

Effect of Pylon Height on Cable Stayed Bridge

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Abstract

Cable stayed bridges are now a day's 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 that is Span/5 to Span/4. Now question is that which exact height of pylon is more effective under this criteria. In this paper different height of pylon has been taken to study which height of pylon is more effective.

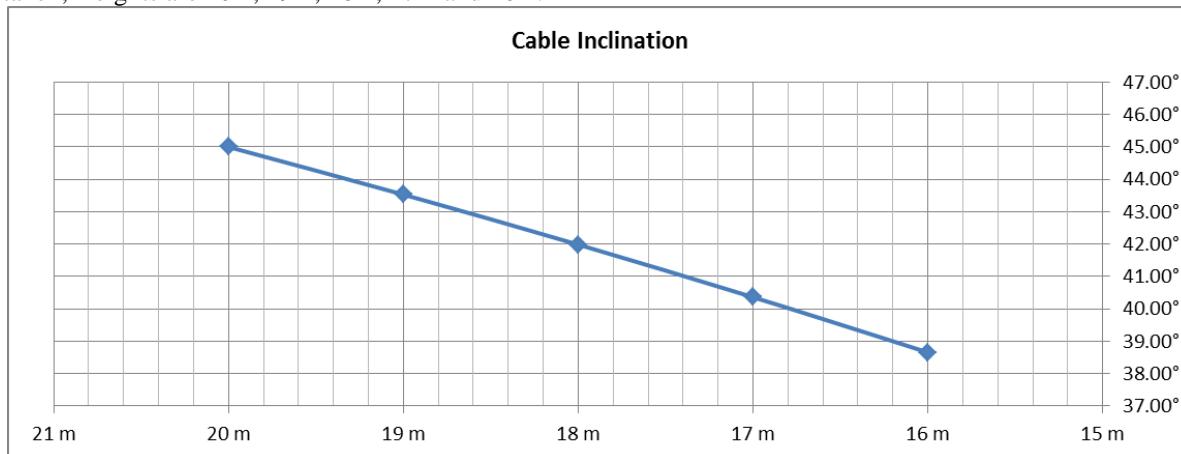
Keywords: Bridges, Cable-stayed Bridge, Stay cable, Pylon, Cable inclination

I. INTRODUCTION

In this paper different height of pylon is studied for cable-stayed bridge. To know behaviour of cable stayed bridge when all parameters are staying constant except pylon height and cable inclination; this study is required. 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.

II. DATA

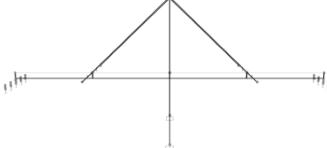
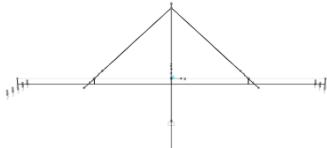
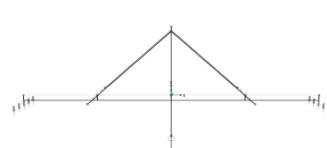
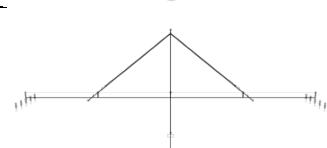
To observe behavior of bridge by these changes we have to fix other parameters of bridge. Fixed parameters of bridge are Bridge span is 80m, width of deck is 20m (four lane), cable connection at 20m. Variables of cable stayed bridge are pylon height and inclination of cable. For 80m long bridge height of pylon is Span/5 to Span/4 i.e. 16m to 20m. In this paper different height of pylon is taken; Heights are 20m, 19m, 18m, 17m and 16m.

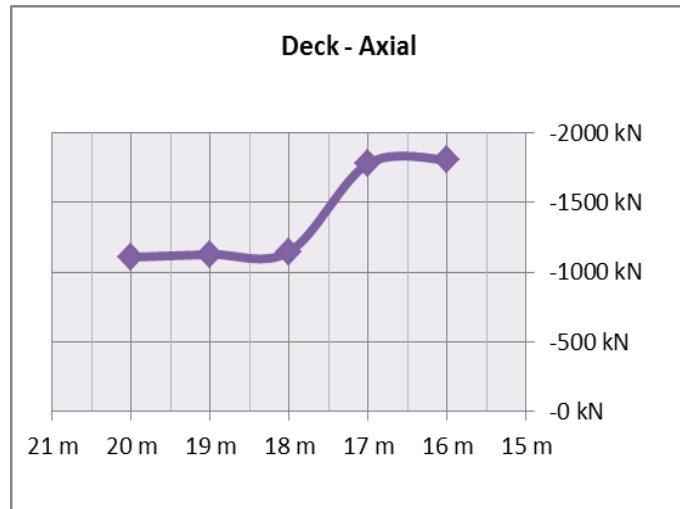
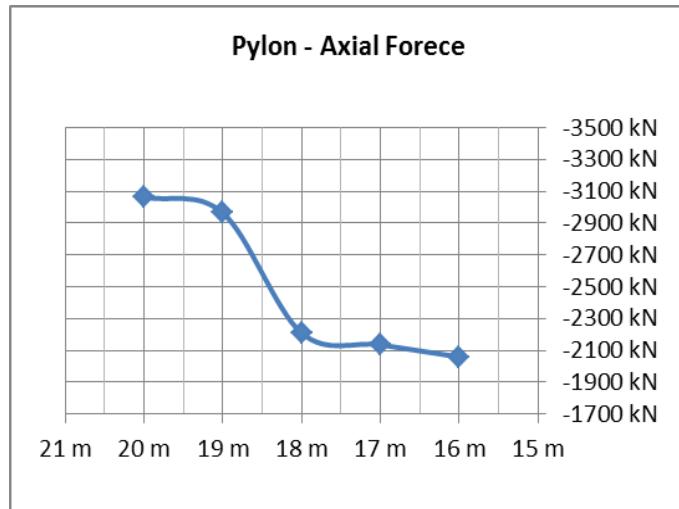
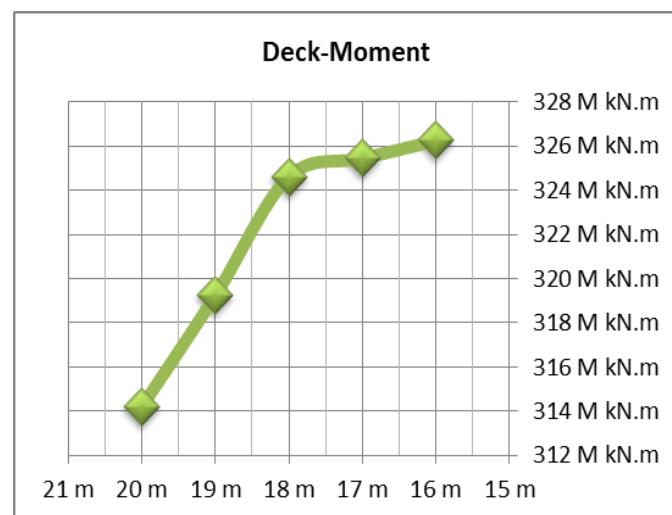
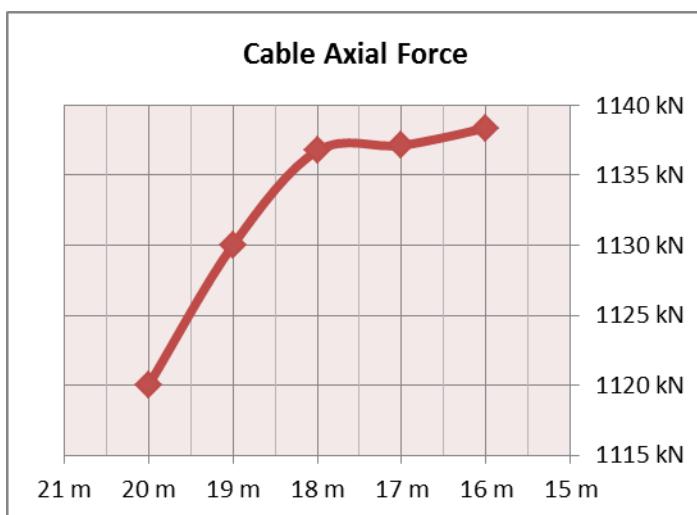


III. ANALYSIS

Analysis is done in Computer aided software as per data discussed above. Table of analysis result is as following for Cable axial force, Pylon Axial Force, Deck axial force, Deck shear force and deck moment.

Pylon Height	Figure	Cable Axial Force	Pylon - Axial Force	Deck - Axial	Deck-Shear	Deck-Moment
20 m		1120 kN	-3064.23 kN	-1108.16 kN	8812.87 kN	309.8 M kN.m

19 m		1130 kN	-2964 kN	-1128.44 kN	8812.87 kN	311.1 M kN.m
18 m		1136.75 kN	-2209.5 kN	-1147.74 kN	8812.87 kN	324.6 M kN.m
17 m		1137.14 kN	-2135.69 kN	-1780.77 kN	8812.87 kN	325.4 M kN.m
16 m		1138.38 kN	-2059.067 kN	-1807.3 kN	8812.87 kN	326.3 M kN.m



IV. CONCLUSION

For cable stayed bridge pylon height is limiting to $L/4$ to $L/5$. Considering bridge of 80m length; pylon height will be 20m to 16m. For this variation what pylon height makes difference in bridge member forces studied.

Conclusions are as following

- 1) As changing height of bridge from 20m, 19m, 18m, 17m, 16m Axial force in Cable will increase as cable's degree of inclination is decreasing.
- 2) Changing Height from 20m to 16m axial force and moment in deck will also increase.
- 3) By Changing Height from 20m to 16m axial force in pylon will decrease.
- 4) From analysis it is seen that best height of pylon for cable stayed bridge is between $L/4$ to $L/5$ and for harp type cable arrangement it is more suitable and economic.

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