LANDSLIDE HAZARD AND RISK MAPPING OF URBAN MURREE

By

Muhammad Naeemuddin

(2002 – NUST – MS - PhD – 8)

A thesis submitted in partial fulfillment of

The requirement for the degree of

Master of Science

In

Department of Civil Engineering

National Institute of Transportation

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This is to certify that the

thesis entitled

LANDSLIDE HAZARD AND RISK

MAPPING OF URBAN MURREE

Submitted by

Muhammad Naeemuddin

Has been accepted towards the partial fulfillment

of

the requirements

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Brigadier Dr. Tayyeb Akram, Ph. D (USA)

National Institute of Transportation, Risalpur

National University of Sciences and Technology, Rawalpindi

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DEDICATED

TO

MY MOTHER

AND

WIFE

ACKNOWLEDGEMENT

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ABSTRACT

Landslides are an inherent dilemma of the mountainous areas and have been observed and recorded for several centuries worldwide. Geographically, Murree lies in the southern part of outer or sub Himalayas and is one of the busiest hill resorts of Northern Pakistan. The altitude of Murree hills above mean sea level ranges from 1600 to 2200m. The population of Murree urban area increases from 25,000 to 300,000 during peak tourist season. Tourist related commercial activities like shops, hotels, and residential construction is growing at a very rapid pace. Owing to the fragile geology, deforestation and uncontrolled urbanization, the area is under constant threat to landslides and slope failures, thereby, creating very high risk to human life, limb and property. In the past no effort was directed towards landslide hazard mapping of the area that should help in the planning, design and construction / maintenance of infrastructure projects, including management and relief works in case of landslide induced disaster. The research described herein highlights the factors affecting the slope instability, causing risk to the human life and property. Landslide Hazard Potential (LHP) and Risk data was collected through reconnaissance site-walkover surveys. Intensive field and laboratory investigations were performed to ascertain critical parameters at the selected locations across Murree urban area. The data was analyzed using Fuzzy Logic Technique. The outcomes of this research are identification of critical factors contributing to the landslide hazard and risk in the study area. Based on the knowledge of these critical factors, landslide hazard and risk models / maps were developed. The resulting maps demarcate the area into different intensity hazard and risk zones.

TABLE OF CONTENTS

CONTENTS **Page No.**

CONTENTS **Page No.**

CONTENTS **Page No.**

LIST OF FIGURES

LIST OF TABLES