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# Need of Composite Foot Bridge & Its Analysis by Software

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**Abstract:- The Steel-concrete composite construction has become increasingly popular because of its speed in construction and economy also. Research has been carried out on composite structures from last decade. Many researchers have carried out research on composite foot bridge for a span of 10m. The paper aims at analyzing a foot bridge of span 24m using STAAD. Pro for the various loads acting on the structure. It is found that reduced selfweight of composite elements has a knock-on effect by reducing the forces in those elements supporting them and the maximum deflection obtained is well within the limit.**

## I. INTRODUCTION

Composite floors using profiled sheet decking have become very popular in the West for high-rise buildings and the foot bridges[1]. Composite roof slabs are generally competitive when the concrete floor needs to be completed quickly and where the average level of fire protection for steel work is sufficient. Bridge projects vary depending on the function of the bridge, the nature of the land on which the bridge is built and anchored, the material used to make it and the funds available to build it[4]. 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.

Steel-concrete composite structures are widespread used in newly constructed bridges and buildings3. A composite member is formed when a steel section, is attached to a concrete material, such as a floor slab or bridge deck2. In a composite beam there is high strength of the concrete in compression and the high strength of the steel in tension6. The fact that each material is used to its maximum advantage makes the composite construction in steel and concrete very efficient and economical. However, the real attraction of this construction is based on having an efficient connection between steel and concrete, and it is this connection that allows a transfer of forces and gives the composite elements their unique behavior.

The study 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 study proposes analysis of composite bridge structure, the span of 24m.

## II. ADVANTAGE OF COMPOSITE CONSTRUCTION

- The most effective realization of steel and concrete is achieved.
- Due to their greater rigidity, composite beams have less deflection than steel beams.
- Keeping the span and loading unchanged, a more economical steel section (in terms of depth and weight) is achievable in composite construction compared with conventional non-composite construction.
- Composite construction is comfortable to “fast-track” construction because of use of rolled steel and pre-fabricated components, rather than case-in-situ concrete.

➢ *Truss Modeling*

In this model composite truss of span 24m is considered.The properties of the composite reinforcement models considered are detailed below.

➢ *DATA*

- *Type of truss- Warren type (pedestrian bridge)*

Span = 24m, Material : steel, concrete, Width of walkway = 4m, Panel length = 3m

Loading :
✓ Dead load :i) self weight ii) slab load iii) floor finish
✓ Live load :i) Pedestrian live load[5]

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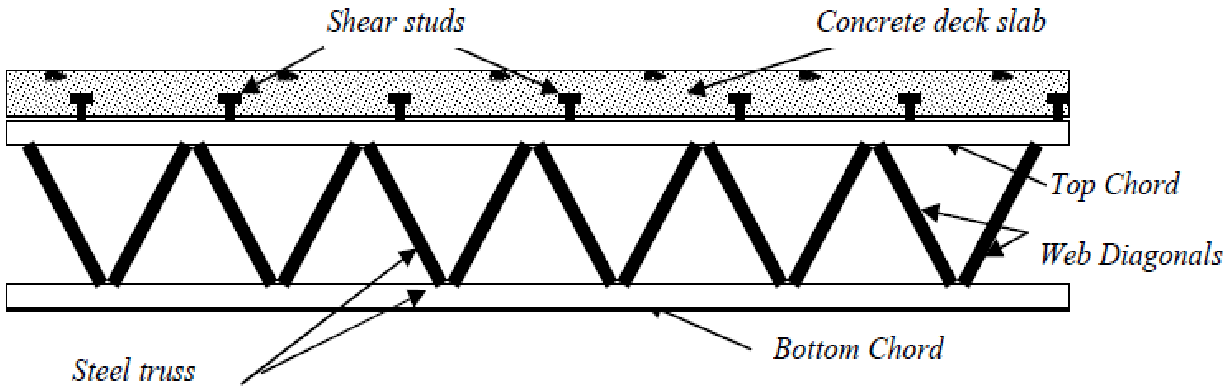


Fig 1:- Geometrical composite truss system

In the above composite truss modelling the top chord is analyze as concrete and other truss member is designed as steel. The support is fixed but type support.On the basis of above data steel-concrete composite truss is analyzed.

The basic idea of designing a composite section is that The coefficient of thermal expansion of concrete and steel is almost the same, which is also the basis for the development of RCC designs. The general analysis procedure consists of the following stage of elastic analysis:

- To determine factored forces resulting from the truss self weight and slab dead load applied to the composite truss.
- To determine factored forces resulting from all superimposed loads applied to the composite truss.

The composite truss is analysed by STAAD-PRO SOFTWARE along with IS-CODE. Moreover STAAD-PRO has a greater advantage as compare to manually calculation as it gives more accurate result than the manual calculation.

## III. FLOW CHART FOR ANALYSIS

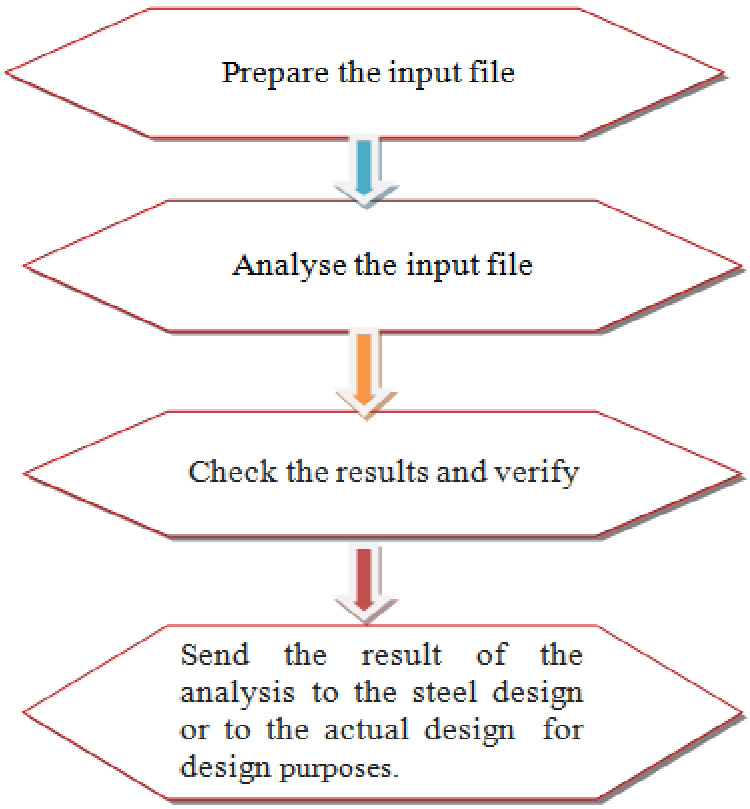


Fig 2:- Flow chart

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## IV. MODELING

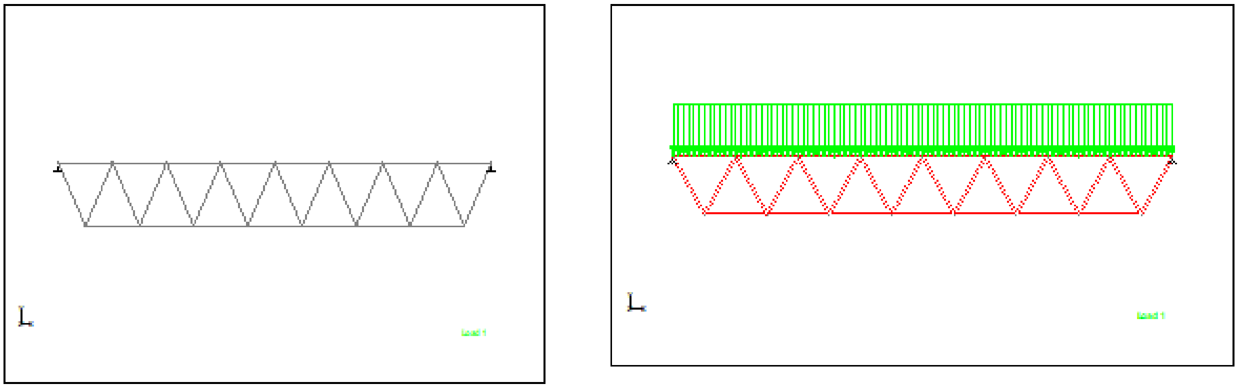

Fig 3:- Dead load acting on the member

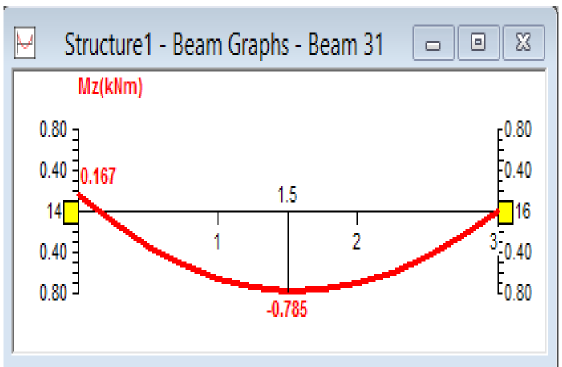


Fig 4:- Beam Graph (Moment) of Beam 31

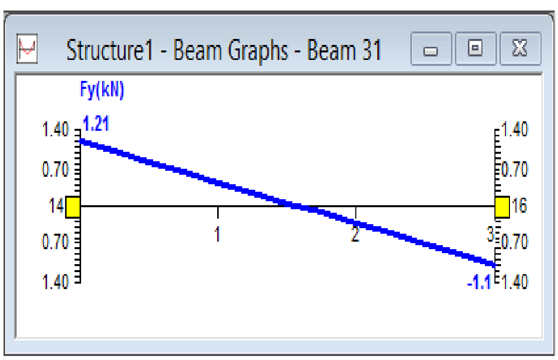


Fig 5:- Shear Force Diagram of Beam 31

## V. CONCLUSIONS

The analysis of the composite truss is carried out and the following conclusions are drawn,

- The analysis depends upon the property of the end sections
- It also depends upon the bottom chord of the truss
- The other sections have the different properties.
- Maximum deflection is found to be 2.789mm at end beam of the truss which satisfy the permissible deflection L/325 that is 8.22mm for end beams.

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