A GUIDE TO PROTECT BRIDGE PIER FROM SCOURING

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TABLE OF CONTENTS PAGE

ABSTRACT

The primary objective of this study is to understand the failures of bridge piers due to scouring and produce a guideline for their protection with the most economical and suitable method. Scouring, when it is excessive can cause unequal settlement of foundation or leave part of the structure unsupported due to undermining and thus cause structural failure.

Protecting or limiting the extent of local scour around bridge piers is a matter of great interest. Usually designer and engineer should make a choice between deep and shallow foundations. The choice is greatly influenced by the cost of the project, local geological conditions and flow characteristics of the river.

By far, the most commonly used method of protection is to provide loose apron over the area susceptible to scour. As the scour develops, the coarse materials covers the sides of the scour hole, thereby paving it and preventing from further scour. Another method is by decreasing the velocity of flow around the bridge piers usually not more than 1.0 m/s.

Several methods of scour protection at bridge piers have been studied and analysed. The selection for the most effective and useful method of scour protection to be used depends on its design and economic criteria.

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Failure of bridges due to scouring at their supports is a common occurrence. The scouring may occur at piers, at abutments or at river banks. The latter may lead to the stream changing its course altogether and outflanking the bridge.

The scientific basis of structural design of bridges is highly advanced, but a unifying theory for estimating scour depth at piers is still in an embryonic stage, mainly due to the complex nature of the scour problems. Major scouring usually occurs during floods which are unsteady flows, and may even have different flow directions from normal flows. The flood flows interact with sediments which may be alluvial sands or gravels, stiff clays, weathered rocks or a mixture of these. Bridge piers have a variety of shapes and their alignment to flow may change with flow. Large random changes may be caused by floating debris or rubbish pack.

The theoretical basis for the structural design of bridges is well established. In contrast, the mechanics of flow and erosion in mobile-boundary channels has not been well defined and it is not possible to estimate with confidence the