



**Report on Visual Inspection & Recommendations
of
Sheikh Zayed Tunnel**

The Problem

- Tunnels and underground infrastructure are getting older, and this aging process leads to increased risks, including leaks, which in turn accelerate the aging. This has consequences for the integrity and safety of the structure.



The Problem

- High concentrations of salt may cause long term damage to concrete and reinforcement which will affect the integrity of the structure.



The Problem

- Not only between joints, also middle of the road are showing leaks.



The Problem

- Not all joints are showing damage however, this will not mean that they are not (yet) damaged.



Recommendations

- Due to the nature of the problem, It is important to understand what the root cause is of the leakage before planning a solution.
- It is recommended to appoint a specialized party to conduct a comprehensive study, identify the problem and propose a solutions.



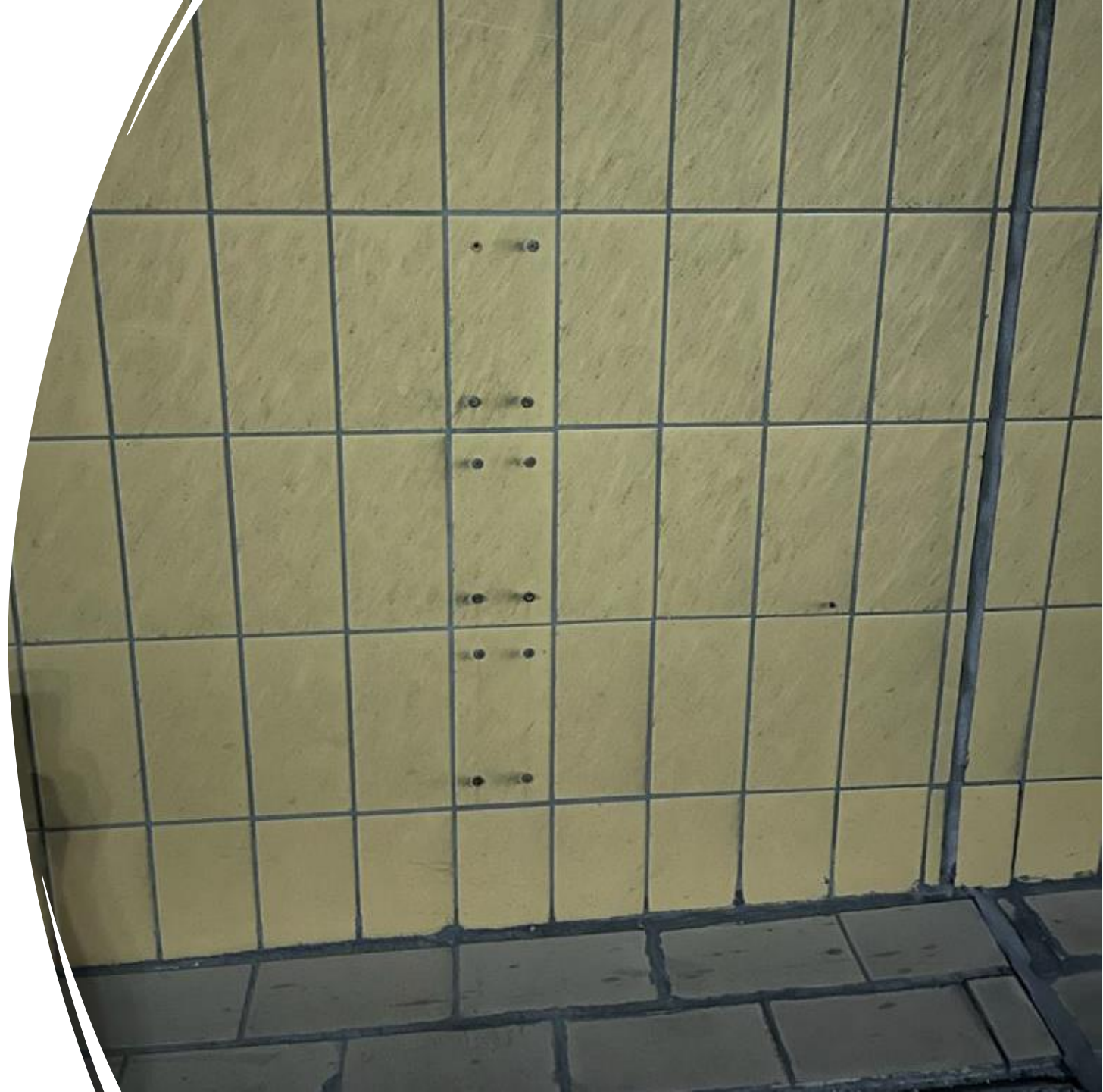
Recommendations

- Quick fixes could do more damage and can be more expensive in the end.
- The visible leakage is not necessarily the origin of the leakage



Recommendations

- Injection can cause damage to the waterproofing if executed without considering the waterstop pressure limitations. Only very low pressures are allowed.



Recommendations

Appointing a specialized party to establish a roadmap identifying the cause, remedial measures as well.

A Roadmap can help structure the approach to the joint repair and can help to allocate the resources carefully and to help address joint damages in other areas as well.



Proposed Scope of Work for Specialized Party



To act as an independent specialist engineering company that can be enrolled during every stage of the project.



Review as built drawings, in depth site inspection (including required testing & monitoring).



Present findings, remedial measures and construction methodology (including materials for Client's approval).



Prepare tender documents for repair work and review technical submittals.



Supervise site work to ensure implementation of the required repair methodology.



Monitoring to ensure satisfactory completion of repair work