall



Figure 4-50 delamination and previous leakage in column



Figure 4-51 Crack in block wall



Figure 4-52 cracks and delamination in concrete wall below stands



Figure 4-53 cracks in stands soffit



Figure 4-54 previous leakage in stands soffit



Figure 4-55 Delamination in stands soffit



Figure 4-56 Cracks in stands soffit



Figure 4-57 Cracks in stands soffit



Figure 4-58 Delamination and previous leakage in concrete wall



Figure 4-59 Delamination and previous leakage in concrete wall



Figure 4-60 Cracks in concrete below stands



Figure 4-61 cracks in stands soffit



Figure 4-62 crack with previous leakage in stands soffit



Figure 4-63 Crack in stands soffit



Figure 4-64 Crack in concrete wall



Figure 4-65 Crack in stands soffit



Figure 4-66 Crack in stands soffit



Figure 4-67 sign of previous leakage in slab soffit



Figure 4-68 previous leakage in stands soffit



Figure 4-69 cracks in stands soffit



Figure 4-70 cracks in stands soffit



Figure 4-71 Cracks in stands soffit



Figure 4-72 Cracks in stands soffit



Figure 4-73 sign of previous leakage in flooring

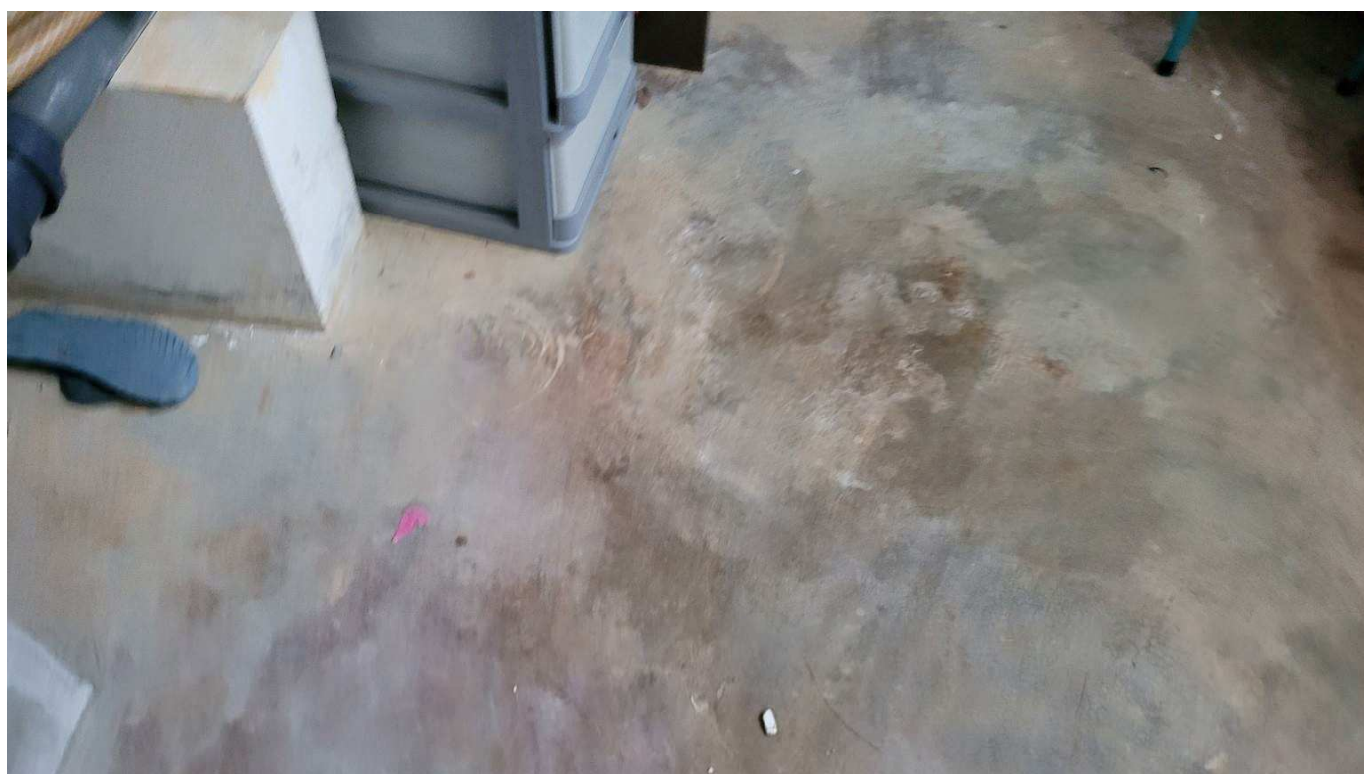


Figure 4-74 sign of previous leakage in flooring



Figure 4-75 previous leakage at expansion joint



Figure 4-76 previous leakage in expansion joint



Figure 4-77 Cracks and dampness in wall

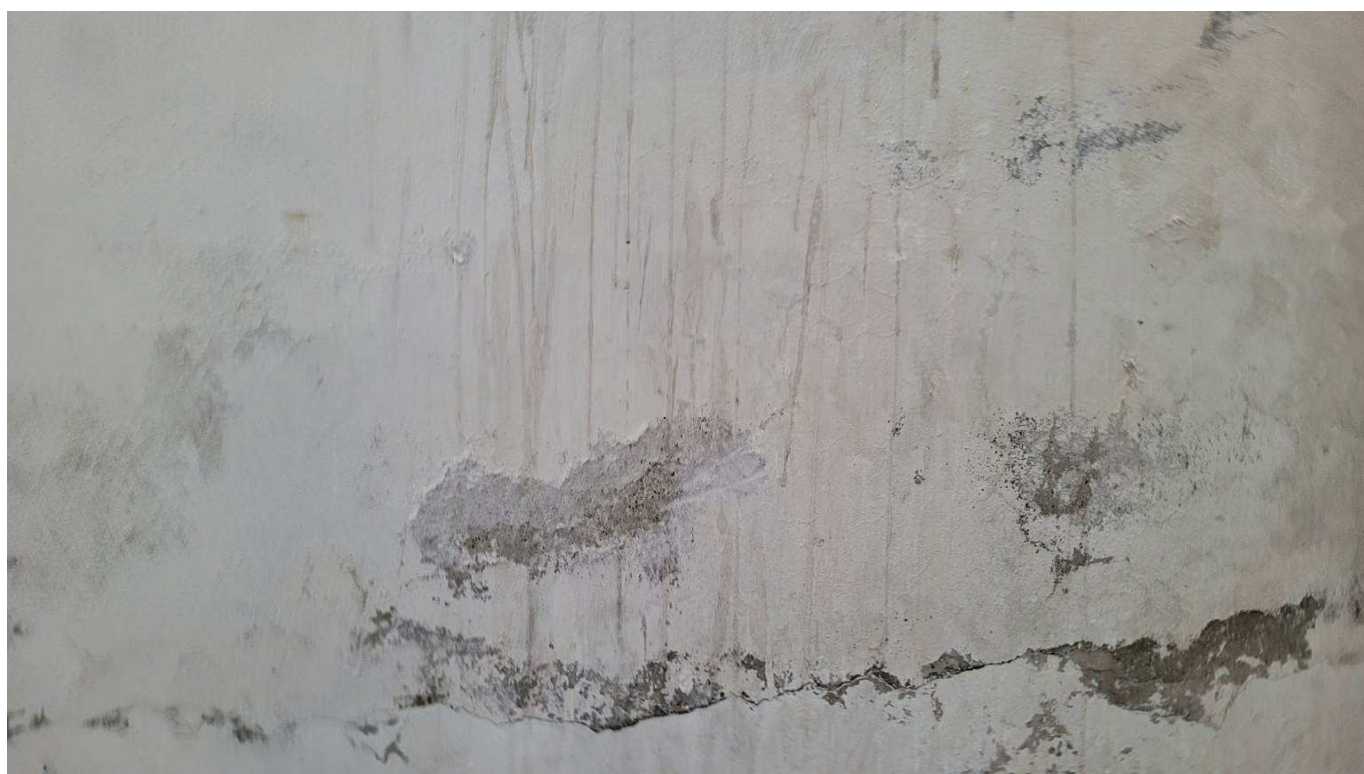


Figure 4-78 Dampness in block wall



Figure 4-79 Crack in block wall



Figure 4-80 previous leakage at expansion joint



Figure 4-81 dampness and cracks in block wall



Figure 4-82 previous leakage in stands soffit



Figure 4-83 dampness in block walls and concrete elements



Figure 4-84 dampness in block wall and concrete elements



Figure 4-85 Previous leakage in slab soffit



Figure 4-86 Previous leakage in slab soffit



Figure 4-87 Previous leakage in slab soffit



Figure 4-88 previous leakage in slab soffit



Figure 4-89 previous leakage in slab soffit



Figure 4-90 previous leakage in slab soffit



Figure 4-91 previous leakage in wooden slab soffit

Conclusion:

The structures are deteriorating more than the status inspected on 2019. Further investigation is required, additional tests need to be done at the concrete elements. The expected repair work for the three buildings (structural repair only) without any finishing issues is around 1.4 million not including the wood replacement.

Regards

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