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A Review: Analysis of Cable Stay Bridge with A ,Y and H Pylon Configuration

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Abstract- Several cable-stayed bridges have been built with diverse forms of pylons in recent years, such as Diamond shaped, Inverted Y-shaped, and so on, resulting in a high demand to assess the impacts of different forms of pylon on cable-stayed bridges under dynamic load. The modeling of cable-stayed bridges with various pylon configurations is the subject of this research. The cable stayed bridge is a type of contemporary bridge that was designed for larger spans. The influence of pylon form on the dynamic response of cable-stayed bridges has to be studied. For this, the bridge span dimension and other parameters are maintained constant, and only the pylon form is changed. This study examines the performance of a Cable Stayed Bridge with four typical cable arrangements: fan type arrangement, star arrangement, radial arrangement, and harp arrangement, as well as various phylon "A" shape, "Y" shape, and "H" shape arrangements. In terms of shear force, bending moment, and displacement, comparisons are made for these arrangement types. STAAD Pro software will be used for all of the analysis.

Keywords:- Cable Stayed Bridge, Pylons Shape, Bending moment, Cable Arrangement, Staad pro v8i.

I. INTRODUCTION

In the latter two decades of the twentieth century, several cable-stayed bridges were successfully erected all over the world. Cable stayed bridges have become one of the most popular types of bridges in recent decades due to its appealing look and extensive use of structural materials. Paragraph comes content here. Paragraph comes content here. Paragraph comes content here. Modern cable stayed bridges are more tolerable and flexible than ever before, and are robust enough to withstand the effects of wind. A conventional cable-stayed bridge has a deck with one or two pylons placed above the piers at the span's midsection.

The wires have been connected to offer additional support diagonally to the girder. This bridge's design and construction mark the start of a new era. Modern cable-stayed bridges have entered a new age. The fast expansion of contemporary cable-stayed bridges throughout the globe Following then, various advancements in bridge engineering have led to a better understanding of the behavior. And performance, as well as recognizing the economic benefits of this sort of bridge.

The cable-stayed bridge is most useful for spans longer than cantilever bridges and shorter than suspension bridges. However it is the range where cantilever bridges would hastily develop heavier if the span has been lengthened; at the same time as suspension bridge cabling might not be more in economical aspect if the span had been shortened.

II. LITERATURE REVIEW

T. Pramod Kumar et al (2015) have done research work on conduct a study and design of the superstructure of a road cum railway bridge planned on the downstream side of the current bridge connecting Mahanadu road in Sithanagaram and

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P.N.Bus station in Vijayawada across the Krishna river. The bridge is composed of a through-type steel truss that carries two railway lines and a highway on the lower level. In the higher level, there is a three-lane carriageway. The span length is identical to that of a neighbouring railway bridge. STAAD.

Pro is used to analyze top floor members, truss members, and bottom floor members. The structural members of the truss, top floor, and bottom floor components are designed in accordance with Indian railway standards. The Indian Roads Congress has a code that is similar to the standard code.

G. M. Savaliya et al (2015) studied on Cable supported bridges are very flexible in behavior. These flexible systems are susceptible to the dynamic effects of wind and earthquake loads. The cable-stayed bridge could provide more rigidity due to presence of tensed cable stays as a force resistance element. The suspension bridge could assigned more span in the field of bridge. So, combination of above two structural system the innovative form of cable-stayed suspension hybrid bridge could be the better option to provide more span.

The goal of this study is to look at a long-span cable-stayed suspension hybrid bridge. The current paper discusses bridge. Suspension using cable-stayed suspension modeling In SAP2000 software, a hybrid bridge is created and validated. Sap 2000 software was used to write a research report. SAP2000 software is used to do nonlinear static analysis and modal time history analysis on a cable-stayed suspension hybrid bridge. The time frame of bridges for various modes The form is used to compare the outcome of Sap 2000 software was used to write a research report.

Guruprasad D (2016) in which the researchers study The analysis of the cable stayed bridge is done using the STAAD pro software which works on the principle of finite element method. Loading considered for the analysis are dead load, live load due to vehicular movement, wind load and seismic load.

They're divided into three categories based on the pylon's form, longitudinal cable configuration, and transverse cable configuration. Cable stayed bridges are categorised as two planes or three planes cable configuration based on the transverse cable configuration. We can use either of these cable configurations for bridges with more than four lanes of traffic.

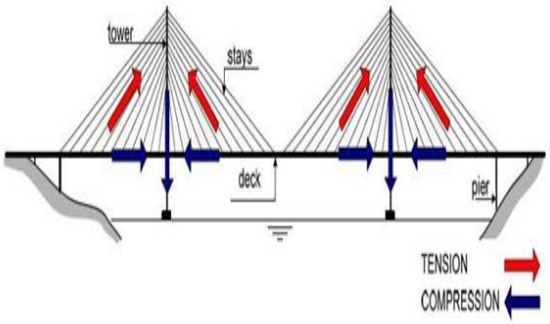

Fig 1. The Behaviour of Cable Stayed Bridge.

Praveen kumar M et al (2017) checked the world of engineering, the cable-stayed bridge is an aesthetic symbol. These long-distance bridges allow for optimal traffic flow. The Pylons are the bridge's load-bearing compression components. The diagonal components that channel the weight from the deck to the pylon are known as cables. This weight is afterwards transmitted to the foundation. under the pylons The pylons' design and cable arrangement are selected so that they can bear a wide variety of loads. The displacements of the cable-stayed bridge deck and pylon under the action of traffic and seismic stresses were investigated.

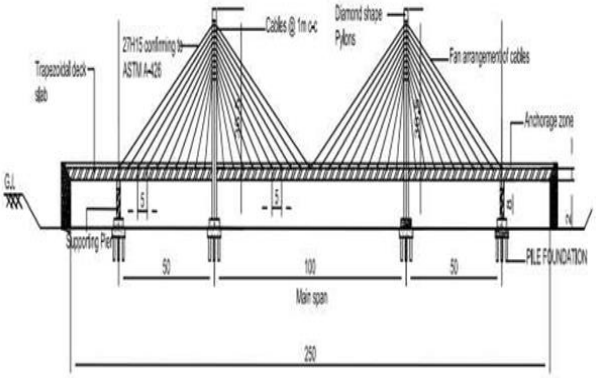

Fig 2. longitudinal elevation of the cable stayed bridge.

Krunali Mavani et al (2017) works on the simulation of cable-stayed bridges with various pylon configurations The cable stayed bridge is a type of contemporary bridge that was designed for larger spans. The influence of pylon form on the dynamic response of cable stayed bridges has to be investigated. For this, the bridge span dimension and

other parameters are maintained constant, and only the pylon form A type, H type, etc is modified.. The height of the pylon is also change for all the shapes for comparison purpose. The modelling of bridge is prepared on SAP 2000 software Several cable-stayed bridges have been built with various pylon forms, such as H-shaped, A-shaped, Diamond-shaped, Inverted Y-shaped, and so on, resulting in a high need to study the impacts of various pylon forms on cable-stayed bridges under dynamic load.

Mycherla Chaitanya et al (2018) performed the goal of structural analysis is to identify the structure's internal forces, stresses, and deformation under varied load conditions. In this research, a girder bridge and a cable-stayed bridge are simulated and a dynamic analysis is performed. circumstances of loading The bridges are compared in terms of dead load, live load, and combined load. There are many different types of bridges, such as Arch Bridges, Girder Bridges, Suspension Bridges, Cable Stayed Bridges, and so on. The role of a bridge, the nature of the terrain where it is built and anchored, and the funding available to create it all influence the design. Structural analysis is a method of examining a building's structure. physicists to forecast the actions and behavior of a structural structure.

Pawan Patidar et al (2017) work on the flexure of the beam bridge distributes vertical loads. Because it transfers vertical stresses through bending, a basic span truss bridge behaves like a beam. Because it transfers vertical stresses through bending, a basic span truss bridge behaves like a beam. When the maximum allowable approach gradient for the track is low, this configuration is appropriate and widely employed in railway bridges. A deck-type bridge is the optimum choice if the construction depth is not crucial, in which case the bracings offer constraint to the compression flange against lateral movement. the buckling The plate girder carries the wooden sleepers over the railway bridge.

Abhishek Pandey et al (2020) studied on the purpose of this project is to use STAAD Pro to construct and analyze various cable arrangements with various pylon forms. There are a few We have a variety of cable combinations to choose from. Choose from fan, radial, star, and harp designs. make preparations "Two lateral stays, i.e. "A" and "Y" shapes circular form, "H" shape, and one axial layer of stays. Following a thorough examination of the structures, the most suitable structure will be offered. With all examples of shear stress, bending moment, and displacements, the relationship emerges. A conclusion will be made about the execution of a few of the agreements.

Mohammed. Yakub Ali et al. (2016) focuses on The goal of this project is to build and analyze a pedestrian bridge. We are developing a pedestrian overhead bridge in this project where the traffic surpasses 2500 vehicles in order to eliminate conflicts between pedestrians and motor vehicles. As a result of the average hourly traffic of over 2500 automobiles in front of the building, Aurora's engineering college is a crossroads for students and others. Crossing on foot might be difficult, if not dangerous, given the high average hourly traffic volume. With this in mind, the goal of this project is to design and construct a pedestrian bridge at the crossroads in front of the institution. This will be beneficial. eliminate highway traffic congestion and delays, as well as confrontations between pedestrians and motorists cars and trucks We're working on a new design.

Yogesh B Jankar et al (2018) studied on the - Seismic Protection is a fundamental issue when it comes to high seismic risk areas design. This protection becomes even more important when we talk about crucial structures such as bridges. Cable-stayed bridges are obviously included in this crucial group of structures. There are several seismic protection systems available and it´s important to make the right choice when one of them is needed. The best way to tackle this topic is to compare and contrast all of the systems that are applicable in a given situation. When working with a cable stayed bridge, the designer must first fully comprehend the structure's dynamic behavior. Oscillation of the deck, pylons, and stays is caused by ground movements. This article discusses how to analyze a c's temporal history.

Madhuri Yadav et al (2018) The purpose of this project is to use STAAD Pro to construct and analyze various cable arrangements with various pylon forms. We picked fan type, radial type, star type, and harp type configurations among the various varieties of cable configurations available. The pylons are made up of two lateral layers of stays (A, Y, and H shapes) and one axial layer of stays (circular form pylon). For each scenario, the shear force, bending moment, and

displacements are compared. The decision will be made in regards to one of the arrangements' effectiveness. This can be beneficial in modifying other people's flaws. Other arrangements will be made more efficient as a result of this effort. Finally, the circular H form with harp and fan form layout is the most popular.

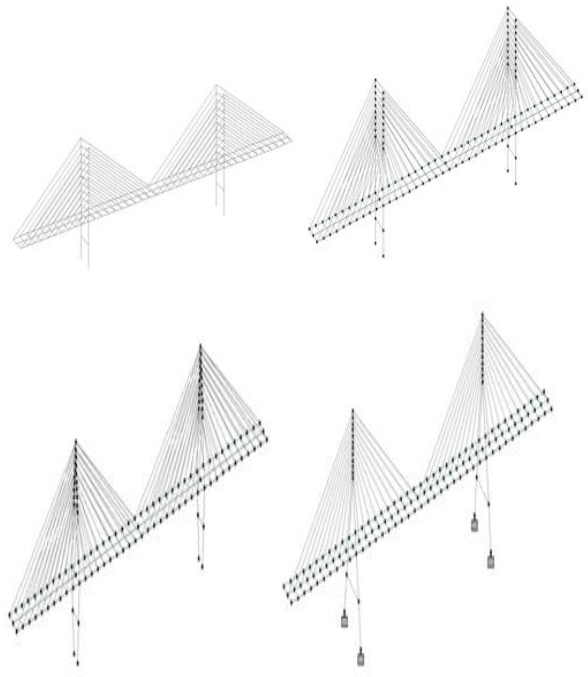

Fig 3. H,A,Y shape tower with cable arrangement.

III. CONCLUSION

We have considered various cases along with dead load & live load for the different cable arrangement with H, A and Y shape tower for analysis by using Staad-Pro software. Following are the conclusions of this study Because the cables can withstand more pressure, cable-stayed bridges have a substantially higher rigidity.

They are also more resistant to environmental disturbances, such as earthquakes, which occur often. Bridges of this sort take less time to build and are more cost effective since they use less materials and construction hours. Because of the reduction in moments in the stiffening girders, cable-stayed bridges are chosen over traditional steel suspension.

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