

# Structural Appraisal



*Extracting Core from Retaining Wall*



*Extracting Dust Samples for Chemical Tests*



*Schmidt Hammer*

**Structural Appraisal** is to study and evaluate the overall structural adequacy of an existing building by examining the factors like overall stability, strength, durability, impermeability, appearance etc. through Non-Destructive and Partial Destructive tests, and making a report on the conclusions of the study with a recommendation on any remedial measures needed for the structure.

## Scope of Work:

1. Gathering of available information and documentation concerning the structure such as as-built drawings, age and history of the structure, previous accidents and damages, previous rehabilitation and modification works, previous testing results and construction details.
2. Visual inspection includes a damage take-off survey and taking photographs.
3. Performing breakouts to expose the extent of damages and extent of reinforcement corrosion.
4. Rebound hammer tests to assess the strength of the surface concrete.
5. Obtaining concrete cores samples which shall be used for:
  - Actual compressive strength and density of concrete.
  - Chemical analysis like pH, Chloride content, Sulphate content.
  - Depth of Carbonation.
  - Petrographic analysis
  - Cement content and cement aggregate ratio
  - Type of cement
  - Indicating type, size and cover to reinforcement.
  - Indicating corrosion & condition of reinforcement.
7. Ultrasonic Pulse Velocity Tests for determining the characteristics of cracks and defects in selected structural elements.
8. Tensile strength tests for the reinforcement.
9. Half Cell potential tests to determine the magnitude of corrosion.
10. Inspection pits in the ground to verify the nature of the sub-grade and also to expose and investigate the condition of the foundation.
11. Geotechnical investigation to determine the general subsurface conditions and verify the adequacy of the foundation system used for the structure. This includes:



*Ultrasonic Pulse Velocity Test on Beams*

- Drilling exploratory bore holes, performing standard penetration tests, and recovering representative soil and rock samples.
- Measuring the ground water levels.
- Performing laboratory testing including grain size distribution, moisture content, Atterbergs limits and chemical tests like pH, Chloride content and Sulphate content.

12. Performing structural calculations to verify the stability of the structure. If required STAAD shall be used for structural Analysis.

13. Crack monitoring works.

14. Preparing a consolidated report of the studies which include:

- Synopsis and scope of work
- Background information
- As-built drawings
- Details of inspections
- Assessment of the investigations, overall stability, calculations.
- Conclusions
- Recommendations and cost estimate for any rehabilitation works if needed.

## **Typical projects undertaken:**

1. Al-Showaier Commercial & Residential Complex, Riyadh.
2. Al-Thomairy Hospital Buildings, Dammam.
3. Several private residences, Riyadh
4. Saudi Telecom Headquarters, Riyadh
5. Al-Rajhi residential complex, Riyadh
6. Three STC Exchange Buildings, Makkah

## Crack monitoring works

**Description:** The monitoring of cracks by measuring the progress of cracks by means of demountable mechanical strain gauges or other devices.

**Equipments:**

1. Mayes Demec Demountable mechanical strain gauge with accessories like reference discs etc.
2. Mayes crack microscope to measure the crack width.
3. Crack Monitoring Calibrated Strips

**Procedure:**

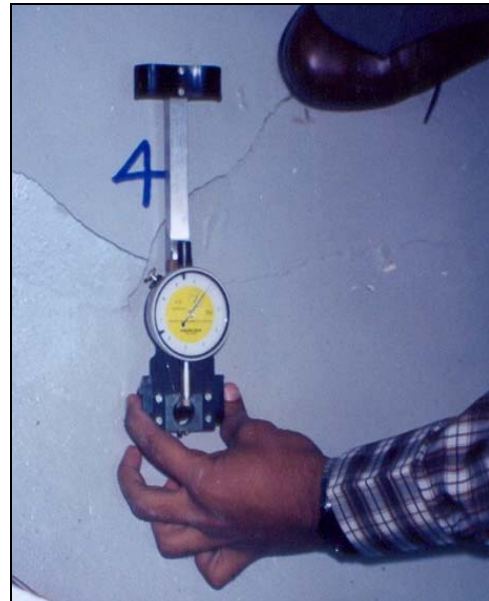
1. Perform visual inspection and select the monitoring stations, such that the overall behaviour of the structure shall be verified.
2. Install the reference discs, each station shall consists of two 6.3mm dia stainless steel reference discs shall be fixed to the surface by epoxy across the crack at a specified distance.
3. The crack width shall be measured by means of a microscope.
4. Periodic readings shall be taken and compared with the initial (base) reading, and arrive at a conclusion on the nature and progress of the crack.

**Advantages:**

1. The instrument is very simply and handy.
2. No instruments will be permanently kept on the crack location except two small reference discs.

**Typical projects undertaken:**

1. Royal Saudi Air Force Building, Riyadh
2. Al – Showaier Commercial and Residential Complex, Riyadh
3. Private residential villa, Riyadh
4. MODA Clinic Building, Riyadh.
5. Riyadh Bank Data Center Building, Riyadh.



*Demec Gauge*



*Crack MON*