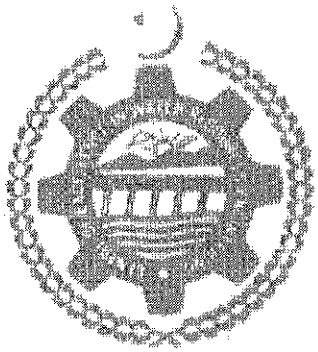
THESIS

DIAGNOSTIC ANALYSIS OF WATER DISTRIBUTION OF A CANAL SYSTEM: A CASE STUDY OF 3R DISTRIBUTARY OF HAKRA CANAL SYSTEM, PUNJAB, PAKISTAN



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ABSTRACT

The Canal System of 3R Distributary was selected for this study which is located in the southern part of the Punjab Province in Bahawalnagar district and it irrigates the area of Haroonabad. It is a large size distributary with a total authorized discharge of 353 cusecs and having total length of 32.5 miles. This system has 125 outlets, serving a total culturable command area (CCA) of 72,753 acres. Many types of outlets were existing on the channel including open flume (OF), Open Flume with Roof Block (OFRB), Pipe, Scratchley, Orifice-Cum-Open-Flume with Roof Block (OCOFRB), Orifice-Cum-Adjustable Proportional Module (OCAPM) and Orifice type. In mid 1990's the 3-R Distributary was lined under Annual Development Programme (ADP) and Fordwah Eastern Sadiqia South (FESS) Irrigation and Drainage Project from RD 72+880 (fall structure) upto its tail. These works were completed by the year 2001 but inspite of these improvements, the distributary was subjected to a series of problems including but not limited to (i) withdrawal of illegal water (ii) various defects and practices (iii) design and construction flaws (iv) improper selection of type of outlets and many others.

These problems were investigated by focusing on evaluation of the hydraulic performance of the outlets of the channel. For this purpose, primary data was collected through actual measurements and observations while secondary data was collected from Irrigation and Power Department. The existing outlets were intentionally designed wrongly by using fictitious hydraulics data so as to provide undue benefits to the irrigators. The selection of types of outlets was not made using the proper design criteria with respect to the hydraulic condition of channel and the command area. During construction, the crests level

of these outlets was also intentionally fixed at lower level than design in order to provide undue benefits to the farmers. After reviewing the existing condition, all the outlets were redesigned on the basis of actual hydraulic data of each outlet. Based on the observed data, capacity statement of channel was revised. As a result of this exercise, most of the non-modular outlets (Pipe and Scratchley) have been converted to semi modular outlets (OFRB and APM). With the implementation of newly designed outlets at site, equitable distribution of supply has been improved. The newly designed outlets with optimum setting will also help to avoid illegal practices. This research will serve as a unique study and can be implemented to other irrigation channels in the Punjab for the equitable distribution of the supply in the system which is the main objective of the Department.