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Comparative Study of the Floating Bridge Components

Prof.A.N.Humnabad[1], Akash Yewale[2], Rohit Rananavare[3], Bhushan Ingle[4], Hrushikesh Rahinj[5]
[1]*Assistant professor, Dept. of Civil Engineering, ICOER, Wagholi*
[2, 3, 4, 5]*B.E. Scholar, Dept. of Civil Engineering, ICOER, Wagholi*
U.G. Student, Civil Engineering, JSPM's Imperial College of Engineering and Research, Wagholi, Pune

Abstract: ***Floating bridge is a set of specialized shallow draft boats or floats hyperlink collectively to cross the river or canal or lake. With a track or deck most early floating bridge had been built for the features of the battle. There are numerous kinds of floating bridges relying on the conditions of the land and the type of barriers to cross. The principle behind floating bridge concept is the Archimedes' principle of buoyancy. This study was made to review previous studies concerned about the floating bridges. Almost all the study concerned with floating bridge components and their suitability with the given condition. only limited information is available for floating bridges in many aspects. In this study we have covered the different types of pontoons, access to bridge, navigational openings, mooring systems, etc. are the most important parts of floating bridge.***
Index Terms: Floating bridges, Archimedes' principle, Pontoon, Mooring system.

I. INTRODUCTION

The human necessity to cross the obstacles is existed since the times although of using many types of structures for this purpose such as the conventional bridges, floating bridges and tunnels civil engineers still faces many difficulties to find the suitable alternatives to cross the obstacles. The floating bridges have particular technical characteristics in comparison with the conventional bridges. The reason of selecting bridges must be investigated in economical and technical problems. The floating bridges consist of concrete pontoons bolted to form continuous floating bridge, box in cross section with top surface of the close for the road. The efficiency of the mooring cable is lower than the sliding pile due to relatively large compliance range that is valid also for the vertical displacement.

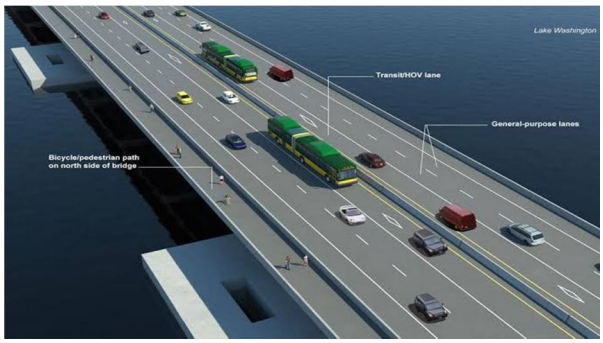


FIG. Basic model of Floating bridge

Floating bridges may be constructed where conventional bridges are impractical. When it is possible to assemble a sliding pile mooring system to introduce al the loads in the horizontal direction, the floating bridge will be stable. In most cases, it is impossible to construct the sliding piles due to the large water depth or the seabed soil weakness; therefore, the mooring system should be replaced by chains/cables mooring system to maintain the lateral supporting. The performance of the mooring cable is lower than the sliding pile due to the notably large compliance range.

As we propose to build a bridge across a natural drainage like rivers or few obstructions, we need to take into account the height of piers constructed above the ground level as well as below the ground level as a part of foundation. When we construct piers for bridges crossing deeper rivers then the height of piers may be very large. although if the river bed is of soft bed rock then the depth up to which the piers have to be laid under the ground level as foundation is also so high. So as entire it leads to a large excavation cost for drilling piles under water as well as constructing supports for incredible heights While designing a pontoon bridge, we should take into account the Archimedes'' principle.

The connection of the bridge to shore requires the design of approaches that are not too steep, protect the bank from erosion and provide for movements of the bridge during changes of the water level.

Floating bridges were traditionally constructed using timber. Pontoons had been shaped with simply lashing several barrels together, by rafts of timbers, or by using boats. Each bridge section consisted of one or more pontoons, which were maneuvered into location and then anchored underwater or on land. The pontoons had been linked collectively using wooden stringers called balks. The balks had been covered by a chain of cross planks called chesses to form the road surface, and the chesses were secured with side guard rails.

A floating bridge may be built in a sequence of sections, starting from an anchored point on the shore. Modern pontoon bridges mostly use pre-stressed floating structures. Most of the pontoon bridges are designed for temporary purpose, but bridges across water bodies with a constant water level can remain in place much longer. The floating bridge can be constructed of wood, concrete, steel, or a combination of materials, relying on the design necessities.

II. LITERATURE REVIEW

1) *Mustafa Ezz Ei-din, "Reviewing study of the floating bridges", April, 2017:* The study was made to review the previous study concerned about the floating bridges. The floating bridges can be studied from two point of views the mechanical and hydraulic point of view. In this study the effect of floating bridges on the open channel flow have been studied.
2) *Maarten Koekoek- "A General Survey and Structural Design of a Modular Floating Pavili"2010:* In given paper a general survey is done on building on water with all relevant problems. With a case examine of a floating pavilion study has been used. Case study floating pavilion the floating pavilion, with dimensions of 24x46 meters, has already been builted , but it has been constructed in one piece A combination of EPS and a concrete framework has been found the most suitable floating system, since this results in an unsinkable and light floating body with a low draught.
3) *M.Sc. thesis: Ali Halim Saleh- "Mega Floating Concrete Bridge" 1985:* From this paper study constructing floating bridges are economc solutions for crossing river or lake with greater depth and very soft strata where conventional piers are impractical. A floating bridge may be constructed of wood, concrete, steel, or a combination of materials, depending on the design requirements.

The function of a floating bridge is to carry vehicles, trains, bicycles, and pedestrians across an obstacle a body of water. Inasmuch as a floating bridge crosses an obstacle, it creates an obstacle for marine traffic.

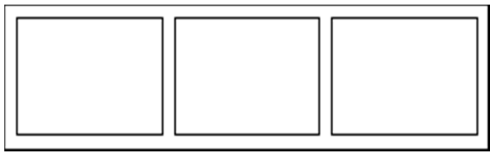
III. METHODOLOY

Economy in creation is the ultimate need for today, so we go for suitable structures to fit the purpose. Pier less bridges are common. Hence it is necessary to find the different types of parts of floating bridge and their suitability at different condition.

Pontoon: floating bridge consists of a series of pontoons in different sizes and shapes that are arranged in different manner to form different types of floating bridges the pontoon can be concrete, caisson steel pipes or made up of a composite material and it represents the foundation of floating bridge. Following are some important types of pontoons:

Type: I

Type: II



1) *Access to Bridge:* The access bridge is link between the ends of deck slab and the shore or river banks. For efficient deck operation the means of access must provide effective circulation and the shortest possible distance from the shore or river bank to deck. The access bridge alternatives are:

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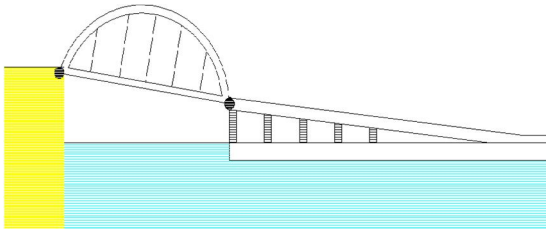
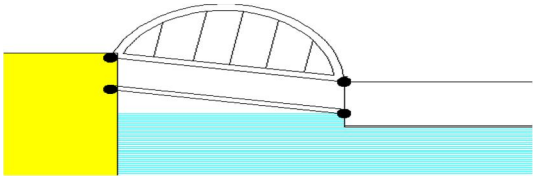
Type: I

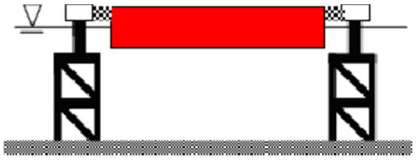
Type: II



Type: III



2) *Mooring System:* The floating bridge has to be kept in position so that the facilities provided on the floating structure can be easily operated and to prevent the structure from sliding away under critical sea conditions and storms.



Dolphin-Frameguide Method

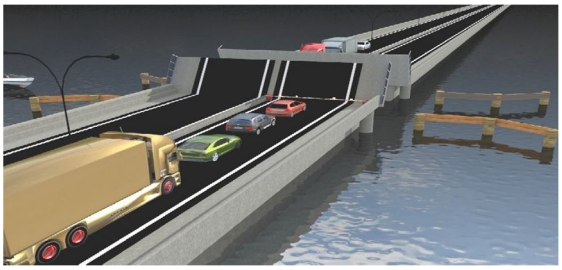
Pier/Quay Wall Method

Chain/Cable Method

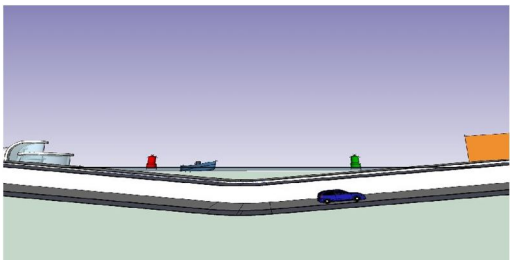
Tension Leg Method

3) *Navigational Openings:* Although floating bridges cross and obstacles, it also creates an obstacle for marine traffic. Navigational opening must be provided for the passage of boats smaller water crafts and large vessels. following are some types of navigational openings.

Type: I



Type: II



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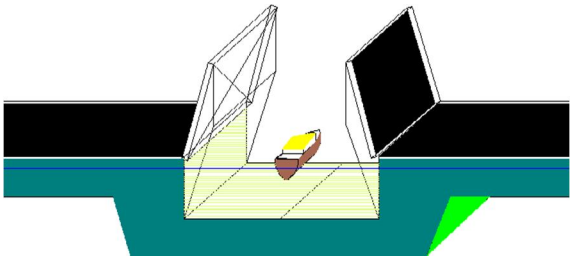
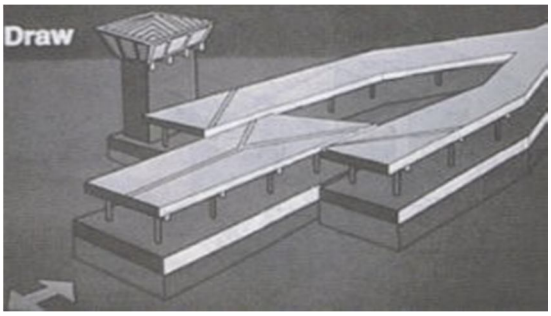


Type: IV



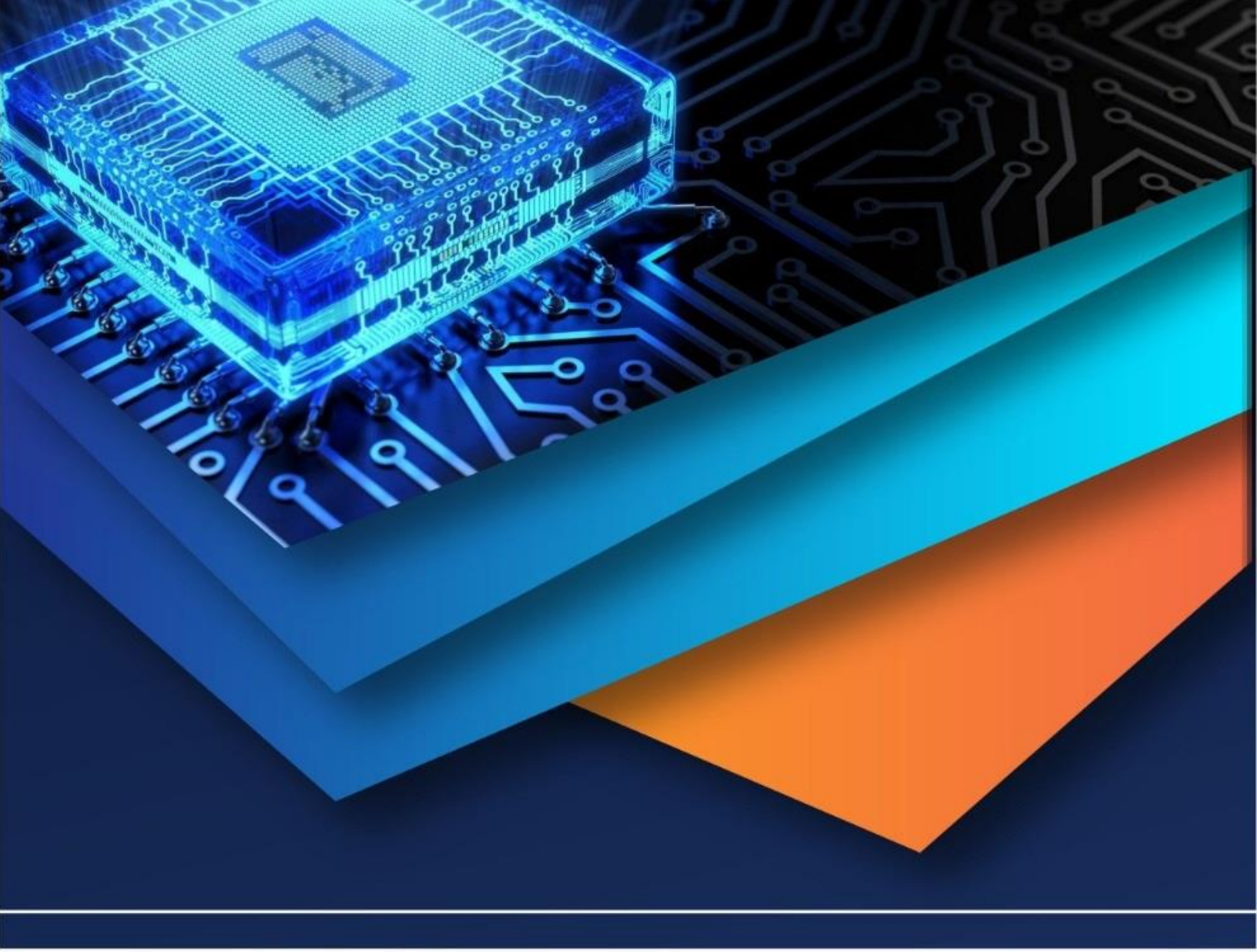
IV. CONCLUSION

From the above study we conclude that

1) *Type:* I of pontoon is best alternative that it has an increment in the projected area which provides an increase of the water resistance and an increase of the added mass that increase the stability of the structure.
2) *For Access to Bridge From Ends Type:* II is mostly adopted in floating bridges where the elevation difference between the abutment and the water level is very high so that the suitable traffic slope required a very long access.
3) The Dolphin-frame guide method provides sufficient stiffness against the lateral loads. This method of mooring system is mostly used. And can be made advancement to tackle the difficulties.
4) Part of the floating bridge can be converted to a curve tunnel submerge, as shown in Type: II, to a suitable depth so that can comply with the marine vessel size.
5) Floating type of bridge is suitable for perineal river in deep water where conventional foundation is uneconomical.

REFERENCES

[1] Eiichi Watanabe "Analysis and design of floating bridges" 2003.
[2] Andrew, C. E., "The Lake Washington pontoon bridge", Civil Eng., 9(12), 1939.
[3] Lwin, M., "Floating bridges solution to a difficult terrain", in Proceedings of the Conference on Transportation Facilities through Difficult Terrain, Wu, J. T. H. and Barrett, R. K.Eds.,A.A.Balkema,Rotterdam,1993.
[4] Maarten Koekoek- "A General Survey and Structural Design of a Modular Floating Pavili"October 2010
[5] M.Sc. thesis: Ali Halim Saleh- "Mega Floating Concrete Bridge" 1985
[6] Landet, E., "Planning and construction of floating bridges in Norway", Japan, 1994.
[7] Lwin, M., "Use of high-performance concrete in highway bridges in Washington State", in Pro- ceedings International Symposium on High Performance Concrete, PrestressedConcreteInstituteand Federal Highway Administration, New Orleans, 1987



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