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A Dam Break Analysis Using HEC-RAS

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ABSTRACT

This paper firstly described the dam break in the aspects of theories and models. Break parameters prediction, the understanding of dam break mechanics, peak outflow prediction were shown as the essential for the dam break analysis, and eventually determined the loss of the damages. Secondly, as an application example, Foster Joseph Sayers Dam break was further modeled and analyzed using USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) model based on available geometry data. The results show that dam break is a complicated and comprehensive process involving lots of principles. Combination of mechanics and case studies, reflection of predominant mechanisms of headcut erosion, more specific categorization of dam, prudent investigation and inference of dam break process are needed in developing a satisfactory dam break simulation model. Foster Joseph Sayers Dam break due to piping elongates the time period of high water surface level, which increases the duration of risk. However, the dam break does not increase the downstream maximum water surface elevation (Max. W.S. Elev) significantly at previous design Probable Maximum Flood (PMF). Dam break has a greater impact on the downstream location where is closer to the dam in accordance with the comparison of the hydrographs at different downstream locations. Sensitivity analysis demonstrates that the changes of dam break parameters had no much influence on the downstream Max. W.S. Elev.

KEYWORDS

Dam Break, Analysis, Model, HEC-RAS, Hydrograph

Cite this paper

Y. Xiong, "A Dam Break Analysis Using HEC-RAS," *Journal of Water Resource and Protection*, Vol. 3 No. 6, 2011, pp. 370-379. doi: 10.4236/jwarp.2011.36047.

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