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**CANDIDATE'S DECLARATION**

I Lokesh Aggarwal, 2k16/HFE/11 student of M. Tech (Hydraulics and Water resource Management), hereby declare that the project dissertation titled “Estimation of Depth of Scouring around Permeable and Impermeable groyne and their comparison” which is submitted by me to the Department of Civil Engineering, Delhi Technological University, Delhi in partial fulfillment of the requirement for the award of the degree of Master of Technology, is original and not copied from any source without proper citation. This work has not previously formed the basis for the award of any Degree, Diploma Associateship, Fellowship or other similar title of recognition.

Place: Delhi

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**CERTIFICATE**

I hereby certify that the project dissertation titled “Estimation of Depth of Scouring around Permeable and Impermeable groynes and Their Comparison” which is submitted by Lokesh Aggarwal, 2K16/HFE/11 Department of civil Engineering, Delhi Technological University, Delhi in partial fulfillment of the requirement for the award of the Degree of Mater of Technology, is a record of the project work carried out by the students under my supervision. To the best of my knowledge this work has not been submitted in part or full in for any Degree or Diploma to this university or elsewhere.

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## **ABSTRACT**

India is part of Indian subcontinent consists of various types of river and alluvial river is one type of them. Alluvial rivers are those carry heavy amount of sediments in suspension with the flow. The loose, unconsolidated particles carried away by the flow is termed as alluvium or sediment load. Sediment load cause problems to hydraulic structures in many ways such as reduction capacity of reservoir, excessive wear and tear of turbine blades, meandering of river that can cause change of its path and many more. These activities of river due to sediment load cause loss of valuable agricultural land, loss of life, huge amount of money and time. To overcome these problems river training structures are used. River training structures constructed either in transverse direction or longitudinal direction. From various river training structures present study is based on groynes/spur dykes. Groynes are a part of river training structures and constructed in the transverse direction to the flow of the river such the one end fixed to the bank of the river whereas other end remain open in the current flow of the river. Groynes reduce the flow velocity, suspended sediment load of the river, protect the bank of river from erosion and allows the river to flow in a specified direction. While protecting the bank from erosion groyne itself experiences scouring due to which its foundation exposed to the atmosphere. The exposed out portion of the groyne will experience more impact energy of flow that may leads to structural collapse of the structure. As groyne sacrifice themselves for the protection of banks so sometime they are called as sacrificial protection measures. They are constructed for the protection of hydraulic structures but if they fail then the results may be more disastrous so it is of prime importance to discuss the scouring phenomenon around the groynes. Groynes are of two type's permeable and impermeable groyne based on the flow pass through the structure or

not. If flow can pass through the structure then it is termed as permeable structure otherwise impermeable structure. There are hundreds of studies available from historical researches about the scouring around impermeable groynes but rare data is available about scouring around permeable groyne. Permeable groynes are more flexible and more cost effective structure so this topic needs more investigation. In this present work, we studied the scouring phenomenon around straight partially submerged permeable as well as impermeable groynes and comparison between them at same hydraulic parameters so as to select a suitable groyne type to construct for river training works. Scouring is also monitored around the groynes by varying the contraction ratio (contraction ratio is defined as the width of groyne divide by width of the flume).

Experiments are done to measure the maximum depth of scour around both types of groynes in tilting flume and comparison is done among all the groyne sets to find out which is more efficient in the given situation. Total 20 models are prepared from wooden board of straight groyne and experiments are carried out in the flume of 8m long, 0.3m width and 0.4m deep flume. Velocity is measured at the head of each groyne to show the variation of velocity with the help of Flow probe velocity meter (FP111) and scour depth measurements are noted with the help of graduated point gauge. Experimental data shows that Short length of permeable groyne experiences less scouring around groynes than other groynes.

Sieve analysis is done in beginning and also at the end of the experiment to find out the median size of the sediment particle that will provide the depth of sand bed in beginning of the experiment. Sieve analysis also give idea about the sediment particle which is more prone to scouring and which one reside inside the flume that may provide the protection measure to the groynes.

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