

Design and Analysis of Flyover Using STAAD Pro V.8.i

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ABSTRACT :In our day to day life, flyover is an essential element. The principle objective of this paper is to design and analysis of flyover by using STAAD Pro V.8.i. The location of flyover is at Pandalam junction where four major roads meet. There are many educational institutions, hospitals and other important institutions are located in this region. Preliminary investigations are made by site visit. Here we designed a straight flyover with safe slopes on both sides and the principal type T beam bridge deck is adopted. Length of adopted flyover is 680m. We are going to analyse flyover elements like deck slab, singly reinforced beam, T beam and Columns. Completion of Flyover is expected to ease traffic congestion by 80%.

KEYWORDS: Flyover, Road, STAAD Pro V.8.i, Deck slab

I. INTRODUCTION

Pandalam is a municipal town and fast growing city in Adoor Taluk of Pathanamthitta district in Kerala. It is also a renowned educational and health care centre in Central Travancore. There are seven colleges, twenty-three schools, few hospitals and it is also considered as a holy town due to its connection with Sabarimala. Because of all these reasons, the traffic congestion is relatively high at Pandalam especially at the main junction. It is an intersection where four major roads meet, that is Pathanamthitta-Chengannur- Mavelikkara- Adoor. Our intention is to limit traffic congestion by the construction of a flyover connecting Adoor-Chengannur road.

The conceptional design of flyover is done by the help of STAAD pro software. STAAD pro is a structural analysis and design software application. It is one of the most widely used structural analysis and the design software products worldwide. It supports over 90 international steel, concrete, timber and aluminium design codes. It can use various forms of analysis from the traditional static analysis to more recent analysis methods like p-delta analysis, geometric non-linear analysis, buckling analysis etc.. STAAD pro can be used for analysis and design of all types of structural projects from building and bridges to towers, tunnels, metro stations, water /waste water treatment plants and more.

Paper is organized as follows. Section II describes various flyover design works by different methods ,the methodology is explained in section III . Section IV represents the results obtained from STAAD. Finally, Section V presents conclusion.

II. RELATED WORK

Flyover construction today has achieved a worldwide level of importance. B .Durga Bhavani et al [1]describes about constructing flyover in prestressed concrete. Because it is better in stability, serviceability and economy. By using hydraulic jack the overpass which is made up of steel and concrete can be transverse vertically. This is explained by M.Hari Sathish Kumar et al [2]. Bodanapu Sony [3] explains the paper that unquestionably the issues which come in flyover improved junction and makes suggestion to improve the space underneath the bridge. A significant part of flyovers over highways and express is developed as two span beam and frame structures by Przemyslaw Mossakawski [4] . The inference from all the journals shows the construction of flyover will reduce the traffic congestion by a great volume.

METHODOLOGY

STAAD is a structural analysis and design software application .It supports all international codes such as steel ,concrete, timber etc. Project work flow is shown below.

- Create T beam model
- Define section properties
- Define material properties
- Assign supports
- Assign loads
- Analysis
- If there is no error in the output file go for post processing
- Design each elements

Our project work deals with construction of flyover connecting Adoor- Chengannur road. It is the intersection of four roads and it faces major traffic problems. The length of flyover is 680 m and T beam bridge is adopted. It consists of nearly 60 number of columns. It is designed as straight type flyover with safe slopes on both sides. The proposed flyover contains 3.5 m two lane road, 1m barricades and 0.6 m safety kerbs on both sides. IRC class AA tracked vehicle is considered for wheel load. This project work is done as per requirements and standards with reference to IS 456:2000 and IRC 21:2000.

III. EXPERIMENTAL RESULTS

Figures shows the results obtained from STAAD

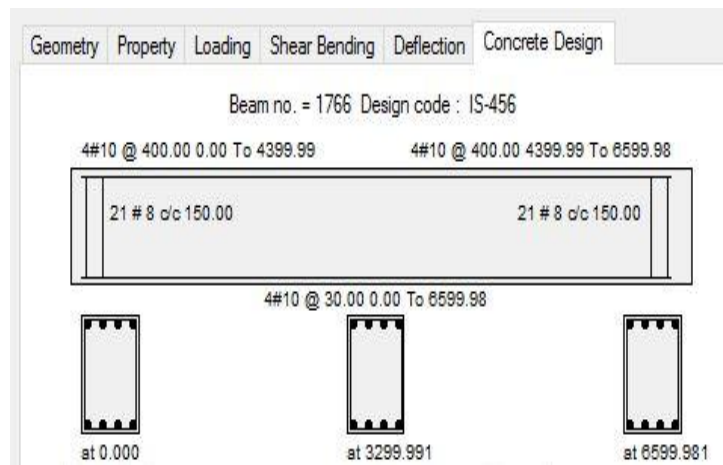


Fig 1. Beam details in STAAD

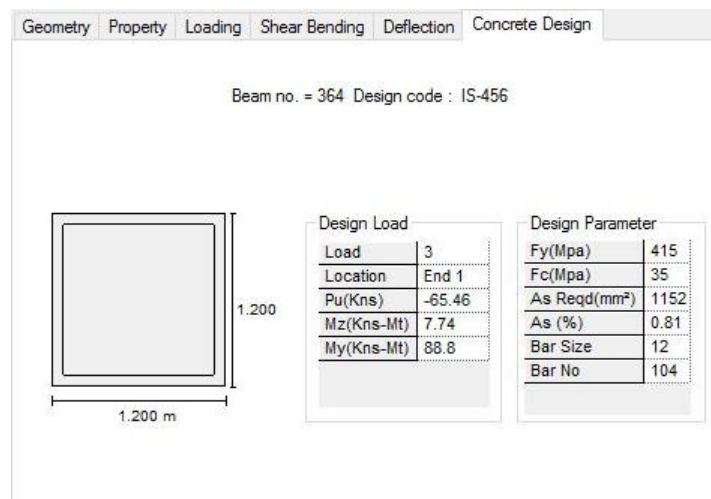


Fig 2 Column Details in STAAD

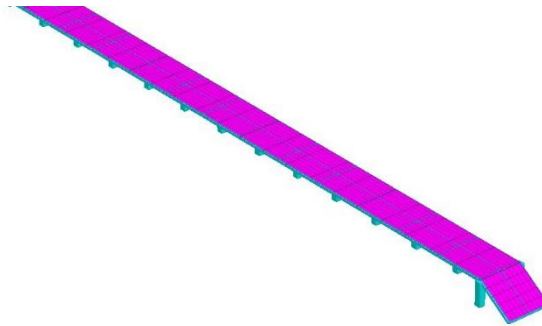


Fig 3. 3D view (i)



Fig 4. 3D View (ii)

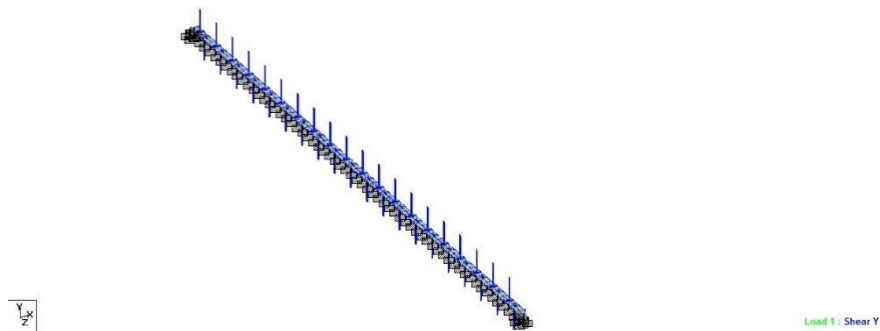


Fig 5. Shear in Y direction

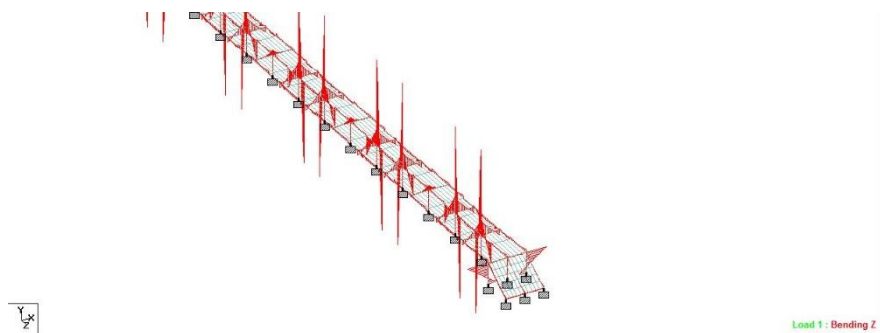
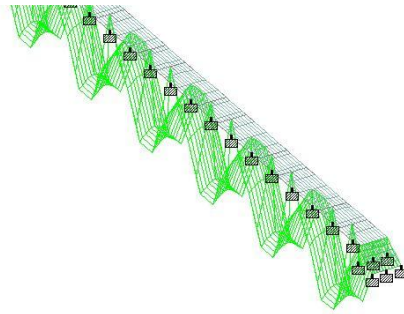
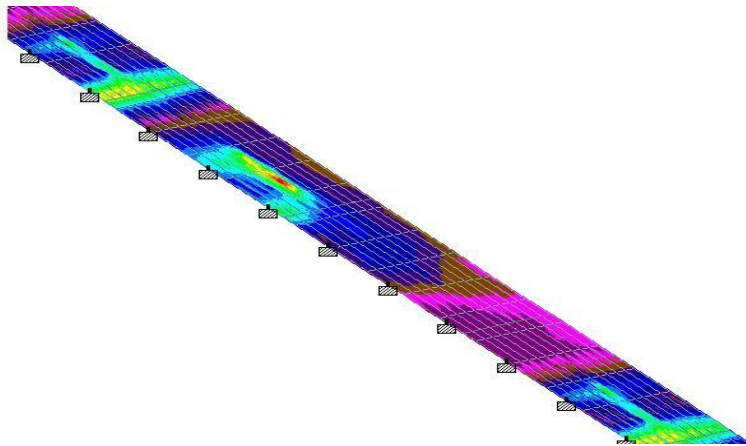
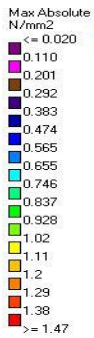


Fig 6. Bending in Z direction



Load 1 : Displacement

Fig 7. Displacement diagram



Load 3

Fig 8 Loads generated during movement of vehicles

Table 1 Summary of Reinforcement Details in Beam

SECTION	0.0mm	230.0mm	460.0mm	690.0mm	920.0mm
TOP	245.78	245.78	245.78	245.78	245.78
REINF.	(sq.mm)	(sq.mm)	(sq.mm)	(sq.mm)	(sq.mm)
BOTTOM	245.78	245.78	245.78	245.78	245.78
REINF.	(sq.mm)	(sq.mm)	(sq.mm)	(sq.mm)	(sq.mm)



Table 2 Design Load Summary

SECTION (in mm)	FLEXURE (Max (Sagging/Hogging moments))				SHEAR	
	P	MZ	MX	Load Case	VY Load case	MX
0.0	0.00 0.00	34.68 -936.97	- 2.49 0.00	63 1	834.34	0.00
183.3	0.00 0.00	28.06 -784.06	- 2.49 0.00	63 1	833.79	0.00
366.7	0.00 0.00	21.43 -631.25	- 2.49 0.00	63 1	833.23	0.00
550.0	0.00 0.00	14.80 -478.54	- 2.49 0.00	63 1	832.67	0.00
733.3	0.00 0.00	8.17 -325.94	- 2.49 0.00	63 1	832.12	0.00
916.7	0.00 0.00	2.63 -173.44	- 2.00 0.00	69 1	831.56	0.00
1100.0	0.00 0.00	18.82 -29.17	- 17.24 - 18.06	66 56	831.00	0.00
1283.3	0.00 0.00	131.26 -11.71	0.00 - 2.49	1 63	830.44	0.00
1466.7	0.00 0.00	283.46 -18.34	0.00 - 2.49	1 63	829.89	0.00
1650.0	0.00 0.00	435.55 -24.97	0.00 - 2.49	1 63	829.33	0.00
1833.3	0.00 0.00	587.54 -31.59	0.00 - 2.49	1 63	828.77	0.00
2016.6	0.00 0.00	739.43 -38.22	0.00 - 2.49	1 63	828.21	0.00
2200.0	0.00 0.00	891.22 -44.85	0.00 - 2.49	1 63	827.66	0.00

IV. CONCLUSION

Our proposed two lane flyover gives safe and equitable balance of safe and efficient movement of traffic. These adopted flyover design has six hundred and eighty meters and consists of nearly sixty columns. As per calculation in the project maximum bending moment value in the deck slab is 13117KNm . STAAD Pro helps to achieve accurate results in the measurements of shear force, bending moment and reinforcement details.

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