

ANALYSIS AND DESIGN OF FOOT BRIDGE

M KALPANA¹ B.V MOHAN RAO²

ASSISTANT PROFESSOR, DEPARTMENT OF CIVIL ENGINEERING, SAVEETHA SCHOOL OF ENGINEERING, SAVEETHA UNIVERSITY, INDIA[1].

PROFESSOR, DEPARTMENT OF CIVIL ENGINEERING, SAVEETHA SCHOOL OF ENGINEERING, SAVEETHA UNIVERSITY, INDIA[2].

U.G. SCHOLAR, DEPARTMENT OF CIVIL ENGINEERING, SAVEETHA SCHOOL OF ENGINEERING, SAVEETHA UNIVERSITY, INDIA [3]. kalpanamohancivil@gmail.com¹.

Ramesh.bhaskar@gmail.com². mohanboilla.1997@gmail.com³.

Abstract: *Civil engineering deals with the design, construction and maintenance 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 fascinating challenges to civil engineers. Materials like timber, iron, steel and concrete has been used to construct the bridge. In India mostly reinforced concrete bridges are existed. A pedestrian bridge is a structure built to span physical obstacles such as roads and railway tracks. This bridge will eliminate traffic congestion and delay at the highway as well as eliminate conflicts between pedestrians and motor vehicles. In this present project work, the analysis and design of RCC pedestrian bridge is done by using STAAD pro with standard design details as mentioned in Indian codes. The planned pedestrian bridge is modelled in STAAD Pro Various loads & combinations are included in the frame analysis also included lateral loads. Structural design is to be done using Limit state method.*

Introduction: The pedestrian bridges are situated across roads to let pedestrians cross safely while not deceleration down the traffic. The latter may be a sort of pedestrian separation structure, samples of that area unit

significantly found close to schools, colleges and busy corridors. The pedestrian bridge is taken into idea for developing the transportation, and its infrastructure to meet the needs and demand of the growing population whilst retaining its distinctive and valued market town character. This project has been proposed especially for pedestrian safety considerations, where the bridge cross over structure will serves as a best for both pedestrians and the fastest moving traffic. The structure provides a strategic and easy access to the bus terminus and in conjunction with the six lanes state highway would enable the traffic to flow at high speed so that the flow should not be disturbed in turn saving the destination, fuel and prevents hazards at a time. Durable and sustainable bridges play an important role for the socio-economic development of the nation. Owners and designers have long recognized the low initial cost, low maintenance needs and long life expectancy of RCC concrete bridges. Designs of bridges vary depending on the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it. For short spans, the simplest form of bridge deck is a concrete slab. Girder bridges are widely used bridge system for short to

medium span (<20m) highway bridges due to its moderate self weight, structural efficiency, ease of fabrication, low maintenance etc.

LITERATURE REVIEW: Design of cable stayed pedestrian bridge

t.nelson ponnu durai dr. p.asha and r.vinoth kumar yang, keun-hyeok; chung. (2015)

This paper intends to describe the conceptual design of a cable stayed pedestrian cross over bridge, near bus terminus. The development of detailed design and critical issues associated with bridge deck, cables and tower are briefly discussed. The bridge is constructed for easy movement of people crossing the expressway and to avoid fatal accidents. Live load acting on the bridge is transferred to the bridge deck, which in turn both the dead load of the superstructure (self-weight of the bridge deck) and live load of the bridge is balanced by tension cables which is anchored to the tower. The tower of the bridge carries the total working load. Additional columns are provided at the end supports. The design is aimed to meet the requirements.

Materials for foot over bridges

Aishwarya Kulkarni, Priyanka Kumbhar, Pooja Mandge and Mrs. Sarita Khot (2016)
The concept of using materials in foot over bridges to improve strength and durability, during the last 30 years different types of materials were introduced and are being continuously introduced in the market as new applications. These types of materials can be made of metals, natural, glass or organic materials. In the past three decades, extensive research on different types of materials has shown that materials can be added to Foot over bridges to improve its durability and physical properties such as

cracking induced by plastic shrinkage, drying shrinkage and thermal gradient on the surface of fresh and mature concrete due to the severe environmental conditions has been marked as one of the several causal factors of deterioration of reinforced concrete in the country. It was found that the use of materials considerably increases the Strength. The compressive strength has increasing by 10% with of fibre than start decrease with increase the fibre quantities.

Design and Estimation of Concrete Girder Bridge on Roads Curves

S.V.V.Prasad (2015)

India had access the reinforced concrete technology from Europe. This technology has been used in the bridge constructions. In this present wall, the analysis and design of concrete girder bridge is done by using standard design details as mentioned in IRC standard super structure components like cantilever slab, interior panel, longitudinal girder and designed for IRC class-AA and class-A, two lane traffic loading . All design parameters confirm to IRC standards. In this we have studied soil, hydrological parameters. We have designed 90m. RCC concrete I Girder Bridge, by manually and by using bridge software also, finally estimates were done for complete bridge structure that in from foundation to super structure.

Design and analysis of pedestrian bridge

Mohammed.Yakub Ali, Gugulothu.Swarna (2016)

This project deals with the design and analysis of pedestrian bridge. In this project we are designing the pedestrian over head

bridge where the traffic exceeds more than 2500 vehicles, for the elimination of conflicts between pedestrians and motor vehicles. As an average hourly traffic of more than 2500 vehicles in front of aurora's engineering college where students and other people cross the road, With this high average hourly traffic value, crossing by foot can not only be challenging, but can be dangerous. With this in mind, this project aims to design and build a pedestrian bridge at the intersection of roads in front of college building. This will eliminate traffic congestion and delay at the highway as well as eliminate conflicts between pedestrians and motor vehicles. We are designing the pedestrian bridge by using staad.pro

Design of a pedestrian bridge crossing over coliseum boulevard Renan_Constantino, Chris Ripke, James Welch (2014)

A major obstacle for pedestrians south of the IPFW campus is Coliseum Boulevard: a main arterial for the city of Fort Wayne which has an average daily traffic (ADT) of 50,000 vehicles a day. With this high of an ADT value, crossing by foot can not only be challenging, but it also can be dangerous. Thus, the civil engineering senior design group has proposed to build a pedestrian bridge over Coliseum Boulevard which would allow for easy, safe travel over this busy roadway. Cohering to the innovative design concepts of both the Willis Family Bridge and the Venderly Family Bridge

TYPES OF PEDESTRIAN BRIDGE:

- Simple Suspension Bridge walls, floor finish etc., as per the provisions
- Clapper Bridge of IS: 875-1987(part I)

which already exist on the campus, the new structure should be designed so that it too can be transformed into a landmark for the IPFW campus as the other two bridges have become.

OBJECTIVES OF THIS PROJECT WORK:

To analyse and design a Pedestrian Bridge over highways road in a metropolitan city.

To design a RCC structure with maximum strength, durability and safety factor.

To make use of a simple and effective design methodology and construction. The design procedure and methodology adopted is to be in conformance to the present methodology being used in the industry.

To analyze the structure using STAAD. Pro for the various loads acting on the structure.

To meet all the requirements of the codal provisions given in the codes, being considered and try to adopt economical sections in the structure.

To make detailed drawings indicating the sections used for the various components.

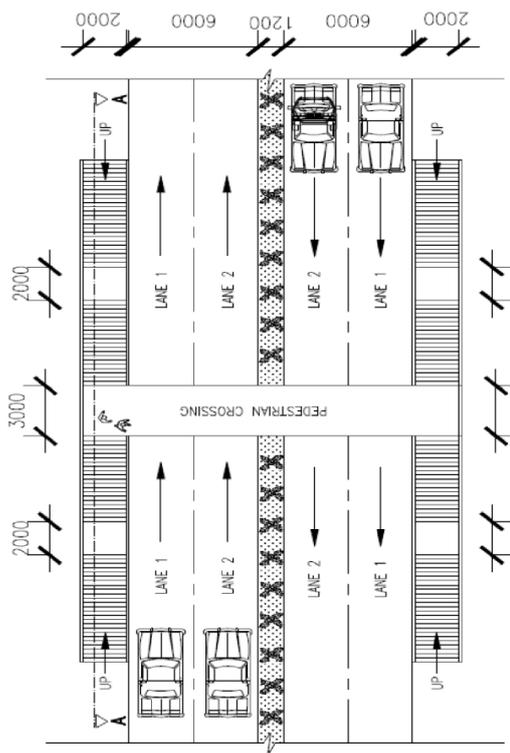
LOADING:

Dead load: Partition wall and other external

- Moon Bridge **Superimposed load:** Uniformly distributed load of 5.00KN/m²
- Step-stone Bridge
- Zig-Zag Bridge 875-1987(part III)
- Plank Bridge

Wind load: As per the provisions of IS:

PLAN VIEW OF PEDESTRIAN BRIDGE:



LOAD COMBINATIONS:

- DL + LL
- DL + WL (+X)
- DL + WL (-X)
- DL + WL (+Z)
- DL + WL (-Z)
- DL + LL + WL (+X)
- DL + LL + WL (-X)
- DL + LL + WL (+Z)
- DL + LL + WL (-Z)

CONCLUSION

- Our project deals with Analysis and design of a pedestrian bridge using STAAD Pro at Chennai.
- The planned pedestrian bridge is modeled in STAAD Pro Various loads & combinations are included in the frame analysis also included lateral loads.

STAAD Pro Various loads & combinations are included in the frame analysis also included lateral loads.

- In this project, the Analysis of frame is done by stiffness matrix method using Staad Pro Software.
- Design of footings, columns, beams, slabs & stair case are done manually by limit state method as per IS456 – 2000, IS 875, and SP16.

REFERENCE

1. Theory of structures
Dhahpat Rai & sons.
-Ramamrutham
2. Design of Reinforced concrete
Tata McGraw Hill
- SN Sinha
3. Design of Reinforced Structure
N. Krishnaraju
4. Indian standard code of practice for Reinforced Concrete
IS: 456 – 2000
5. Design Aids for Reinforced concrete to,
SP: 16-1978
6. Design loads for Reinforced concrete to
IS: 875 – part-I, IS: 875 – part-II
7. Design of cable stayed pedestrian bridge -
t.nelson ponnu durai dr.
p.asha and r.vinoth kumar yang, keun-
hyeok; chung
8. Materials for foot over bridges -
Aishwarya Kulkarni, Priyanka
Kumbhar, Pooja Mandge and Mrs.
Sarita Khot
9. Design and Estimation of Concrete
Girder Bridge on Roads Curves -
S.V.V.Prasad
10. Design and analysis of pedestrian
bridge - Mohammed.Yakub Ali,
Gugulothu.Swarna
11. Design of a pedestrian bridge crossing
over coliseum boulevard - Renan
Constantino, Chris Ripke,
James Welch

