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# PARAMETRIC STUDY OF CABLE STAYED BRIDGE FOR DIFFERENT PYLON HEIGHT

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**Abstract** - *Over the last few years in India, construction of bridges completed over a river around 15 bridges in which few bridges are constructing as a cable-stayed bridge. Cable stayed bridges are now a days main option for long span bridges. In cable stayed bridge, cable transmits reaction forces of deck to pylon; and pylon transmit load of cable to foundation. There are some criteria for pylon height which is Span/5 to Span/4. For that different pylon height, with the help of STAAD.PRO (V8i)., analysis was done for the long span. By applying dead load ( self weight )& live load ( moving load / vehicle load ) on long span of cable-stayed bridge on the TAPI river( Athwa side: Agricultural university on Surat, Adajan, Near Dr.V.S. Marg on Surat hajira road) and Comparision of the results had been carried out..*

***Keywords***- *Bridges, Cable-stayed Bridge, Cable Suspension, and Connection of cable, long span bridges*

## I. INTRODUCTION

In In this paper different heights of pylon is studied respected to cable-stayed bridge. To know behavior of cable stayed bridge when all parameters are assumed to be constant except the effect of pylon height on long span of cable stayed bridge. Pylon is a column that is connected with all cables and transmits cable's forces to foundation. By changing the height of column, it will also change the inclination of cable, method of connecting the cable and distance of span connection.

## II. DATA

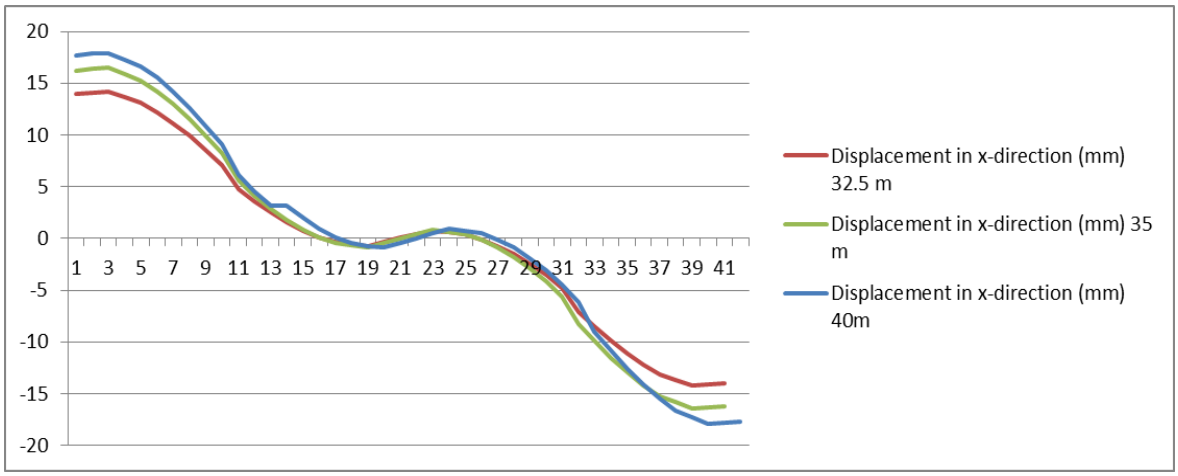
To observe behavior of bridge by these changes we have consider a model on which we are analysis all the parameters. Fixed parameters of bridge are Bridge span is two span of each 150m, width of deck is 23.50m (four lane), cable connection at 23.50m. Variables of cable stayed bridge are pylon height and type of connections. For 150m long bridge height of pylon is Span/5 to Span/4 i.e. 1m to 20m. In this paper different height of pylon is taken; Heights are 40m, 35m, 32.5 m .
And also the material specification is given in below table :

| Name | Modulus of elasticity ($kN/m^3$ ) | Poisson Ratio | Weight Density ( $kN/m^3$ ) |
|---|---|---|---|
| Cable | $1.9613x10^8$ | 0.3 | 77.09 |
| Girder | $1.9995x10^8$ | 0.3 | 77.09 |
| Pylon | $2.78x10^7$ | 0.2 | 23.56 |
| CBeam_Girder | $1.9613x10^8$ | 0.3 | 77.09 |
| CBeam_Pylon | $2.78x10^7$ | 0.2 | 23.56 |

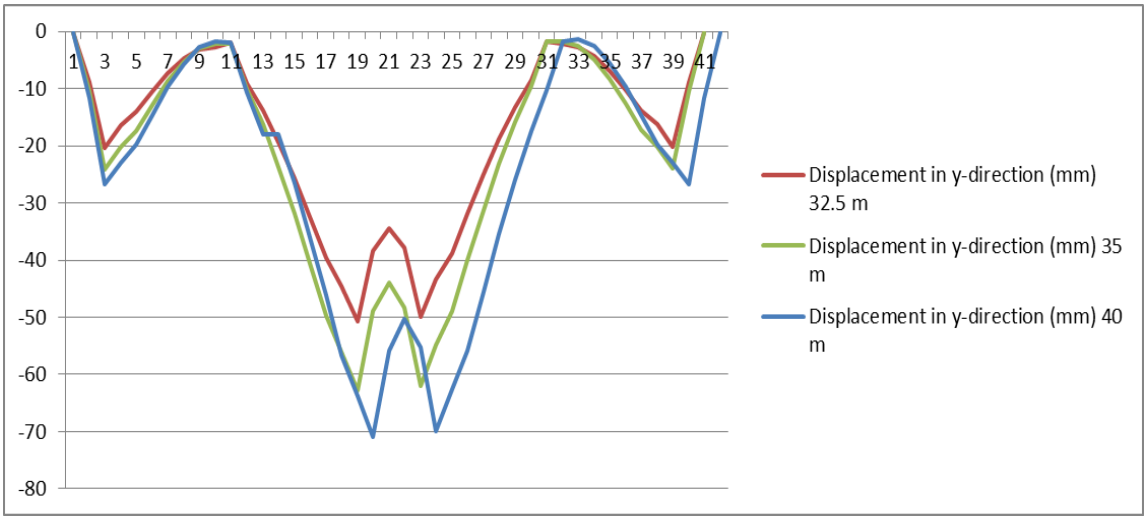
Results of the above assumed parameters in cable stayed bridge are compared whose graphs are shown in analysis part.

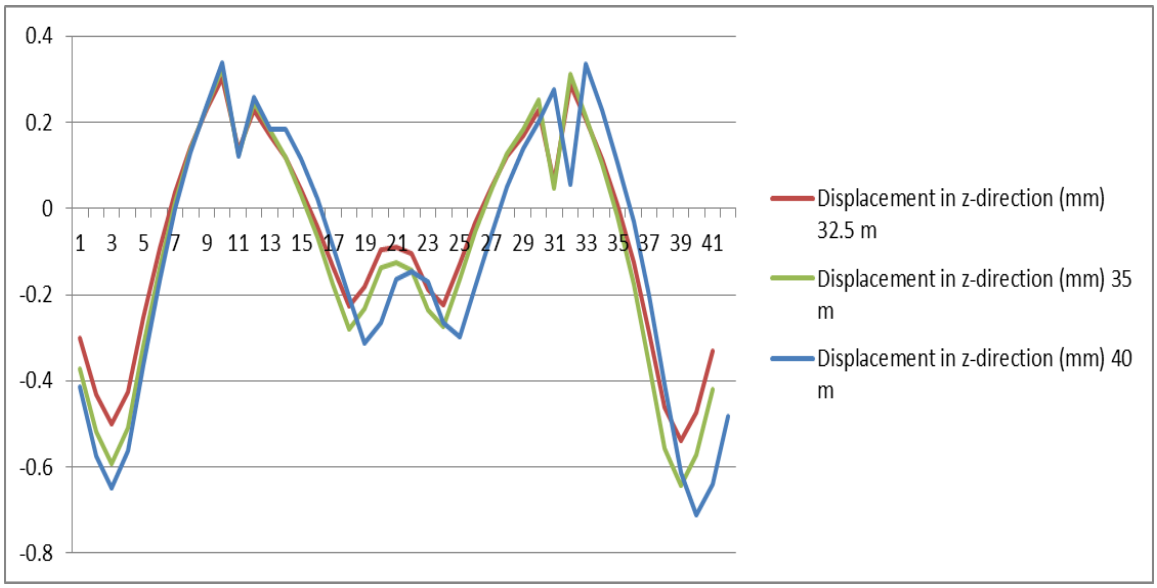
## III. ANALYSIS




**Graph 1 displacement in x direction of span cable stayed bridge**

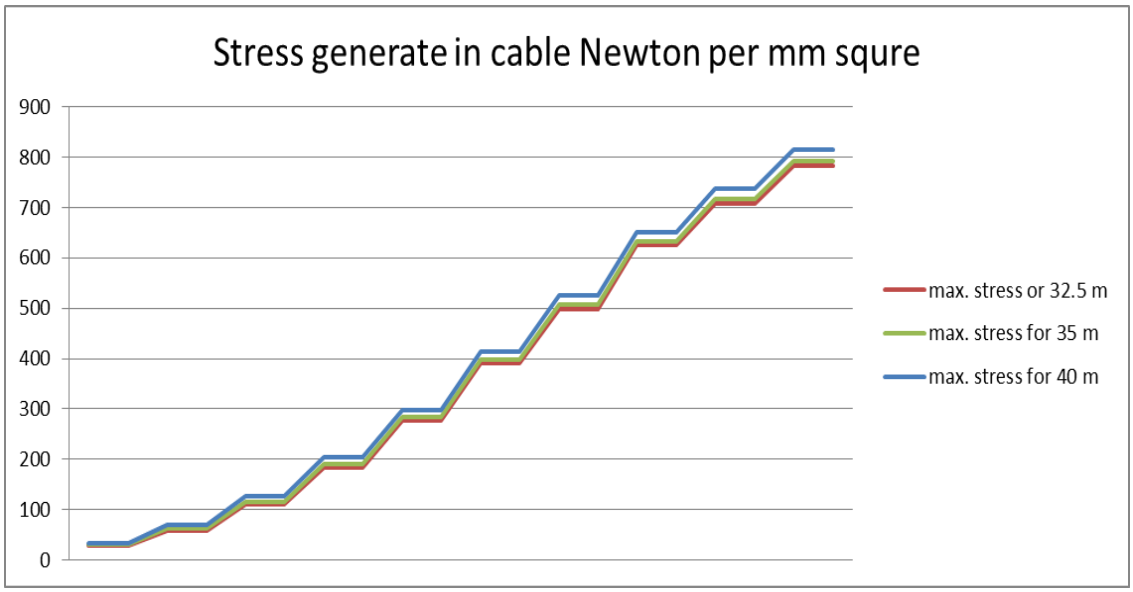



**Graph 2 displacement in y direction of span cable stayed bridge**




**Graph 3 displacement in z direction of span cable stayed bridge**




**Graph 4 Stress generate in cables connected with span of cable stayed bridge**

## IV. CONCLUSION

For cable stayed bridge pylon height is limiting to L/4 to L/5. Considering given example bridge .For this variation which pylon height makes difference in bridge member forces were studied.

Conclusions are as following

1) As changing height of bridge from 40m to 35 m Axial force in Cable will increase as cable's degree of inclination is decreasing.
2) By Changing Height from 40m to 32.5m axial force in pylon will increase.
3) By Changing Height from 40m to 32.5m deflection in x- direction is reduced.
4) By Changing Height from 40m to 32.5m displacement in y direction at middle of span 150 m is reduce almost 20 mm.
5) By Changing Height from 40m to 32.5m stress in cables are also reduced.
6) From analysis it is seen that best height of pylon for cable stayed bridge is between L/4 to L/5. Also we can conclude about height of neck is 50 mm for 32.5 m pylon height cable stayed bridge.

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