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**SCOUR PROTECTION AT BRIDGE PIERS**

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## **SYNOPSIS**

One of the problem that arises during the lifetime of a bridge so far, as the foundations are considered is the undermining due to scour at the bridge pier. The scour 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 extent of local scour around bridge piers is a matter of great interest. Usually designer should make choice between deep and shallow foundations. The choice is greatly influenced by economy of the project, local geological conditions of the river and flow characteristics.

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 material covers the sides of the scour hole, thereby paving it and preventing further scour.

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

## CHAPTER ONE

### 1.1 Introduction

Many bridges are destroyed by floods. Piers built in alluvial material, unless set deeply, are apt to be undermined and may settle or collapse. The depth of scour that may be expected in any given location depends upon the duration and peak flow of the flood, the susceptibility of the bed material to rapid erosion, and the degree to which the cross-sectional area of flow is constricted.

Although progress has been made since the rule of thumb "for every foot rise of water surface, the bottom goes down three or four" was a common guide, deciding what depth will be safe but not too costly is difficult even when field measurements taken during a flood happen to be available and model tests can be made.

An alternative to carrying the foundation down to below the uncertain level of the deepest possible scour is to provide local protection around the pier. It has long been standard practice to place thick "mattresses" (willow branches woven or tied together and weighted down with rocks) around the caissons used in constructing piers in the Mississippi and other large rivers.

According to Waddell, the mattress must fit tightly around the pier or caisson. He stated that when the outer edges are undercut, the weighted mattress will bend down and prevent further undermining. It would be interesting to know how long some of these installations have continued to function. Ordinarily they are only needed to keep scour holes from forming while the caissons is being sunk to solid rock or to a depth considered to be sufficient.