بسم الله الرحمن الرحيم

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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Irrigation and Hydraulics Department

Management Plan for Hydraulic Structures

A Thesis Submitted in Partial Fulfillment of the
Ph.D. Degree of Science in Civil Engineering
Irrigation and Hydraulics Department
Ain Shams University

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AIN SHAMS UNIVERSITY
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MANAGEMENT PLAN FOR HYDRAULIC STRUCTURES

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STATEMENT

This thesis is submitted to the Irrigation and Hydraulics Department, Faculty of Engineering, Ain Shams University in the partial fulfillment of the requirements for the Ph.D. Degree of Science in Civil Engineering.

The work in this thesis was carried out in the Irrigation and Hydraulics Department, Faculty of Engineering, Ain Shams University from January 2014 to February 2020.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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THESIS SUMMARY

Egypt is located in an extreme aridity belt, with average annual rainfall of less than 18 mm and population of more than 100 million. The rapid growth of the population and per capita consumption enhances the need to manage well the available water supply trying to fulfill these needs.

In this study, Management Plan (MP) is conducted for water distribution system in Egypt that depends mainly on a complex set of control Hydraulic Structures (HS) along the entire length of the Nile River. 140 control HS were selected for the study. The selected structures vary with respect to size from barrages on the Nile River to small water Mesqa intake regulators.

Different types of data like hydraulic, structural, social and environmental data were collected using different techniques such as aerial and satellite photography, land and bathymetric survey, underwater video filming, etc. Geographic Information System (GIS) package was used to store and handle the huge amount of data collected to decide measures to be taken for system rehabilitation to guarantee best system performance. Decision Support System (DSS) was designed using the SD V2.6.0 software to prioritize the selected 140 structures regarding rehabilitation process. Sensitivity Analysis (SA) was performed to determine the effects of the eight selected criteria on the ranking of the 140 structures under study.

The study resulted in the determination of the remedy measures to be taken for the structures, complete priority list for all the 140 control HS, and the eight effective criteria regarding prioritization of the structures under study. It is hoped to give a new insight to engineers and researchers regarding MP for water distribution systems controlled by HS.

Keywords: Management Plan, Hydraulic Structures, Geographic Information System, Decision Support System, Sensitivity Analysis.

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