The study of ground water effect and risks on the safety of the Archaeological Islamic buildings in Egypt applied on Azabk El-Youssefi Madrasa”
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Introduction
The increase of ground water’s level is considered one of the most effective deterioration factors which works on the decrease of stone’s mechanical properties¹.
First, the deterioration appears on the surface, and then the ground water arises with the capillary system through the pores that leads to the dissolution of the cement materials of the stone².
The soil under the building’ foundations affects badly from the ground water, especially if its type is (clay soil) which absorbs the water and swells, during the drought the soil shrinks, This movement of swelling and shrinkage causes the foundations movement and architectural elements cracking in the end¹, the soil returns after the shrinkage to its original size that causes the soil falling².

1. The case study (Azabk El-Youssefi Madrasa)
This Madrasa returned to Mamluk era “900 AH-1494 A.D” in Sayeda Zeinab street in Cairo - Egypt Fig.1, it consisted of the mosque, Kuttab, Sabil and the minaret in the past but now there are the mosque, the minaret, the Kuttab and the Sabil remains because of the man – made deterioration “human encroachments”.
The mosque consists of four iwans; the main one is for praying (southeastern iwan).
The ground water affected badly on the Madrasa in some deterioration pheno-

Fig.1 - The main façade of the Madrasa (Northeastern facade)
mena, some of them are architectural and the others are not. The source of the ground water in the Madrasa is the drainage water that results from the bad drainage system in the area.

1.1. The architectural deterioration phenomena in Azabk El Youssefi Madrasa

From the field investigation of the study case, we found that the ground water impressed on not only the architectural elements but also the foundations and the soil under them as the followed:

1-The ground water level rising in the building which caused the structural destruction like: irregular falling in the Madrasa marble floors and foundations decay, Figs.2-3.

Fig.2 - irregular falling in the Madrasa marble floors (Northwest Iwan); Fig.3 - The ground water rising in the floors
2- Severe cracks in area under the minaret because the over load of it in the main facade. Fig.4.
3- Isolation in one of the northwest iwan walls because of the foundations rotation under it which affected badly on the safety of the building. Fig.5.

Fig.4 - Shows the minaret of the Madrasa

Fig.5 - Shows the isolation of one of the walls in the northwest iwan
2.1. The other deterioration phenomena in the Madrasa which related to the ground water level rising: 
1- Salts crystallization on the walls. Fig.6

![Fig.6 - The salts crystallization on the walls](image)

2- Biodeterioration spots especially in the lower part of the walls. Fig.7

![Fig.7 - The biodeterioration growth in the lower part of the walls](image)
References

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