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ANALYSIS AND DESIGN OF COLD FORMED STEEL FOOT OVER BRIDGE

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ABSTRACT :- This paper mainly deals with the design and analysis of foot over bridge using cold formed steel of box section by using STADD pro. A CFS box section foot over bridges are needed to provide separate path for the pedestrians to cross. The main purpose of this paper is to reduce the dead weight of the structure and to avoid accidents between the pedestrians and motor vehicles. As per the survey approximately 1077 vehicles passing per hour in Kondalampatty bye-pass, Salem . Nearby this location colleges, schools are present where students, employees and people crosses the highway frequently. So this paper provides an idea for designing a CFS box section foot over bridge for pedestrian for easy crossing and CFS sections will reduce dead load and provides high strength and durability.

Key words: Foot over bridge, Cold Formed Steel, box section, STADD pro.

1. INTRODUCTION

A foot over bridge is a bridge designed for the pedestrians. Foot over bridges can be used to link the two distinct areas. These are often situated to let pedestrians cross safely without slowing down the vehicles. The foot over bridges are small but important to avoid fatal accidents and traffic congestion, efficiently convey the traffic, ultimately decrease the destination time.

The foot over bridge is been constructed using the cold formed steel. The thin sheets are cold formed steel that their manufacturing process involves forming steel section in a cold state from steel sheets of uniform thickness. The thickness of the steel sheet used in cold formed construction is usually 1 to 3 mm. the yield strength of the steel sheet is at least 280N/mm2. The zinc coatings of 0.04 mm are essential when moisture is present for longer periods. The foot over bridge is constructed using (CFS) because of ease and simplicity of bending operation and comparatively low cost. These been manufactured of unique shapes for special purposes and possible to use thin material shaped for maximum stiffness. The dead weight of the structure is also decreased.

1.1 OBJECTIVES

1. To analyse and to design a foot over bridge using CFS box section in kondalampatty by-pass.
2. To design a safe, economical and simple to assemble foot over bridges for pedestrians.
3. To design the structure with light weight and to achieve maximum strength, durability, and safe factor.
4. To analyse the CFS box section foot over bridge using STAAD pro.
5. To design the CFS box section beams and columns using the codal provisions requirements to adopt the economical section.

1.2 NEED

The increasing of pedestrian traffic on road crossings, junctions and inaccessible road terminals in the cities. It becomes tedious for the pedestrians to cross the road in peak hours. The vehicles are stopped for pedestrian crossing which disturbs the traffic flow. The CFS box section foot over bridges are economical, easy and fast to construct.

1.3 SCOPE

The scope of the project includes preliminary design of CFS box section foot over bridge specific requirements of geometric and structural design were obtained from the general data collected in the form of design and analyses basis note.

The construction of the proposed bridge is at an early stage of development. The development of the scheme shall be undertaken by any kind of bridge and iron companies, NHAI,IRC or any other private firms, which so ever is economic to both the public and the private sectors.

2. LITERATURE REVIEW

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.

T.NelsonPonnuDurai ,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 (selfweight 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.

Mohammed YakubAli and Gugulothu Swarna (2016). This paper deals with the design and analysis of pedestrian bridge. In this project we are designing the pedestrian overhead 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 built 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.

3. FOOT OVER BRIDGE

3.1 LOCATION AND DIMENSIONS OF FOOT OVER BRIDGE

The site chosen for the CFS foot over bridge is kondalampatty by-pass in Salem district Tamil Nadu. The foot over bridge is connecting the four sides of the roads. The dimensions of the CFS box section is 300x300x3 mm where the length of the beam is 10 m, height of the column is 5 m.

3.2 DIMENSIONS OF FOOT OVER BRIDGE

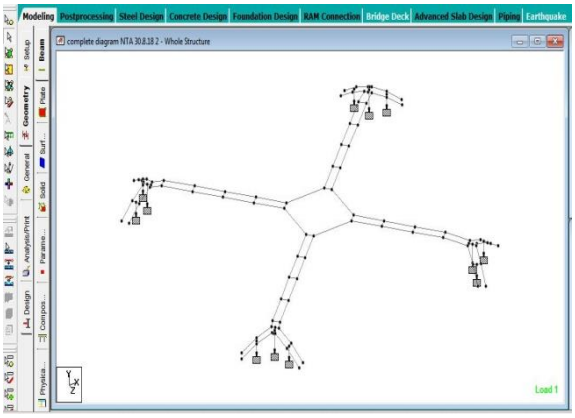

Fig.1 View of foot over Bridge

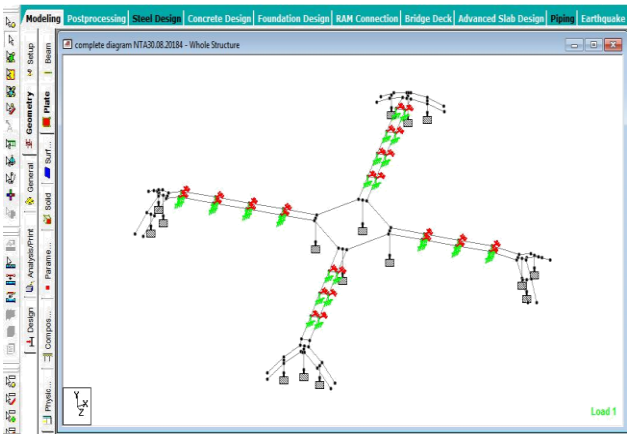

Fig.2 View of foot over bridge with moment resisting fixed butt

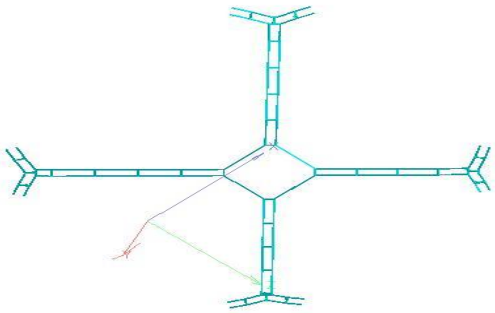

Fig.3 Rendered 2-D view of foot over bridge

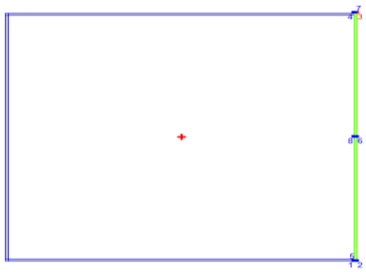

Fig.4 Section wizard creation of box section of size 300x300x3 mm

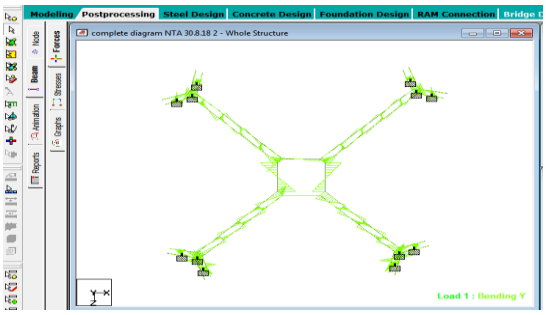

Fig.5 Assigning property to the foot over bridge

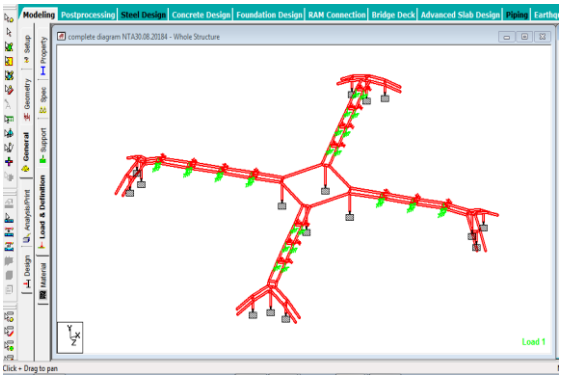

Fig.6 Assigning dead load to the foot over bridge

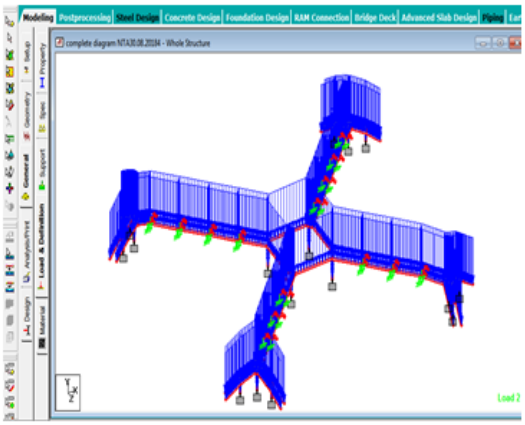

Fig.7 Assigning live load to the foot over bridge

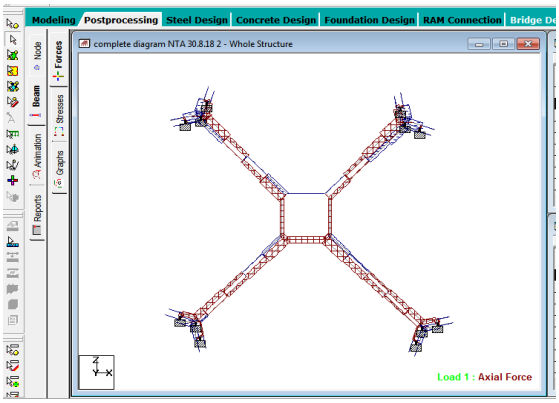

Fig.8 Bending moment of the foot over bridge (3-D view)

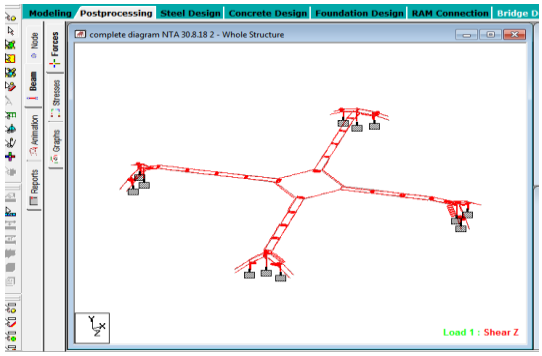

Fig.9 Shear force of the foot over bridge (3-D view)

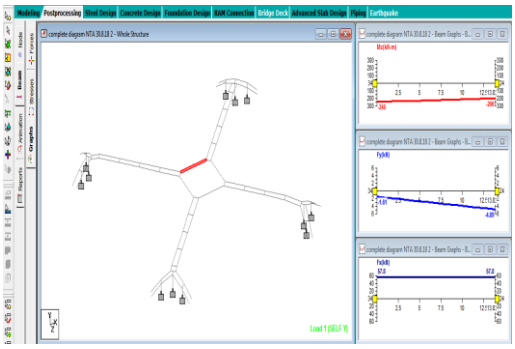

Fig.10 Graph representation of structural beam of the foot over bridge

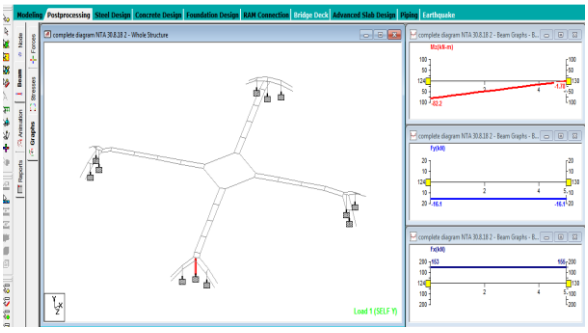

Fig.11 Graph representation of structural column of the foot over bridge

4.METHODOLOGY

1. Study of foot over bridge.

2. Literature Review

3. Identification of need of research.

4. Data collection

5. Planning of foot over Bridge using Auto-cadd.

6. Analysis of foot over bridge with CFS box section using STADD pro v8i.

7. Designing of foot over Bridge using CFS box section.

8. Interpretation of results and conclusion.

5. CONCLUSION

Our paper deals with Analysis and design of a CFS box section foot-over bridge using STAAD Pro at Kondalampatty bye-pass, Salem. The planned CFS foot-over bridge is modeled in STAAD Pro. In this paper, the Analysis of a CFS foot-over bridge is done by Staad Pro. Design of CFS box section beams and columns are done manually Eurocodes EN 1993 (1-8).After computing the results, following important conclusions are draw from the study:

- With increasing different spans the dead load bending moment increases almost square of the span.
- It is also true that bending moment increases in a parabolic manner with increasing span.

REFERENCE

1) 3D Structural Analysis and Design Software – "STAAD.Pro V8i". Bentley.com. Retrieved 2016-07-27.
2) Eurocode 3: Design of steel structures- Part 1.3: General rules- Supplementary rules for cold-formed thin gauge members and sheeting. London.EN 1993-1-3.
3) Design of Cold- formed steel structures by Dan Dubina, ViorelUngureanu, RaffaeleLandolfo.
4) Dan Dubina (2008), 'Structural analysis and design assisted by testing of cold-formed steel structures,' Thin-Walled Structures, Vol 46, pp 741–764.
5) Eskom‟s," Renewable energy experience" presented at village power 98, Oct 6-8, 1998.
6) American Association of State Highway and Transportation Officials.AASHTO LRFD Movable Highway Bridge Design Specifications:2008. Interim Revisions.
7) Washington, DC: American Association of State Highway and Transportation Officials, 2008.
8) "IRC SP 084: 2014". Manual of specification & standards for four lainingof highway through public private partnership (First Revision).
9) "IRC: SP: 56: 2011". Guidelines for Steel Pedestrian Bridge First Revision).Indian Road Congress.
10) IS: 875(Part1): Dead Loads on Buildings and Structures.
11) IS: 875(Part2): Live Loads on Buildings and Structures.
12) Dr.Prem Krishna, Dr.Krishen Kumar. Department of Civil Engineering, Indian Institute of Technology Roorkee. Document No. :: IITK-GSDMAWind02-V5.0. IITK-GSDMA-Wind04-V3.0
13) "Solar panel Angle Calculation". Solar Trading Post LLC.Web. 7 Oct.2009.
14) "Report – design of foot over bridge". University of Toledo, Ohio. 2009 Department of civil engineering.Dr.Jiwan Gupta, Ryan Askins, Chris
15) Beckert.
16) "Design of Pedestrian Bridge crossing over Coliseum Boulevard".
17) Civil Engineering Program-Department of Engineering. Indiana University- Purdue University Fort Wayne. December 11, 2009.

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