

**THESIS**

**EVALUATION AND MANAGEMENT OF  
SEVERE FLOOD AT PUNJNAD BARRAGE**

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## ABSTRACT

From 1973 to 1998, the history of 25-years floods in Pakistan indicates that many of our barrages are now facing floods of such magnitudes, which are even higher than their design capacities. One of the many reasons of flood losses is the now insufficient design discharge capacities of the hydraulic structures. The National Strategy should be to safeguard the barrages against flood damages in such a way that sure canal supplies could be maintained and, secondly, their existence should not aggravate the flood problem; thus adding to the National Strength in two ways.

The aforementioned proposed National Strategy demands that the discharge capacities of our important hydraulic structures, like barrages, should be reevaluated under present hydraulic conditions and compared against Severe Floods, having reasonable return period, preferably 100 years. The structures found deficient to pass such floods should be remodeled, on priority basis, taking into account economic and social factors.

Punjnad Barrage was constructed during 1927-32 across Chenab River to irrigate vast tract of fertile agricultural land, lying on the left side of the River, through Punjnad and Abbasia Canals. It is located about four kilometres downstream the confluence of River Chenab and River Sutlej. The total area benefited by this Barrage, through Punjnad and Abbasia Canals, is 1.63 million acres, which is 8.03% of the total CCA of the Punjab province and 4.29% of the total CCA of the country.

Historic discharge data of Chenab River at Punjnad Barrage indicates that flood discharges exceeded the design capacity of the Barrage during the years 1973, 1976, and 1992. The highest flood was recorded in 1992, which amounted to 812,152 cusecs, and was 112,152 cusecs in excess to the Barrage design capacity. Occurrence of discharges greater than the design capacity at Punjnad Barrage indicates that the present design capacity of this Barrage is also inadequate. Such an important structure, which irrigates vast tracts of agricultural land, cannot be left unprotected against severe floods. This warrants remodelling of the Barrage.

Punjab Flood Commission, in a meeting held on June 17, 1974, decided to provide breaching sections for different Barrages. For Punjnad Barrage, the breaching sections were approved between RD 19 to 21 of Right Marginal Bund (RMB) and RD 28 to 30 of old RMB. However, experience has shown that breaching sections do not develop adequately; consequently some other relatively more effective alternate solutions are required. This study aims at alleviating flood problems of Punjnad Barrage through suitable improvements in its hydraulic design, so as to make it safe against severe flood. Eight alternatives have been analytically studied for the management of severe flood as listed follows:

- Option 1A: Passing Additional Discharge by Raising Water Level**
- Option 1B: Raising Water Level and Replacing Junction Groyne with four bays**
- Option 2A: Passing Additional Discharge by Lowering Crest of Weir**
- Option 2B: Lowering Crest of Weir & Replacing Junction Groyne with four Bays**
- Option 3A: Passing Additional Discharge by Extending Waterway**
- Option 3B: Extending Waterway and Replacing Junction Groyne with four bays**
- Option 4A: Construction of an Auxiliary Weir**
- Option 4B: Auxiliary Weir plus Replacement of Junction Groyne with four Bays**

Out of these options, option No. 3A "Passing additional discharge by extending water way" (without removing Junction Groyne) is found to be the most economical one; therefore the same is recommended for adoption. The recommended proposal may be evaluated in detail as a Feasibility Study, and model testes could be conducted. A dredger may be provided at the Barrage, which would be very useful in improving River approach and removing undesirable shoal formation close to the Barrage.

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