Design and Analysis of Flyover Bridge By Using SAP

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ABSTRACT

An overpass or flyover is a bridge, street, railway that crosses additional road or railway. A bridge is a high-degree overpass, built above important overpass lanes constructed over an at-grade intersection. Main objective of this study is to get acquire knowledge in analysis and designing of fly over bridge and estimating and costing of the bridge. Necessary building drawing show the plan, front elevation and sectional view are prepared. The fly over bridge consists of bridge deck, structural member, hand rail and piers. In this study, plan prepared with AUTO CAD software. The analysis and the designing of structure is carried out by limit state method with the code book Guidelines for the Design of fly Bridges. The study is very useful to know how to analysis and design the foot over bridge.

Keywords: Bridge, Auto Cad, Analysis and SAP

1. INTRODUCTION

The duct and passageway collectively form a mark departure. It's far a bridge that contains one road or railway line above any other either without or with supplementary roads, for communication between the two. It's miles commonly assumed that the flyover is related to the bridge constructed over avenue or railway tracks.

1.1 Advantages of Flyover

- Flyovers mostly used in streamlining the traffic control system.
- Through flyovers masses of time is saved avoiding congestion.
- Pollutants effect is reduced.
- Flyovers reduce the hazard of injuries.
- Flyovers additionally make contributions lots to the aesthetics of the metropolis. The flyover used to human traveling of the one place to other place.

2. METHODOLOGY

Figure 1 shows the Methodology of the study.

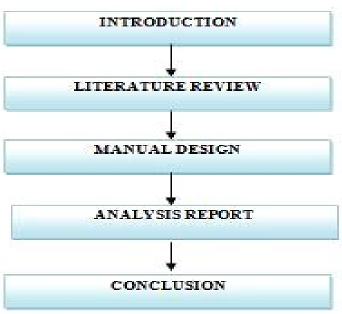

Figure 1 Methodology

3. MANUAL DESIGN

3.1 Design of Deck Slab

Carriage way = Two lane 8 m wide
Materials = M 25 & Fe 415
Kerbs = 600 mm wide
Clear span = 25 m
Width of slab = 8 m
Wearing coat = 80 mm
Width of bearing = 400 mm
Loading = IRC. Class AA

The design should conform to the specification of the bridge code IRC: 21 – 1987

3.1.1 Allowable Stress

f_{ck} = 25 N / mm^2
f_y = 415 N / mm^2
σ_{cb} = 8.3 N / mm^2
σ_{st} = 200 N / mm^2
j = 1
Q = ½ j.k.
m = 10
j = 0.90
Q = 1.1

Effective depth required is computed as
Where, M = $M_{dead} + M_{live}$
Q = 1.1 (constant)
B = 1000 mm,
d = 2157.26 mm
Effective depth provided = 2470 mm
$d_{pro} > d_{req}$
Hence, the design is safe.

3.2 Pier Design

3.2.1 Longitudinal Reinforcement

Gross area A_g = π *d^2 /4 = 3141.592 *10^3 mm^2
Let assume A_{sc} = 1% A_g
= 0.01 A_g
= 0.01 x 3141.59 x 10^3
= 31415.9 mm^2

3.2.2 Check for one way shear

Maximum Shear force at face of column = 300.0 KN
Shear stress = 300 x 10^3 / 600 x 622
= 0.80 N/mm^2
For Pt = 0.20%
ζc from Table 61 of Design Aid to IS 456 -1978 = 0.33 N /mm^2
Shear to be carried by stirrups shear.
Vus = (0.80 – 0.33) x600 x622 x 10^{-3}
= 175.40 KN.
Vus /d = 175.40 / 62.2 = 2.81 KN/cm
Provide 8 Φ RTS 4 legged stirrups @ 120 mm c/c.

3.3 Pile Foundation Design

3.3.1 Data

Load = 1000kN (From calculation)
No.of.Piles = 6Nos (assume)
Service load on each pile = (1000/6)
= 166.6kN assume 200 kN
Design ultimate or factored load
(P_u) = (1.5x200)
= 300 kN
Depth of foundation
H = $p\,(1-\sin\theta)^2/\Upsilon\,(1+\sin\theta)^2$
p = Bearing capacity of soil
ϒ = Density of soil
Φ = Angle of Repose
h = (200/18) x (0.11)
h = 1.2m assume 2 m
Grade of concrete = 25 N / mm^2
Yield stress of steel = 415 N / mm^2
Pile of length 3D = 3 x 300 = 900 mm
Volume of spiral = 0.6% of gross volume
Using 8mm helical ties (A_s = 50 mm^2)

Provide 8 mm dia ties at 110 mm centres for a distance of 900 mm from the ends of the pile both at Top and Bottom.

4. ANALYSIS REPORT

Figure 2 shows the Finite Element model.

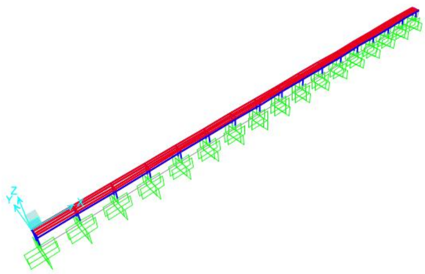

Figure 2 Finite element model

Figure 3 shows the Bending Moment diagram.

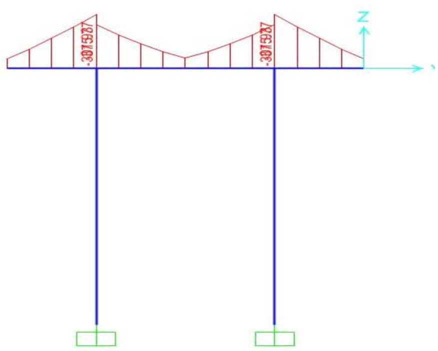

Figure 3 Bending moment diagram

Figure 4 shows the shear force diagram.

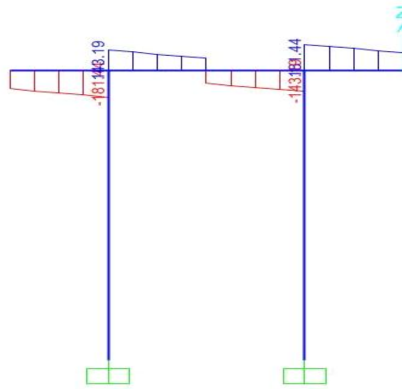

Figure 4 Shear Force diagram

Figure 5 shows the Stress Diagram.

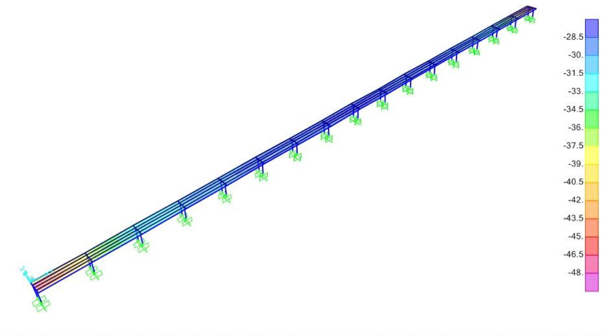

Figure 5 Stress Diagram

4.1 Structure Results

This below Figures 6 result shows the structural Deformed shape.

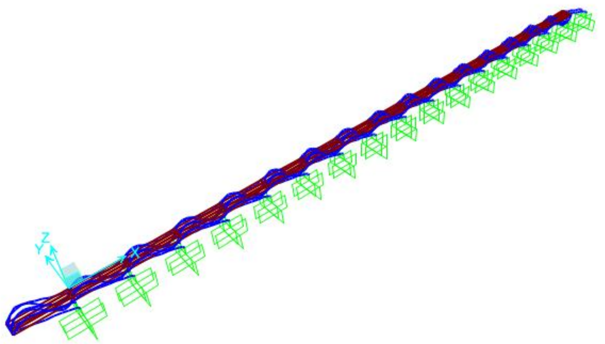

Figure 6 Deformed shape

Figure 7 shows the Design window.

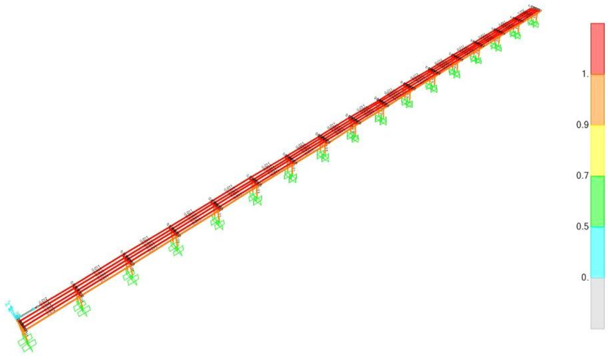

Figure 7 Design window

5. CONCLUSION

The outcomes of study, however, show that site visitors signalization for both the prevailing at-grade scenario and flyover upgraded state of affairs has been and is still controlled by fixed time control plans, there is still long queue and put off mainly at the secondary highways. In our project grade centrifuge, the most elements consist of Deck block, longitudinal beam, Crossbeam, bearing plate, Pier, and Foundation. The geometric style of the grade centrifuge was done by victimization IRC Code Books.

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