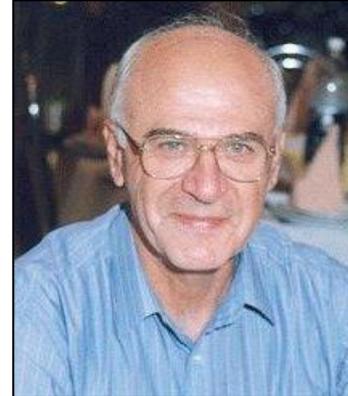


## Using 'NDT' in strengthening, rehabilitation and sustainability of various structures – case studies.

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1. **Key words:** strengthening, rehabilitation, sustainability, carbonation, chlorine ingress, NDT-Non Destructive Tests, Live- Loads.
2. **Key-concepts used:**  
'Bauhaus' – known as well as the 'International Style', introduced in the thirties of the last century in Tel-Aviv.  
'Pal-Kal' – double flange joist floor, containing closed internal voids and thin steel sheets blocks  
LCC – Life Cost Cycle



In recent years, a widespread trend can be noticed in seismic strengthening of existing structures, rehabilitation of 'Bauhaus' buildings planned for preservation, various NDT in so-called 'Pal-Kal' floors, NDT and rehabilitation of bridges, tests in structures, along the congested populated seashore strip of Israel, that were effected by carbonation and/or chlorine ingress.

Most of these structures and bridges are over 30-40 years old, others are planned for rehabilitation, such as Bauhaus style buildings, are 70-80 years old. Due to the long time since they were built, there is no available technical documentation for most of them, such as engineering and architectural detailed drawings and other useful information, in order to use them as a basis in the design of the renovated structures.

In such cases NDT are most helpful because the findings of the tests give us a clear picture of the physical state of the framing elements and the framing scheme of the structure. As a result of this useful information, we get the following advantages:

- a. Creating design infrastructure of the new renovated structure.
- b. Reducing the uncertainty of a number of important factors which enable us to reach the right decisions in selecting the optimal solution for each building.
- c. NDT expenses are relatively low relating to the total budget of the project but they can lead to significant savings in the construction expenses of it.

The strengthening works are performed almost to all structural elements such as foundations, columns, beams, floors, brick walls etc., depending on the type of the project, the problems which have to be solved, connected with the updated regulations, codes, live -loads and so on.

The most common types of tests are performed with equipment such as GPR, thermographic camera, boroscope, X rays, Iridium 192 Isotop, profometer, ultrasonic and sonic equipments, Schmidt hammer and others.

Phenol-phtalain indicator for depth control of carbonation and chemical analysis for chlorine ingress are used for the evaluation of the LCC of these buildings.

The lecture will present various case studies showing the combination of NDT with strengthening of the structure elements according to accepted modern materials and methods, common in recent years.

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