EVALUATION OF SEISMIC RESISTANCE FOR AN OLD WATER STRUCTURE IN EGYPT USING DYNAMIC TESTING

By

Rana Nasser Ellaithy Hamed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

in

STRUCTURAL ENGINEERING

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Under the supervision of

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Title of Thesis	:	EVALUATION OF SEISMIC RESISTANCE FOR AN OLD WATER STRUCTURE IN EGYPT USING DYNAMIC TESTING
Key Words	:	Dynamic analysis, Seismic analysis, Dynamic testing, Hydraulic structures, Dynamic characteristics, Seismic resistance.

Summary :

Scope of the research is to propose a methodology for the assessment of the dynamic resistance of a hydraulic structure. This objective was reached by studying the effect of dynamic loads on the hydraulic structures; case study El-Ayat regulator. A hydraulic structure may expose to many types of dynamic loads such as earthquakes and vehicles flow. Effect of seismic load on hydraulic structures not only depends on to the value of the peak ground motion due to earthquake but also the dynamic characteristics of the structure. In this research; ANSYS Software, workbench module was used to create a finite element model for the structure. Field tests were held to determine the dynamic characteristics of the structure and their results were used to verify the numerical model by comparing the results of the tests with the model's results and updating the model. Finally, seismic analysis was held to the regulator using different Peak Ground Acceleration (PGA) levels to reach the failure condition to evaluate the seismic resistance of the regulator. It was found that an earthquake with 7.3 magnitude on the moment magnitude (Mw) scale caused a stability failure for the regulator. And many other important results for the decision makers.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Rana Nasser Ellaithy Hamed Date:

Signature:

Dedication

To my Lovely Family - the most supportive family one can ever have -; My Mother **Prof. Dr. Nadia Eshra**, My Father **Eng. Nasser Ellaithy**, My Lovely sisters **Issraa** and **Aalaa**, my soul mate and husband **Ahmad Abd Elazeez Eshra**, and my Grand Father **Ellaithy Hamed**. Thank you for being there every time I needed your support which actually without it, I never could finish this work or any other good step in my life.

I also dedicate this work to the precious souls that have departed our world, but still alive in our souls and mind and still supporting us from their world; Our Family's God Father (My Great Lovely Uncle) **Abd Elazeez Eshra**, My Beautiful Grandmothers **Amenah** and **Saadia**. "God please them all."

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