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Analysis of the Lifting (Bascule) Bridge

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ABSTRACT: *The motivation behind the project is the DESIGEN AND DEVELOPMENT OF VERTICAL LIFTING BRIDGE, HAMSBERG, GERMANY. The bridge was built in 1972. The bridge has a unique future that it based on the "Vertical Lift Mechanism", its middle (movable) part lifts to give way to the ship passing by thus maintaining waterways transport. Till now no bridge such has been built in India. Experimental systems can measure the actual response of a structure subjected to various loading. However, with most systems only a few selected points on a structure can be monitored. An optimum evaluation system would incorporate both analytical and experimental techniques. An analytical model of such a system can be systematically modified until it simulates structural behaviour observed under experimental conditions. We considered the deck and truss of the bridge for analysis because to eliminate the complexity of the project. We considered the bridge as a fixed beam and the load to be a uniformly distributed load and calculated total deformation, maximum stresses and strains.*

KEYWORDS *–Lifting Bridge, Movable , Technology, Load, Mechanism*

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I. INTRODUCTION

The construction of a bridge over water, with segments being brought by barge and lifted into position, gives rise to complex dynamic phenomena. The segments are being lifted by cables while the barge and the bridge are undergoing the motions induced by the sea state and the wind. The authors were involved in conducting the necessary calculations, first for the bridge "Constitución_de 1812" across the Bay of Cádiz and then for the Queensferry Crossing in Scotland. The present paper describes the problem, the methodology used and the obtained for the latter bridge.A bascule bridge (also referred to as a drawbridge or a lifting bridge) is a moveable bridge with a counterweight that continuously balances a span, or leaf, throughout its upward swing to provide clearance for boat traffic. It may be single- or double-leafed. The name comes from the French term for balance scale, which employs the same principle. Bascule bridges are the most common type of movable span because they open quickly and require relatively little energy to operate, while providing the possibility for unlimited vertical clearance for marine traffic.

1.**1CASE STUDY**

Movable bridges are used to provide both waterway for vessels and ships to pass though the bridge and provide traffic way for cars, trains, and other forms of transportation. There are different type of movable bridges which can be constructed based on conditions of the project site and bridge related factors. Certainly, each type of movable bridge has various advantages and disadvantages. Benefits and drawbacks of three distinct type of movable bridges including bascule, vertical lifting bridge and swing bridges are discussed. It opens the water way for ships and vessels with considerable speed and it permits the passage of small size boats to pass through even if the passage is not opened completely.It is reported that, the passage of small boat through partially opened bascule bridge is safer compare with partial opening of vertical lift bridge and swing bridge, especially if the bascule bridge is double leaf. The operation of the bridge is by means of cables fixed to the open span. These cables pass over the top of the towers and are fixed to counterweights. The machinery ensures that the bridge travels upwards and the counterweights downwards. This ensures that everything is balanced during the vertical movement.

Bridges are mostly useful for crossing rivers, valleys, or roads by vehicles but people have also used bridges for a long time for walking. Bridges are structures built over railroad tracks, roads, rivers or some other obstacle. ... The bridge must also be able to withstand earthquakes, strong winds, freezing and thawing.

Bascule bridges have sections that rotate upward and away from the centerline of the river, providing clear passage for river traffic. Side-by-side on the Willamette River in downtown Portland, the Morrison and Burnside bridges are two examples of bascule bridges. These two bascule type bridges have a very clean,

uncluttered look to them because the counterweights and operating machinery are located out of sight in the piers supporting the bridge. The Morrison Bridge is a Chicago-type bascule bridge and the Burnside Bridge is a Strauss-type bascule bridge. The Broadway Bridge, located further downstream near the Rose Quarter, is an example of a Rall type bascule bridge. With this Roll type bascule, the counterweights are located above the roadway and much of the machinery is located in sheds, also above the roadway.

II. RESULT & DISCUSSION

Bascule bridges have sections that rotate upward and away from the centerline of the river, providing clear passage for river traffic. Side-by-side on the Willamette River in downtown Portland, the Morrison and Burnside bridges are two examples of bascule bridges. These two bascule type bridges have a very clean, uncluttered look to them because the counterweights and operating machinery are located out of sight in the piers supporting the bridge. The Morrison Bridge is a Chicago-type bascule bridge and the Burnside Bridge is a Strauss-type bascule bridge. The Broadway Bridge, located further downstream near the Rose Quarter, is an example of a Rall type bascule bridge. With this Roll type bascule, the counterweights are located above the roadway and much of the machinery is located in sheds, also above the roadway.

There are also several swing bridges on the Columbia and Willamette rivers. These bridges are mostly railroad bridges. Interesting examples include the Burlington/Santa Fe Railroad Bridge over the Columbia River at Vancouver, WA and the Columbia Slough near N. Columbia Blvd. A relatively new swing bridge built in the 1990s is located at the U.S. Army Corps of Engineers' Bonneville Dam where it carries the main access road across the front of the new navigation lock. Because of the excessively long time to operate a swing bridge, many older bridges were replaced with bascule or vertical lift bridges.

The materials chosen for the comparison are Stainless steel and Structural steel. Steel is generally utilized far and wide for the development of bridges from the extensive to the little. It is a versatile and successful material that gives productive and maintainable arrangements. Steel has for quite some time been perceived as the monetary choice for a scope of any bridge. It commands the business sectors for long traverse spans, railroad bridges, footbridges, and medium traverse interstate extensions. Steel spans epitomize great outline, they are quick to construct, and have empowered the recovery of numerous previous modern, dock and canal side regions. The high strength-to-weight ratio of steel minimizes the structural weight of superstructures and thus minimizes the substructure costs, which is particularly beneficial in poor ground conditions. Minimum self-weight is also an important factor in the cost of transporting and handling components. The yield strength of Concrete is 0 Pa. This means that concrete cannot be elongated or compressed at all and is a very rigid material. The ultimate compressive strength of but then again comes at a costlier price than structural steel. It is observed clearly that stainless steel undergoes more stress and hence more strain and deformation for the same loading conditions as that of structural [*] https://en.wikipedia.org/wiki/Pamban_Bridge steel. This is mainly because of its lesser yield stress than structural steel. This makes it more susceptible to failing over the period of time. As far as the anti-corrosive property of structural steel is considered, it can be improved by applying a galvanized coating on structural steel which will enhance its anti-corrosive properties and make it more suitable for construction of the bridge over a water body

III. CONCLUSION

According to the results, Water operated vertical bridge lifting acquires less consumption of power than that of the conventional type of bridges. It not only eliminates the complicated gear mechanism but also eliminates highly rated electric motors. while travelling, naturally rivers are to be faced, therefore from both point of view i.e. ship and automobile transport bridge to be constructed is as perour project, which would be best solution as power saving. We are confident that our project will notonly add a feather to our cap but also it will rise the bar of our knowledge of various sections which are include in the syllabus of course. It will also enable to the junior friends to carry out experiment successfully. Double leaf bascule bridges become unstable because they are poorly designed, poorly constructed, or poorly maintained. They are more susceptible to deficiencies from these causes because they are more delicate than other common types of movable bridges.

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REFERENCES

[1]. P. V. Kapure, Allan Pereira, Pratik Chikane, Akshay Malkar, Pankaj Galande, Ragho Mhaddalkar Department of Civil Engineering, AISSMS Polytechnic Pune, India Diploma Student, AISSMS Polytechnic Pune, India Diploma Student, AISSMS Polytechnic Pune, India Diploma Student, AISSMS Polytechnic Pune, India Diploma Student, AISSMS Polytechnic Pune, India.