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ANAYSIS AND DESIGN OF CABLE STAYED BRIDGE BY USING STAAD PRO SOFTWARE

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***Abstract*:-**This paper describes the structural behavior of cable stayed bridges, identifies cable stayed bridge elements, and discusses their role in supporting the structure. It present methods of pre-sizing the stays and describes mathematical procedure that allows optimal tensioning of forces in the stays, so that the structure complies with the design criteria.

A parametric study if structure similar to the "Vasco da Gama" bridge (a cable stayed bridge that spans the tagus River in Lisbon), was carried out to understand the suspension, static and longitudinal system.

The study analysis the level of deformation and stress in the bridge deck, the stays and in the towers. It took into account the used of various arrangements of stays, the presence of piers in the side span, the size of the approach viaducts and the relationship of the central span to the side span.

Keywords—Bandra-worli sea-link ,cable-stayed, dar AL-Handasah, Mumbai.

I. INTRODUCTION

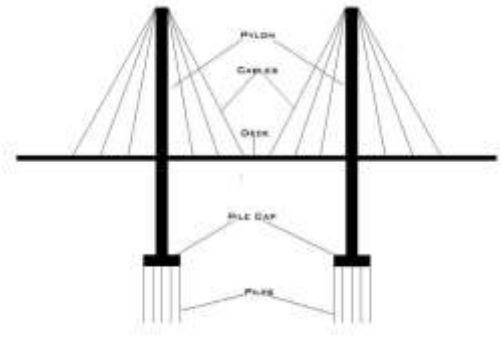
A Cable stayed bridge has one or more towers, from which cables support the bridge deck. Distinctive features are the cable which run directly from the tower to the deck normally forming a like pattern.
A Cabal Stayed Bridge one of the most modern bridge, Consist of a Continuous string beam with one or more pillars or towers in the middle.
Cabal stretch diagonally between these pillars or tower and the beam .these cabal support the beam.

The cabal or anchored in the tower rather than at the end.
In the cabal stayed bridge, the towers are the primary load bearing structures which transmit the bridge loads to the grounds. A Cantilever approach is after used to support the bridge deck near the towers , but length further from them are supported by cables running directly to the towers.
The cabal stayed bridge is optimal for spans longer than cantilever bridge and shorted than suspension bridge.

Cable stayed bridge are extremely elegant and very effective structure and they are also architectural landmarks. And combination of the multiple simple systems allow for a structure where the role of each of its components is well define. When a cable stayed bridge is chosen, the initial design phase is of utmost important. The characteristics of the structure and whether if it is mainly constrained by structural or architectural reason must be define at an early stages in the design process.

Design Of cabal stayed bridges

The main structure elements of a cabal stayed bridges are the bridge deck towers piers and the stays. The dack support to the load and transfers them to the stays and to the piers to bending and compression the stays transfers the forces to the tower which transmit them by compression to the foundation.



ed bridge in

In recent years, Vietnam has seen a rapidly expanding transport infrastructure, especially roads and bridges, the letter once being large-size structures. This is determine by the geological features of the area with a very high number of large rivers. A Significant part of the bridge in this country is cabal stayed.

Advantages

The various advantages of cable stayed bridge are mentioned below:

1. They are strong.
2. They take less time to build.
3. They are more economical.
4. Much greater stiffness than the suspension bridge.
5. Can be constructed bay cantilever ing out from the tower.
6. For a symmetrical bridge the horizontal forces balance and large ground anchorages are not required.

Disadvantages

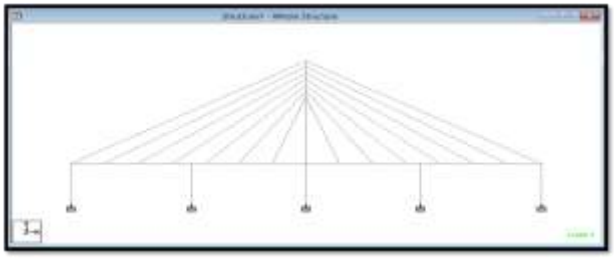
1. They may not be too stable.
2. They are not ideal for distances that are too far
3. Inspection and maintenance may be more difficult.

Necessity of cable stayed bridge

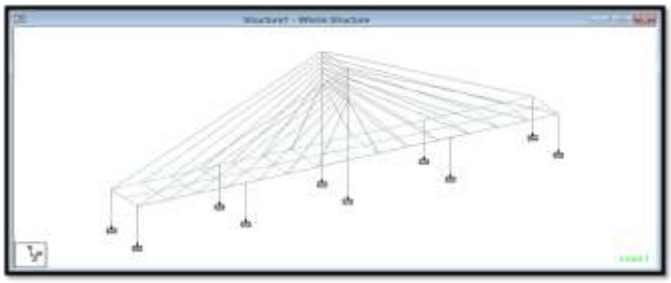
- Traffic during peak time and evening time found very high.
- To overcome the accidents on the railway gate.
- Provide an fast access to the vehicle to reduce the time.
- Provide an economical approach which help to create aesthetic model and reduce the traffic intensity.

Analysis steps of the Staddpro.

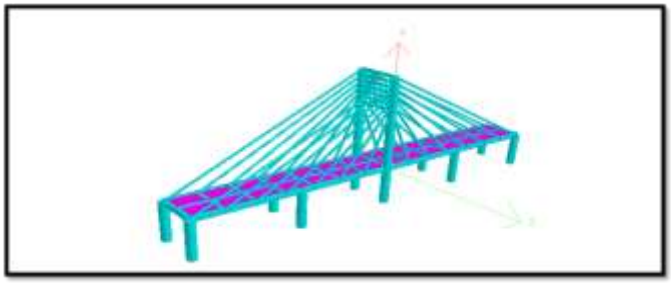
- Create a 2d Model with supports in Staddpro.



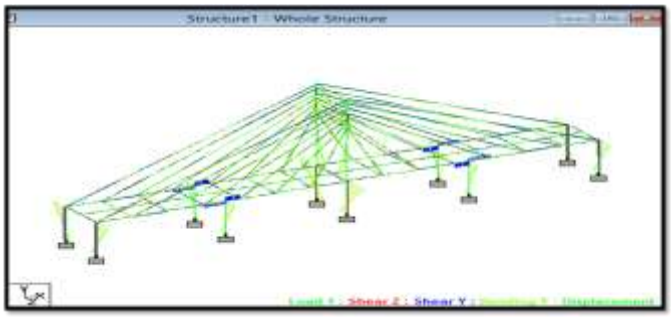
- Convert 2D model into 3D model with the help of exclude command.



- Checking of the 3D model which help to modify the changes.



- Final analysis which provides stress and bending moments in all sections which can use to design the member of the cable stayed bridge.



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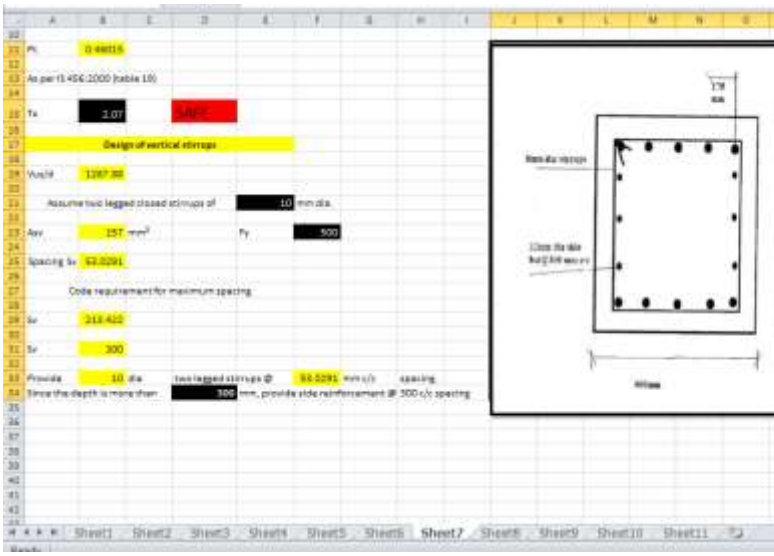
Given data				
Total length of the bridge	70	m		
Width of the bridge	7.5	m		
Number of cables	14	nos		
Thickness of RCC slab	200	mm	0.2	m
			0.27	m
Thickness of wearing coat	70	mm	0.07	m
Cross section of logritudinal girder	800	mm	0.8	m
	800	mm	0.8	m
Cross section of cross girder	450	mm	0.45	m
	800	mm	0.8	m
Total sapn	35	m		
Panel length	5	m		



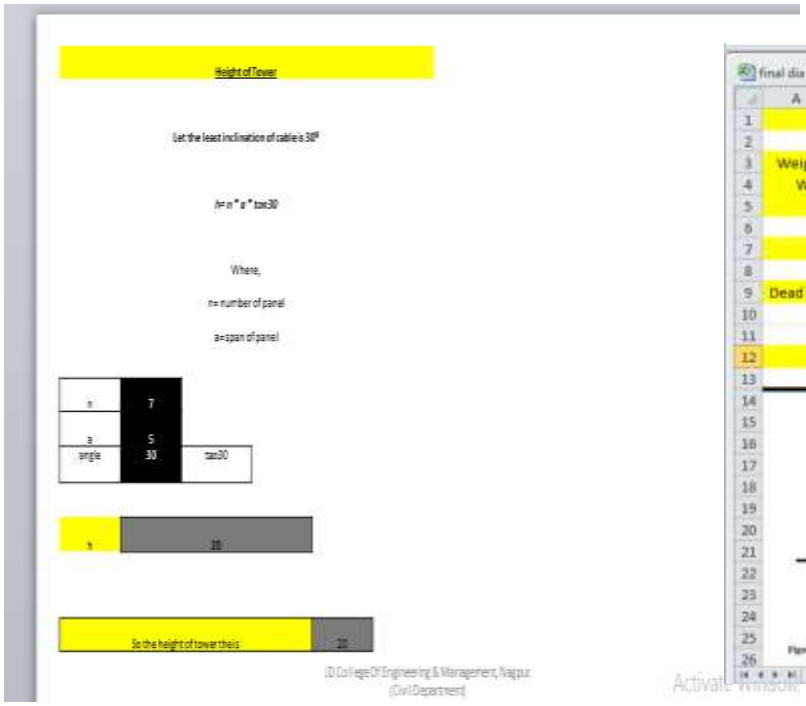
Design of vertical stirrups

Assume two legged closed stirrups of 10 mm dia.

Code requirement for maximum spacing

Provide 10 dia two legged stirrups @ spacing

Since the depth is more than 300 mm, provide side reinforcement @ 300 c/c spacing



Height of Tower

Let the least inclination of cable is 30°

h = n * a * tan30

Where,

n= number of panel

a=span of panel

n	7
a	5
angle	30

tan30

h 35

So the height of tower theis 35

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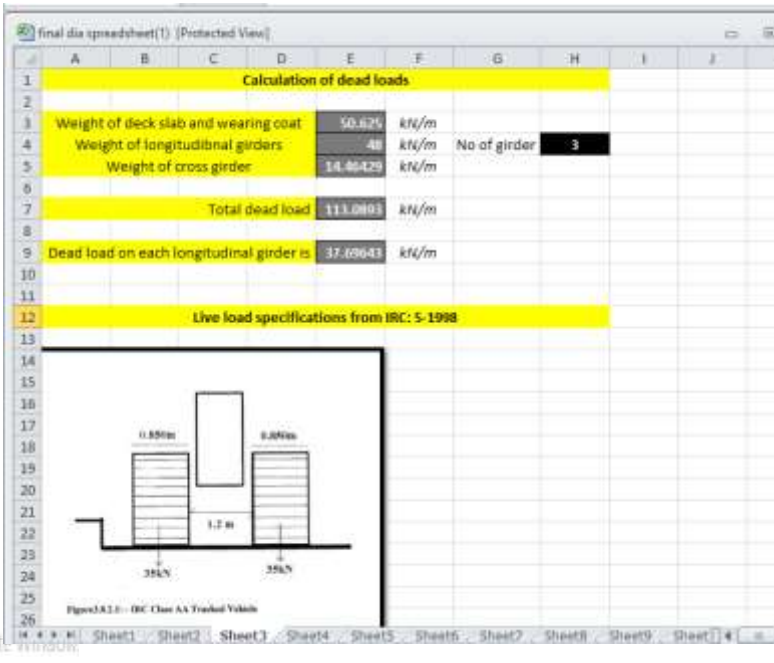

final dia spreadsheet(1) [Protected View]

Calculation of dead loads

Weight of deck slab and wearing coat	50.625	kN/m		
Weight of longitudibnal girders	48	kN/m	No of girder	3
Weight of cross girder	14.46429	kN/m		
Total dead load	111.0893	kN/m		
Dead load on each longitudinal girder is	37.69643	kN/m		

Live load specifications from IRC: 5-1998

Activate Windows

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