

Analysis and Design of Foot Over Bridge

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ABSTRACT: It is known that civil engineering deals with the design, maintenance and construction of physical and naturally built environment, including works like bridges, roads, canals, dams and buildings. Construction of bridge has always been one of the most interesting challenges to all civil engineers. Materials such as timber, iron, steel, and concrete has been used to construct the bridge. Physical obstacles like roads and railway tracks are span by building a pedestrian bridge structure. Traffic can be eliminated by construction of bridges to reduce the delay at highways and conflict between pedestrians and motor vehicles. Various loads and combinations are included in frame analysis which also includes the lateral loads. Construction of foot over bridge is designed solely for pedestrians as it ensures people collision free crossing from one side to another side of the road and railway platforms.

I. INTRODUCTION:

A foot over bridge, also known as a pedestrian overpass or a pedestrian bridge, is a structure that allows pedestrians to cross over a busy road or railway line without being affected by the traffic. It is essentially a bridge designed for pedestrians, providing a safe and convenient way to cross from one side of the road to the other.

Foot over bridges is typically constructed over major roads, highways, and railway tracks in urban areas where pedestrian traffic is high. They are usually elevated above the ground level, with staircases or ramps leading up to them from either side of the road. Some foot over bridges may also have elevators or escalators for the convenience of elderly or disabled pedestrians. Various loads and combinations are included in frame analysis which also includes the lateral loads

The primary purpose of foot over bridges is to improve pedestrian safety by separating them

from vehicular traffic. They also help to reduce congestion and improve the flow of traffic by preventing pedestrians from crossing at ground level and causing disruptions to the movement of vehicles. Overall, foot over bridges play an important role in urban transportation infrastructure and help to make cities more pedestrian-friendly.

II. RELATED WORKS:

There have been several studies and research works conducted on foot over bridges to improve their design and functionality. Some of works are:

1."Pedestrian footbridge design: A review of standards and recommendations" is a research paper authored by J.A. Calvo-Rolle et al. that provides a review of the existing standards and recommendations for pedestrian footbridge

design. The paper analyses different design criteria and suggests improvements for future designs.

The authors first review the different standards and codes that exist for footbridge design such as Eurocodes, AASHTO, and the Australian Bridge Design Code. They then analyse the design criteria for footbridges including the structural design, the requirements for accessibility, the impact of wind, and the use of materials.

The paper highlights the importance of considering the pedestrian flow and comfort while designing footbridges. The authors recommend using design guidelines that take into account the human factors and behaviour to ensure that the footbridge is safe and comfortable for pedestrians.

The authors also suggest improvements for future designs, such as the use of new materials like polymer composites, the integration of sustainable features like solar panels, and the incorporation of digital technologies to improve pedestrian safety and comfort.

Overall, the paper provides a comprehensive review of the existing standards and recommendations for footbridge design and highlights the need for considering the human factors and behaviour while designing footbridges. The recommendations provided by the authors can help improve the functionality and safety of footbridges in the future.

2. "Design and analysis of foot over bridge near Mysore station" is a research paper authored by M. Vinod Kumar and B.V. Venkataraman Reddy that presents the design and analysis of a foot over bridge near Mysore station in India.

The authors consider various factors such as the traffic and pedestrian flow, wind loads, and seismic force to design a safe and functional foot over bridge. They use the software STAAD Pro to analyse the structure and determine the

appropriate size and thickness of the structural members.

The paper also considers the construction process and suggests using prefabricated structural elements to reduce the time and cost of construction. The authors also recommend using a precast concrete deck for the foot overbridge to ensure durability and reduce maintenance costs.

The authors conclude that the foot overbridge near Mysore station is designed to withstand the expected loads and stresses and is safe for pedestrian use. The paper provides insights into the design and analysis process of foot overbridges and highlights the importance of considering various factors such as traffic and pedestrian flow, wind loads, and seismic forces to design a safe and functional foot overbridge.

3. "Aesthetic Design of Foot Overbridge: A Case Study of Kurla Railway Station, Mumbai" is a research paper authored by Aradhana Choudhary and P.K. Jain that focuses on an analysis of various structural forms.

The authors review the different types of pedestrian bridges such as suspension, cable-stayed, arch, and truss bridges and analyze their structural properties and advantages and disadvantages. They also consider the different materials used in the construction of pedestrian bridges, such as steel, concrete, and timber.

The paper also considers the design criteria for pedestrian bridges such as the pedestrian flow and comfort, the impact of wind and seismic forces, and the requirements for accessibility. The authors recommend using design guidelines that consider the human factors and behavior to ensure that the pedestrian bridge is safe and comfortable for pedestrians.

The authors conclude that the selection of the appropriate structural form for a pedestrian bridge depends on various factors such as the span length, the load requirements, and the aesthetic appeal. The

paper provides insights into the design and analysis process of pedestrian bridges and highlights the importance of considering various factors while designing pedestrian bridges to ensure safety, functionality, and aesthetic appeal.

Overall, the paper provides a comprehensive review of the different types of pedestrian bridges and their structural properties and design criteria. The analysis presented in the paper can help engineers and designers in selecting the appropriate structural form for pedestrian bridges based on the aesthetic design of foot over bridges and presents a case study of Kurla railway station in Mumbai, India.

4. "Design of Pedestrian Bridges – Analysis of Various Structural Forms" is a research paper authored by Maria Jolanta Grzelak and Anna Ewa Siemińska-Lewandowska that focuses on the design and analysis of pedestrian bridges and presents the authors analyse the different design elements such as colour, lighting, and landscaping to create an attractive and functional foot over bridge. They suggest using bright and contrasting colours to make the foot over bridge visible from a distance and incorporating natural elements like plants and trees to provide a pleasant walking experience for pedestrians.

The paper also considers the use of lighting to enhance the aesthetic appeal of the foot over bridge and ensure safety at night. The authors recommend using energy-efficient LED lighting fixtures to reduce energy consumption and maintenance costs.

The authors conclude that an aesthetically designed foot over bridge can improve the pedestrian experience and encourage more people to use it. The paper provides insights into the design process for aesthetically appealing foot and highlights the importance of considering the visual appeal and pedestrian experience while designing foot over bridges.

III. CONSTRUCTION AND USES OF FOB:

The construction and use of foot over bridges have several benefits, including:

- **Increased Safety:** Foot over bridges provide a safe and secure means for pedestrians to cross busy roads and railway tracks, away from the traffic and potential accidents.

- **Improved Traffic Flow:** Foot over bridges help to ease traffic congestion as pedestrians do not need to cross at street

level, reducing the number of stops for vehicles and improving the flow of traffic.

- **Enhanced Accessibility:** Foot over bridges improve accessibility for people with disabilities or mobility impairments, providing a safer and more accessible route for them to cross busy roads or railway tracks.

- **Cost-Effective:** Foot over bridges is generally cost-effective as they require less land compared to level crossings or underpasses. Also, they require minimal maintenance and have a longer lifespan.

The construction of foot over bridge has many steps, including:

Site Analysis: The location of the foot over bridge must be carefully analyzed to ensure it is in the most suitable location to accommodate the expected pedestrian traffics.

Design: The design of the foot over bridge must be developed to meet the required specifications and standards, including pedestrian flow, load capacity, wind load, and seismic forces.

Construction: The construction of the foot over bridge involves the assembly of the various structural components, including the foundation, columns, and deck, which may be constructed using various materials such as steel, concrete, or timber.

Maintenance: Regular maintenance

is required to ensure that the foot over bridge remains in a safe and functional condition, including cleaning, repairing any damage, and replacing any worn-out parts.

In summary, foot over bridges provide a safe and secure means for pedestrians to cross busy roads or railway tracks, improving accessibility, traffic flow, and safety. The construction of a foot over bridge involves careful site analysis, design, construction, and maintenance.

IV. 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 are 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 are 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.

REFERENCES:

- [1] "Pedestrian footbridge design: A review of standards and recommendations" is a research paper authored by J.A. Calvo-Rolle et al.
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