

Caisson Deep Foundation Stimulated Model

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Abstract— As development in the field on peak in recent years deep foundation is one of the field to explore. Specially, deep foundation from caisson is one of the most used construction practice for bridges and harbours for laying foundation in sea or river. Therefore, this research determine difficulties on site during sinking of caisson through reduced scale model made up of solid p.v.c material.

Key words: Stimulation Model, Sinking, Deep Foundation Caisson

I. INTRODUCTION

A caisson is type of foundation of the shape of a hollow prismatic box which is built above ground and then sunk to required depth as a single unit. It is a water tight chamber used for laying foundation under water as in river, lake, harbour, etc.

A. Types of Caisson

- 1) Box caissons
- 2) Open caissons or wells
- 3) Pneumatic caissons

B. Box Caissons

A box caisson is open at top and close at bottom and is made of timber, reinforced concrete or steel. This caisson is built on land, then launched and floated to pier site where it is sunk in position. Such type of caisson is used where bearing stratum is available at shallow depth and where loads are not very heavy. Closed box caisson also used for break waters and seawalls.

C. Open Caisson or Wells

An open caisson is a box of timber, reinforced concrete, steel or masonry which is open at top and at the bottom. It is used for building and bridge foundations. Open caissons are also called well foundations. They are used on sandy or soft bearing stratum liable to scour and where no firm bed is available for large depth below the surface.

Pneumatic Caisson

A pneumatic caisson is open at bottom and closed at top. This is useful at location where it is not possible to adopt wells. They are suitable when the depth of water is more than 12m, and maximum depth of water up to 35m.

The essential feature of a pneumatic caisson is that compressed air is used to remove water from working chamber at bottom, and the foundation work is carried out in dry conditions.

II. LITERATURE REVIEW

We have studied reference book named Soil mechanics and foundation by Dr. B.C Punmia, Ashok kumar Jain, Arun Kumar Jain to understand basic design methods for caisson and suitable type of caisson for specific location.

Additionally, reference book Soil mechanics and foundation engineering written by Dr. K. R. Arora provide us in depth knowledge regarding different type of materials used for construction of wells and design criteria for same. The design and drawings are been done inline with given theory and concepts given in these books.

III. MATERIAL USED AND DESIGN

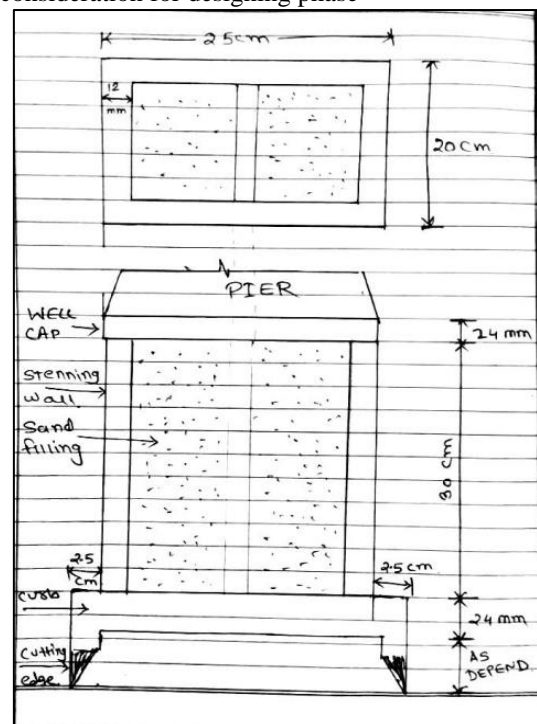
A. List of Materials

Material used for model of caisson are as given below:-

- Solid P.V.C sheet of 12mm thickness
- Aluminum angle
- Super glue for adhesive bonding
- Screws
- Metal nails
- Mechanical equipment
- Waterproof adhesive
- Hard paper
- Glue tape
- Steel sheet
- Thermocol sheet

B. Design of Caisson

- According to design criteria given in reference book design for caisson model was prepared for double rectangular caissons for reduced scale.
- Site condition and soil characteristics were taken in to consideration for designing phase



IV. METHODOLOGY USED FOR CONSTRUCTION OF CAISSON

A. Initial Trial Base Model from Hard Paper

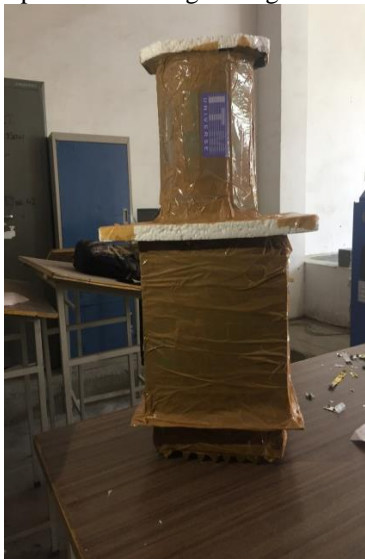
- 1) STEP-1:- For the purpose of trial, one model was constructed with the hard paper as it is easily available.



- 2) STEP:-2:- Very thin material of steel sheet was used in the making of cutting edge.



- 3) STEP:-3 :- Pier was made with thermocol sheet.
- 4) STEP:-4:- All three components were aligned in vertical direction with the help of glue.
- 5) STEP:-5:- Outer surface of caisson bounded by glue tape for the purpose of water tightening of caisson.



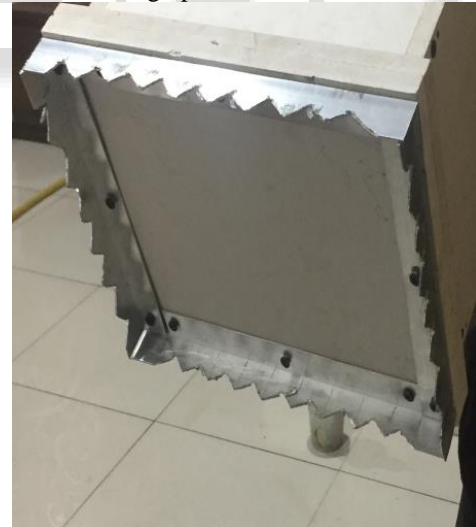
B. Model Made from Solid P.V.C Material.

After, achieving desire results from paper based model, we proceeded for next stage which include solid p.v.c material with purpose of high strength, sustainability and good floating ability of caisson.

- 1) STEP-1:- Firstly, sheet of solid p.v.c material was cut according to requirement of design.
- 2) STEP-2:- Caisson of specific dimension was made through p.v.c material, where steel needles and screws were used to provide good strength.



- 3) STEP-3:-Aluminium angle was used for cutting edge as it ease the sinking operation for caisson.



- 4) STEP-4:- Metal screws used to attach the structure together and glue for water proofing.



V. CONCLUSION

From our study, we found the construction methodology of box caisson/monolith. It is observed by sinking the model under various types of subsoil condition like muddy soil, Sandy soil and Soil mixed up with Gravel, easy sinking in Sandy soil Whereas Muddy soil and soil with Gravel shows hard sinking and tilting too. So this indicates more friction due to presence of fine particles. Tilting is due to gravel particles below cutting edge. So, the difficulties occurred in sinking operation of caissons and determined precautions during tilting and sinking operation of caisson.

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