International Journal of Scientific Research & Engineering Trends
Volume 7, Issue 1, Jan-Feb-2021, ISSN (Online): 2395-566X

Foot over Bridge Random Vibrational Analysis for Diffrent Slab Material

PG Student J. P. Pawar, Prof. R. S. Patil, Dr. G. R. Gandhe (H.O.D)
DIEMS Aurangabad,India
jppawar31@gmail.com

***Abstract*- Damping performs essential function in format of vibrational resistant structures, which lower the changeof the shape when they are subjected to lateral loads or vibrational load. In the existing study the deck of bridge is check for various materials like MS steel plate, RCC slab, and aluminum and MS plate composite deck. The important challenge of a structure is to endure the vibrationalloads on deck slab. In order to reduce structuralvibration has been used. The bridge is modeled in ANSYS 2019 and modeled with different material of deck. After the study results show foot over bridge having 100 mm thick slab shows better result than having composite sheet or having MS sheet as deck slab.**

***Keywords*- Foot over bridge, composite, Vibration analysis.**

I. INTRODUCTION

Bridges are the design built for brandishing the railroad and street traffic or other moving Burdens which are preceding onward Scaffold Bridge.

Bridges are constructed on obstruction which incorporates a river, channel, canyon, valley, avenue or railway. If a bridge is formed to hold highway site visitors, its miles called a road bridge. It's far built to hold railway site and visitors; it is mentioned as a railway bridge.

1.1 Description on Truss Bridge:

Bridge which super structure is load bearing accommo dates steel is thought as span having connecting normally forms triangular in shape.The related factor is also puzzled from compression, tension or every so often each in reaction to dynamic loads. Steel bridges are one in every of the oldest varieties of modern bridges which is used for foot over bridge [16].

II. SYSTEM DEVELOPMENT

Perform static structural and vibrational analysis of pedestrian bridge for various material of deck slab. The change of material is considered in deck the material used are MS plate, ALUMINIUM and MS plate composites and concrete slab for deck.

1. Member Detail:

- Channel Section = ISMC 150 = 150X 75 X 9 MM
- Beam Section = ISMB150 = 150 X80 X8 MM
- Thickness MS Plate = 20MM
- Thickness Composite Sheet = 20 MM (15MM MS+ 5 MM ALUMINIUM)
- Slab Thickness = 100 MM

2. Loading Calculation:

- LIVE LOAD
- Weight of single person= 100 kg (Wt. of person is 75 kg +carrying Wt. 25 kg)
- Considering 4 PERSON / M 2.

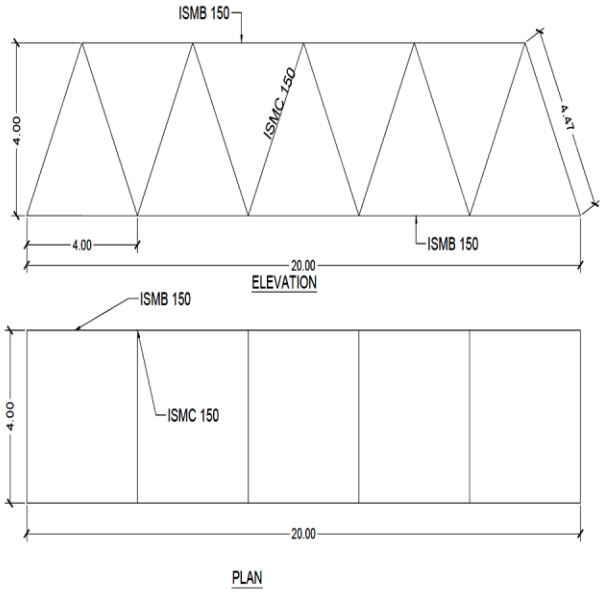

Fig 1. Plan and Elevation of Pedestrian Bridge.

- Per Sqm. load on plate = 400 KG/M2.
- Dead load of bridge = Self weight bridge
- Live Stock = 400 KG/ M2
- Light Motor Vehicle = 400 KG/ M2
- Total Weight = 400+400+400+400 = 1600 KG / M2. = 0.011775 N/MM2

International Journal of Scientific Research & Engineering Trends
Volume 7, Issue 1, Jan-Feb-2021, ISSN (Online): 2395-566X

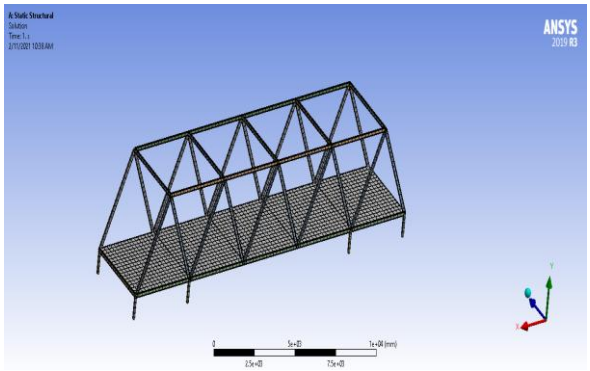

Fig 2. 3d Model from Ansys Software.

III. RESULT

In ANSYS Workbench Software foot over Bridge deck was analysed and results were analysed on the basis of result parameters mentioned below.

1. Total Deformation:
Overall deformation of structure is found less where the 100 mm concrete slab is used further followed by 20 mm thick MS plate and then after composite sheet deck as shown in table no.

Table 1. Total Deformation.

Total Deformation			
Sr.No	Description	Max (Mm)	Avg (Mm)
1	20 Mm Thick Ms Plate	75.312	20.421
2	Concrete 100 Mm Slab	15.578	5.75
3	20 Mm Thick Composite 15 (Mm)Ms+5 (Mm)Alu Plate	110.82	32.32

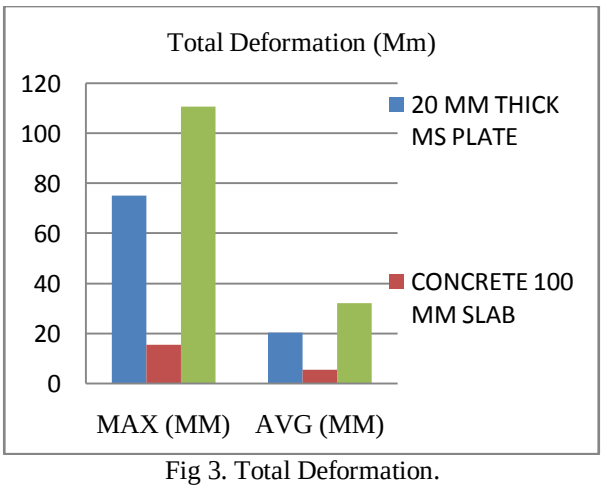

Fig 3. Total Deformation.

2. Equivalent Stress:
Overall equivalent stress is found maximum in composite sheet deck slab compare with 20mm thick MS plate and 100 mm thick concrete deck.

Table 2. Equivalent Stress

Equivalent Stress			
Sr.No	Description	Max (Mpa)	Avg (Mpa)
1	20 Mm Thick Ms Plate	172.08	75.944
2	Concrete 100 Mm Slab	10.866	5.14
3	20 Mm Thick Composite 15 (Mm)Ms+5 (Mm)Alu Plate	216.25	58.89

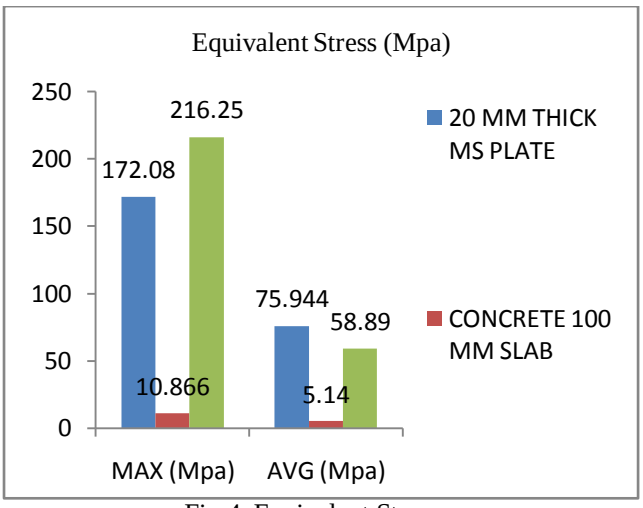

Fig 4. Equivalent Stress.

3. Shear Force:
Shear force resisting capacity of bridge with concrete 100 mm slab is found more than composite sheet and 20 mm thick MS plate.

Table 3. Shear Force Beam (N).

Shear Force Beam (N)		
Sr. No	Description	Max (N)
1	20 Mm Thick Ms Plate	653.04
2	Concrete 100 Mm Slab	692.76
3	20 Mm Thick Composite 15 (Mm)Ms+5 (Mm)Alu Plate	642.67

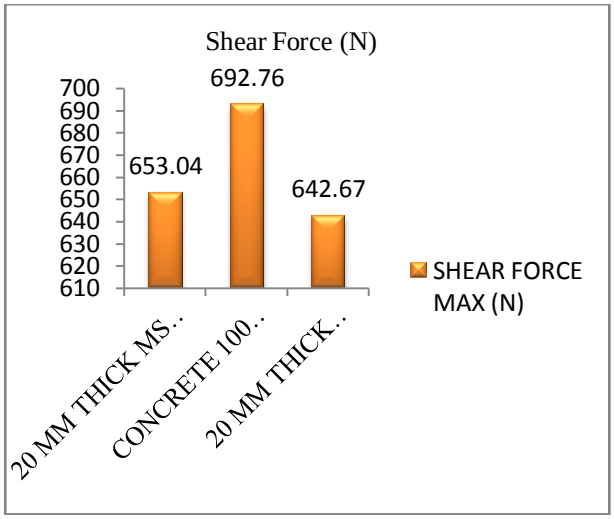

Fig 5. Shear Force.

IV. CONCLUSION

This paper provides comparison between three models of foot over bridge for vibration analysis of it. After looking at result 100 mm thick slab deck gives better performance than that of 20 mm thick MS plate and composite sheet.

RFERENCES

[1] Wardhana,K. and Hadipriono, F.C., 2003. Analysis of recent bridge failures in the United States.Journal of performance of constructed facilities,17(3), pp.144 150.

[2] Catbas,F.N.,Susoy,M.andFrangopol,D.M.,2008.Struct ural health monitoring and reliability estimation:Long span truss bridge application with environmental mon itoring data. Engineering Structures,30(9), pp.2347 2359

[3] Cai,S.,Chen,W.,Kashani, M.M., Vardanega, P.J. C.A., 2017. Fatigue life assessment of large scale T-jointed steeltruss bridge components.Journal of constructional steel

[4] J.Kalaetal “Footbridge Response on Single Pedestrian Induced Vibration Analysis”World Academy of Science, Engineering and Technology 26 2009

[5] Iemke Roos et al “Human Induced Vibrations on Foot bridges” Application & comparison of pedestrian load models, Delft University of Technology, Netherlands 2009

[6] Stana Zivanoviý et al “Probability-Based Estimation of Vibration for Pedestrian Structures due to Walk ing”2010

[7] Kuldeep Pathaket al “A Review Study Of Pedestrian Bridge Truss Structure For Low Traffic Volume 2010.