iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.51311

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

Analysis and Design of Foot Over Bridge

Dr. Vinayak Vaidya[1], Prasad Ugemuge[2], Gautam Wakpaijan[3], Shrutika Tiple[4], Nikhil Bhadke[5]
[1]*Asst Prof,* [2, 3, 4, 5]*UG Students, Department of Civil Engineering, K.D.K College of Engineering, Nagpur, India*

Abstract: ***A foot over bridge (FOB) is a pedestrian walkway that is built over a road or a railway track to provide a safe and convenient passage for pedestrians. The analysis and design of a foot over bridge involves various aspects such as structural design, architectural design, and safety features. In this paper, we will discuss the key considerations involved in the analysis and design of a foot over bridge. The first step in the analysis and design of a foot over bridge is to identify the location and purpose of the bridge. The location of the bridge determines the traffic flow, the pedestrian traffic, and the environmental factors that need to be considered in the design. The purpose of the bridge may be to connect two points, provide access to a specific location, or provide a safe passage over a hazardous area. The next step is to carry out a structural analysis of the bridge. This involves calculating the loads that the bridge will have to bear, such as the weight of the pedestrians, the wind loads, and the seismic loads. Based on these calculations, the dimensions of the bridge and the materials to be used can be determined. The architectural design of the bridge is also an important aspect of the analysis and design process. The design should be aesthetically pleasing and should blend in with the surrounding environment. The design should also consider the needs of the pedestrians, such as the width of the bridge, the slope of the ramps, and the placement of the handrails. Safety features such as lighting, signage, and emergency exits are also important considerations in the analysis and design of a foot over bridge. The lighting should be sufficient to ensure visibility during the night, and the signage should be clear and easy to understand. Emergency exits should be provided in case of an emergency and should be clearly marked. In conclusion, the analysis and design of a foot over bridge involves various aspects such as structural design, architectural design, and safety features. The design should consider the location, purpose, and needs of the pedestrians, and should be aesthetically pleasing while ensuring the safety of the pedestrians.***

I. INTRODUCTION

A foot over bridge (FOB) is an essential infrastructure that provides a safe and convenient passage for pedestrians over roads, railways, and other hazardous areas. The increasing urbanization and population density have led to a rise in the demand for foot over bridges in cities and towns. The design and analysis of a foot over bridge involve various technical and architectural aspects that ensure its structural integrity, functionality, and safety.

The purpose of this paper is to discuss the key considerations involved in the analysis and design of a foot over bridge. The paper will cover the structural analysis, architectural design, and safety features that need to be taken into account while designing a foot over bridge. The paper will also discuss the importance of location and purpose in the design of a foot over bridge and highlight the challenges involved in designing foot over bridges in urban areas.

The design of a foot over bridge should not only ensure the safety of the pedestrians but also provide an aesthetically pleasing and functional infrastructure. The design should be able to withstand various environmental factors and loads that the bridge will be subjected to. The analysis and design of a foot over bridge require expertise in civil engineering, architecture, and safety regulations.

The paper will provide an overview of the analysis and design process involved in the foot over bridge, including the identification of the location and purpose of the bridge, structural analysis, architectural design, and safety features. The paper will conclude by highlighting the importance of the foot over bridge as a critical infrastructure that provides safe and convenient passage for pedestrians and the need for continued investment in its design and maintenance.

II. LITERATURE REVIEW

A. *Akhilesh Kumar Maurya, Jagannath Panda. Study of the pedestrian movement over foot over bridge. Discovery, 2015, 40(182), 104-117*

The study conducted on the pedestrian road of Mahatma Gandhi Marg Gangtok by taking various data likewise gender speed ratio, statistics of loading gender, age, loading, bags carrying conditions. In the study, they simply find out that with the increase of speed of pedestrians there is decrease in flow of pedestrians. At the same time the speed density ratio shows the density increase, pedestrian speed declines in an exponential order. The average walking speed found to be 1.27 m/sec.

©IJRASET: All Rights are Reserved

Flow density have quadrant downward parabolic relationships which shows upward increase density flow up to a certain point, after that it declines gradually. In gender consideration the speed of female found to be 12% less than speed of male. Overall, it gives enough data for pedestrian flow, its density, speed with different kind of gender and age.

B. Analysis and design of foot bridge M Kalpana 1, B. V. Mohan Rao 2

The study carried out for Design and analysis of foot over bridge which is proposed by respective project. In this study they sorted that the strategic position of fob is based on various criteria like area; condition of terrain, disturbance due to pedestrian to the vehicle traffic.

The purpose of foot over bridge is not only allows the pedestrian traffic but also safer movement of vehicle traffic. While designing of fob the span criteria also matter where it influence the selection of type of bridge may be truss bridge or Girder Bridge. For short spans the simple concrete slab is better. The girder bridges are provided for short to medium span because of moderate self-weight and structure efficiency, easy for fabrication and low maintenance cost. While considering the loading the guidelines should be followed by IS 875: 1987 part 1. The super imposed load should be taken from 5kN/m2. for wind load consideration IS 875: 1987 part 3 followed.

C. An Overview of Foot Over-Bridges at Dhaka City Abdur Razzak Zubaer1, Raihad Farin Mahi2, Salma Afia Ratri3, Talha Ibne Aziz4*

The study was conducted on three foot over bridges in Dhaka City which are science lab foot over bridge from (site 1), farm gate more fob (site2) and Mirpur 10 gol chottor fob respectively.

The data were attained through peak hours on weekdays for around three hours. The data selected randomly and the trap of 10m length with effective width for site scale between 1.83 to 1.85m. While analyzing the data different kinds of eight factor are considered with their gender age and profession. The data collected putted in excel and analyzed by SPSS software to check the direct link or significance between pedestrian, gender, age and profession and its diverse factor. At the end it concludes that the percentage of females are 33 to 35 and contrary aged group 18 to 25 carry the mass of the percentage but 0 to 17 and 40+ age groups are very little in percentage.

D. Appraisal and Design of Foot Over Bridge Limje Mayur1, Solanki Dharmendra2, Patel Darshan3, Patel Neel[4], Patel Hiren[5], Chauhan Dixit[6]

This study proposes a fob in Surat city from Surat railway station to Surat central bus stop. The stretch was divided in three portions AB BC and CD are 90m 55m 26m respectively. Fob is straight till point A to point B then it has cross shape from point B to point c then it is continued straight from point c to point D.

There is approximately 115000 passengers arrived daily at Surat railway station. Approximately 35000 passengers were departure from Surat bus station. They had design fob over the capacity of 20000 per day. Normally there was a capacity of 10000 persons per day.

They assume the minimum specifications as per Indian railway work manual with width of gangway 4m and height from the ground level 12m. They also assume the live load of 5kn/m2 with total span 171m. The various components of fob were analyzed using STAADpro and the most economic and safe section were arrived through manual design.

E. Comparative study of cold formed section steel foot over bridge under different configuration Manjusha Nathe1, Dr. Sachin Mulay2

This paper deals with Comparative study of foot over bridge under different configurations this study bridges are analyzed and design by using two different software that is STAAD pro and Tekla texture .

Three different type of places are considered and from which the best place is selected. For this project two types of survey was conducted first one is pedestrian traffic survey and second one is vehicle traffic survey. To know current situation on the site where the fob is supposed.

After conducting the survey, the dimension of the road is measured and effective span height, width of staircase assumed. After that the geometry and modeling of different kind of fob are analyzed by STAAD pro and Tekla software. At the end of the conclusion is taken from this test is weight of cold form steel fob was low comparatively:

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

F. Pedestrian Road Crossing Behavior at Foot Over Bridge and Zebra Crossing at Progoti Sarani in Dhaka City Md. Sanaullah Shamim 1, Md. Mahadi Hasan2, Md. Alamgir Hossain Mridha2 1Lecturer, 2B. Sc. Student.*

The study conducted by the project member with Comparative study of zebra crossing and the foot over bridge Crossing at the particular junction at Dhaka City on the various stages of survey conducted by them the conclusion has to be taken is that the pedestrians are more interested in foot over bridge rather than zebra crossing because it is more reliable and it avoids the direct conflict between pedestrians and the vehicles. In other hand zebra crossing has not provided this kind of safety and reliability under the circumstances of rush period. And also, the opinion of pedestrians on zebra crossing and foot over bridge is to be continuous and strict maintenance throughout the year. Around 70% pedestrians prefer fob than zebra crossing.

G. Comparative analysis of different truss type railway steel bridge considering railway loading (ijesrt volume 06 oct 2017) s. Gupta and s.s bhadauria

The study on Comparative analysis of different truss type railway steel bridges considering railway loads. The study assumes the span of 15m with loading of 32.5T has assign in different types of Pratt truss, Howe type truss, warren type truss and k-type truss. This mention trusses are found out stable and optimize sections the STAAD pro software is used for design and analysis. The standard used by the study as per Indian railway standard and Indian Road Congress. In this paper results of shear force for Warren type truss is more as compare to prat, Howe and k type truss but axial force results of prat truss are more as compare to others. The deflection is minimum in warren steel truss whereas maximum in Howe truss bridge which shows Howe truss bridge require more supports than pray truss. The economy is achieved by Howe truss and the warren truss is more costly than others

H. Review on Behavior of Foot Over Bridge 1Dhiraj P. Lad, 2R.D. Patil 1PG Student, 2Assistant Professor

The research paper based on the studies conducted by various expertise with fob considering material, roads, behavior while rush period and high density different kind of age group and velocity and its effect. The study include this all type of factor are necessary while designing of foot over bridge. It shows the gap which must be fill these are

1) Comparative study of seismic analysis of different type of foot over bridge for four different span.
2) Analysis and design of foot over bridge by using ETAABS SOFTWARE
3) Analysis and design of foot over bridge by changing base spacing by different span with channel section using STAAD pro software.

III. METHODOLOGY

1) Literature survey
2) Codal provisions (IS 800-2007, IRC 24 and IRS)
3) Geometry of bridge
4) Mathematical modeling in softwar
5) Loading
6) Analysis
7) Design

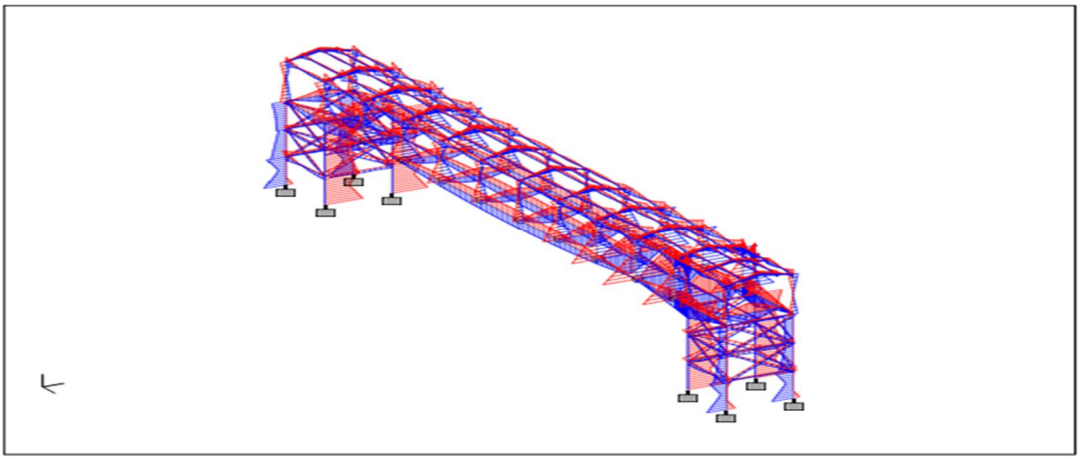


Fig. no. Combined loading

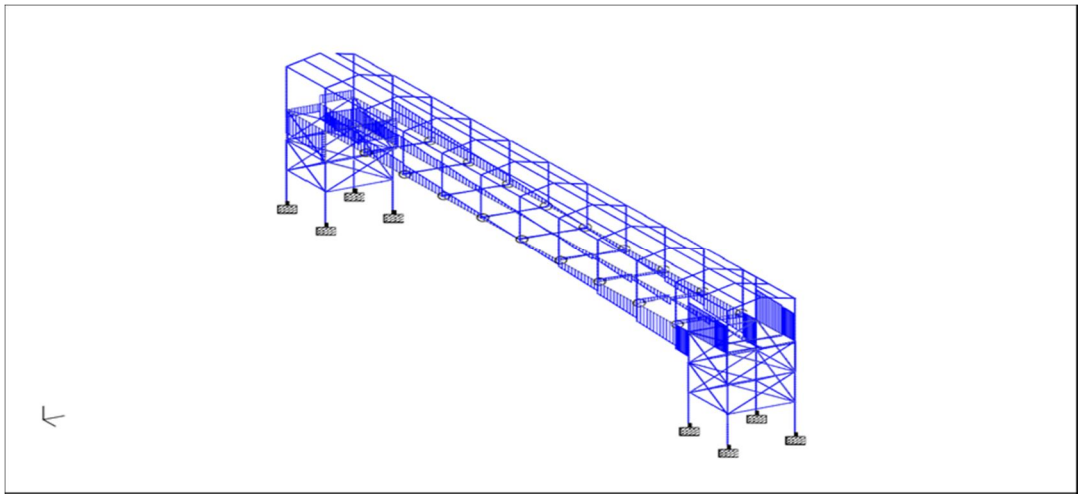


Fig. no. Shear force diagram

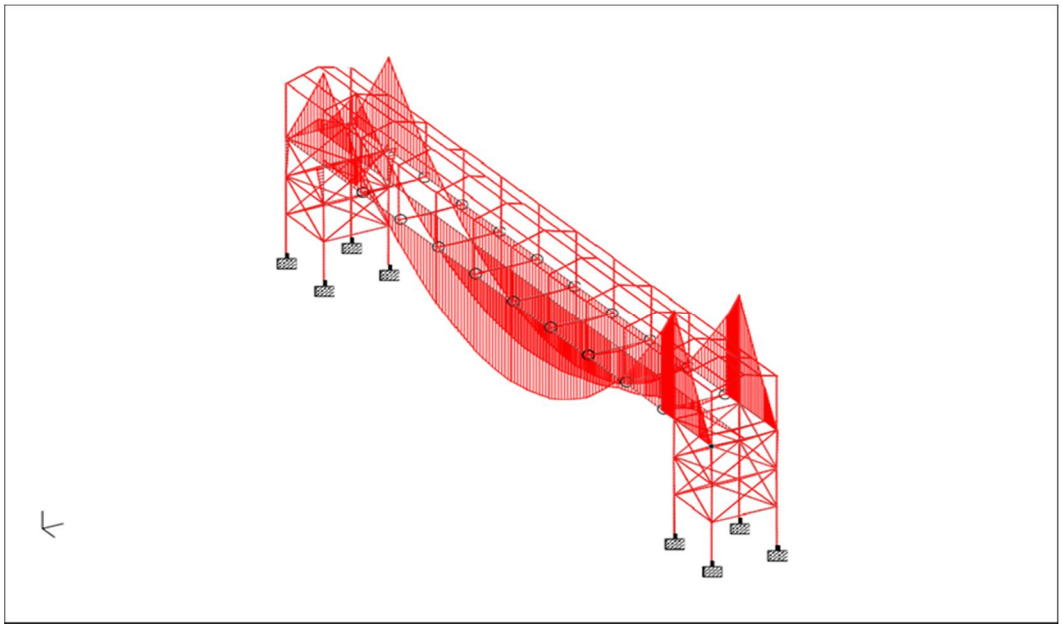


Fig. no. Bending moment diagram

IV. GEOMETRY OF FOB

1) The Dimensional detail of Bridges is as follows:
Length :34m
Width:3 m
Height:6.3 m

2) Loading assumed for calculation:
Dead load
Self-weight of structure by staad Pro
Deck slab: 4.75 kN/m2
Self-weight of sheets to be given on purlins
Live load
Live load in deck slab: 5kN/m2
Live load on purlins: 0.75kN/m2

Section properties

Prop	Section	Area (cm^2)	I_{yy} (cm^4)	I_{zz} (cm^4)	J (cm^4)	Material
1	ISMB450	92.300	834.000	30.4E+3	79.900	STEEL
2	ISA75X75X8 SD	22.800	227.663	120.363	4.847	STEEL
3	Taper	440.000	52.1E+3	737E+3	774.167	STEEL
4	ISMB600	154.000	2.57E+3	90.3E+3	195.000	STEEL
5	ISMC175 D	49.800	540.395	2.47E+3	12.985	STEEL
6	TUB1001006	21.600	311.000	311.000	498.350	STEEL
7	TUB75753.2	8.930	75.500	75.500	118.447	STEEL

Supports

Node	X (kN/mm)	Y (kN/mm)	Z (kN/mm)	rX (kN-m/deg)	rY (kN-m/deg)	rZ (kN-m/deg)
107	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
108	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
109	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
110	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
111	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
112	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
113	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
114	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed

V. RESULT

The Analysis and Design Of Given Structure Of Foot Over Bridge By Using STAAD pro Software Give Satisfactory Result.

VI. CONCLUSION

In general, foot over bridges play a critical role in enhancing pedestrian safety and reducing congestion in busy urban areas. The research findings suggest that foot over bridges is effective in providing safe and efficient passage for pedestrians, particularly in areas with high foot traffic.

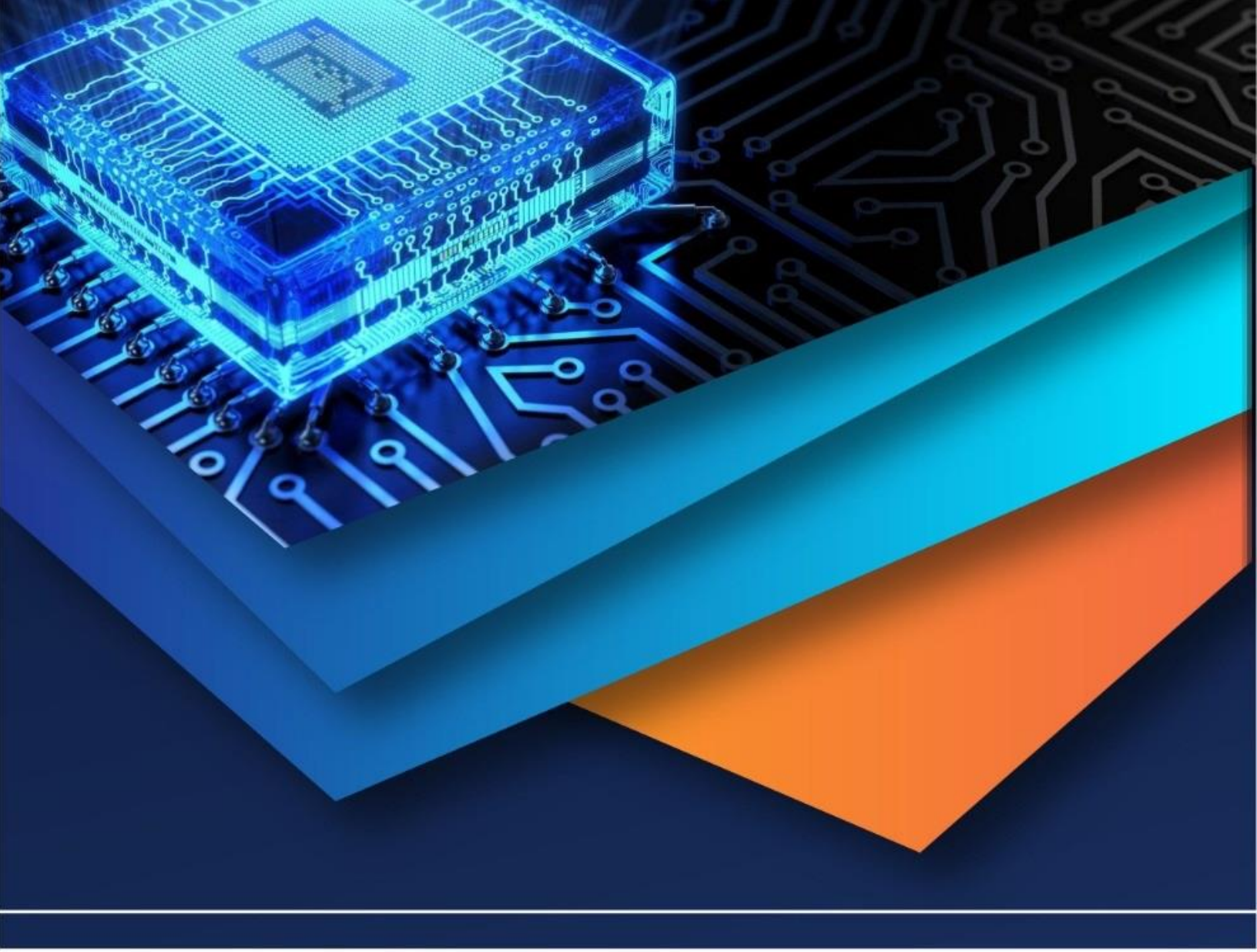
Additionally, the study highlights the importance of considering various factors such as location, design, accessibility, and maintenance when planning and constructing foot over bridges. The implications of the research findings suggest that further research and practical application are necessary to address the challenges associated with foot over bridge implementation and maintenance. In conclusion, foot over bridges is an essential component of modern urban infrastructure, and their implementation should be approached with careful consideration of various factors.

Future research and application are necessary to ensure their continued effectiveness in enhancing pedestrian safety and mobility in urban areas.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

REFERENCES

[1] Blaauwendraad, J. (2010) Plates and FEM-Surprises and Pitfalls. Springer, Dordrecht.
[2] Al-Emrani, M., Engstrom, B., Johansson, M. & Johansson, P. (2008): Bärandekonstruktioner Del 1 (Load bearing structures part 1. In Swedish). Department of Civil and Environmental Engineering, Chalmers University of Technology, Goteborg.
[3] Sustainable Bridges (2007). Non-Linear Analysis and Remaining Fatigue Life of Reinforced Concrete Bridges. Sustainable Bridges - Assessment for Future Traffic Demands and Longer Lives.
[4] Durkee, Jackson, "Steel Bridge Construction", Bridge Engineering Handbook, Repress 45-58, 2000.
[5] G. Mylonakis and G. Gazetas. Seismic soil-structure interaction: beneficial or detrimental". Journal of Earthquake Engineering, 4(03):277-301, 2000.
[6] Granath, P., "Distribution of Support Reaction Against a Steel Girder OnALaunchingShoo." Journal of Constructional Steel Research, Vol. 47, No.3. Pp. 245-270, 1998.
[7] Durkee, Jackson L., "Foot Over Bridge Erected by Launching", Journal Of The Structural Divisions.
[8] Indian Road Congress (IRC) IRC 6-2000 Standard specification andcodeof practice for procedure for the design and construction of road.
[9] National Program on Technology Enhanced Learning (NPTEL) LecturebyProf. Piyali Sengupta (CED, IIT Dhanbad).
[10] Bridge engineering by S.C. Rangawala.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)