

# Review on Counter Measures for Scouring Around the Bridge Pier

Kuldeep Patel, Snehanu Nath

**Abstract**—Bridge pier as a crucial part of a bridge is used for various marine and transportation purposes. Local scouring around the bridge pier is a prominent cause which leads to the failure of the bridge system. Scouring around the bridge pier is caused due to the effect of vortices created by water current. To prevent scouring we have to design the countermeasures and also maintain the sediments which are erodible. This review examines both type of countermeasure devices. Measures such as to divert the flow or to strengthen the river bed. Use of slot can reduce the scouring to 20% and with combination of collar and slot the reduction efficiency increases. Use of rip rap strengthens the river bed and reduces the scouring. Both the measures are different in their aspects and can be used to reduce scouring. Various countermeasures used together can reduce the scouring effectively.

**Keywords**—Bridge Pier, Collar, Countermeasures, Geo bags, Rip rap, Scouring, Slot.

## I. INTRODUCTION

Bridge is widely used structure as a hydraulics structure in river[1][2]. As the water passes in the river, the pier becomes an obstruction to the current. The current velocity will reach stagnation point at pier surface and the following water will push down the stagnant water fig-2[3][4]. As an effect of that horse shoe vortex will generate at the base of pier and scouring will occur fig-1[5]. Scouring around the bridge pier is considered to be the major cause of failure of the pier. Many researches have been done on estimating the scour depth, but very little research is done on countermeasures to be taken to reduce scouring. Countermeasures that we can take depends on the site condition. We can take countermeasures which either strengthens the bed surrounding the pier or which diverts the flow of current or both[1][6][7][8][9]. Use of rip-rap, geo bags will strengthen the river bed. Use of guiding vane, collar, slot, different shape of pier will alter the course of current [1][6][4][10].

## II. USE OF RIVER BED STRENGTHENING MEASURES

### A. ARTIFICIAL RIPRAP

Artificial ripraps as shown in fig-3[1] can be placed around the bridge pier. Ripraps strengthens the river bed to a certain degree and also slows the water current velocity thus reducing the scouring around the pier. Different shapes can be used for ripraps and can be used.

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\* Correspondence Author

**Kuldeep Patel\***, Dept. of civil engineering, Parul university, Vadodara, India. Email: [190303209017@paruluniversity.ac.in](mailto:190303209017@paruluniversity.ac.in)

**Snehanu Nath\***, Dept. of civil engineering, Parul university, Vadodara, India. Email: [snehanu.nath270125@paruluniversity.ac.in](mailto:snehanu.nath270125@paruluniversity.ac.in)

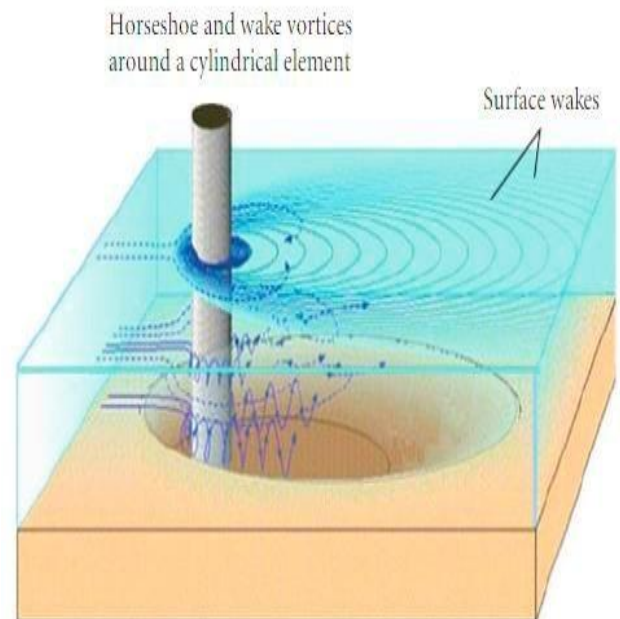


Fig. 1. Local Scouring[5]

Geo bags are also a countermeasure which strengthens the river bed and reduces the scouring around the pier.

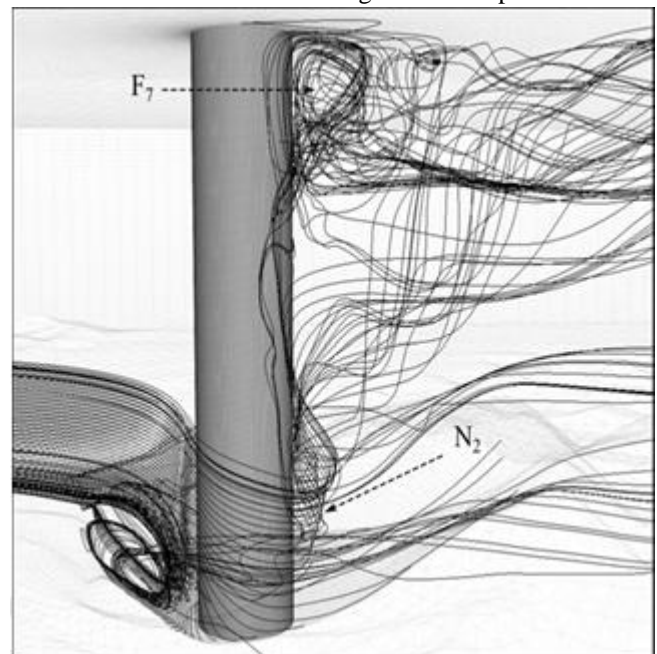


Fig. 2. Representation Of. Horseshoe Vortex And Downflow[3]

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