

THESIS

**BANK STABILITY ANALYSIS OF GREATER THAL  
CANAL USING SLOPE/W**



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By

Malik Ikram Ullah  
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## ABSTRACT

A canal breach may lead to a lot of hazards like loss of life, property, various crops and wastage of national money already spent on canal construction and further required for repair of the failed section. It is better that the slope of a newly designed canal sections should be analyzed regarding the stability problem in order to avoid any hazard in future. The canal after its construction may have to face any worst condition such as sudden draw down of full supply level. In order to avoid these worst conditions, focus on slope stability analysis is of prime importance. Slope stability research will be helpful in estimating the future problems regarding the canal stability. Greater Thal Canal project lies in sandy area and stability is a major part of concern there. The research will also be helpful in improving the cross-sections at various RDs of the proposed canal.

SLOPE/W, a slope stability model, was used for the stability analysis in this research. SLOPE/W is a software to compute the factor of safety of earth and rock slopes. The SLOPE/W makes it possible to easily analyze both simple and complex slope stability problems using a variety of methods to calculate factor of safety. SLOPE /W has also application in the analysis and design for geotechnical, civil and mining engineering projects.

For the analysis of slope stability, data from feasibility report prepared by consultants in 1995 and recent geotechnical investigation report was used in this study for analysis. Slope stability analysis has been performed for two worst conditions i.e., before running of canal and for sudden drawn down conditions.

SLOPE/W gives us several options for selection of analysis method for the slope stability analysis. In order to select the most suitable method, stability analysis was performed at one cross-section using various methods available in the model SLOPE/W and results were compared with stability analysis by an analytical method i.e., Swedish Circle Method. Bishop method of analysis method gave comparatively more accurate results. Factor of safety obtained from Bishop Method was 2.386 while factor of safety from analytical method was 2.39. Thus the factor of safety of Bishop Method comes to be within 0.2% of the analytical result.

Slope stability analysis was performed at selected cross-sections of main canal for the scenarios of before operation of canal and for sudden draw down conditions. The factor of safety results at the selected cross-sections vary from 1.593 to 2.543 for the condition of before operation of canal and 1.080 to 1.757 for rapid draw down conditions. The factor of safety for sudden draw down conditions was comparatively lower, but still it satisfies the stability requirements at all the selected cross-sections. Further rise in the ground water table may cause problem. As increase in the level of ground water table will increase the uplift force which tries to rupture the surface above it.