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"EFFECT OF MAXIMUM BENDING MOMENT AND SHEAR FORCE VALUE DUE TO MOVING VEHICLE OVER THE STRUCTURE"

[1]Abhishek Niranjan [2]Rajeev Singh Parihar [3]Abhay Kumar Jha, [4]Barun Kumar, [5]Rajesh Misra

1Research Scholar, 2 Associate Professor, 3Associate Professor, 4Assistant Professor5Assistant Professor
1, 2, 3, 4,5 Department of Civil Engineering, LNCT, Bhopal, Madhya Pradesh, India

Abstract: The planning and analysis of Solid Deck Slab utilising Staad-Pro software are the subjects of the study. This study uses a solid deck slab with an 8.2 m long span, a 0.65 m thickness, and simple support. Using AutoCAD software, the drafting and detailing work was finished, and then "Staad-Pro v8i ss6" was used to finish the entire design process.Manual load analysis is contrasted ideally to software results, and it is decided that Staad-Pro is a suitable instrument that can save a lot of time and produce results that are sufficient. The findings of the analysis in terms of shear, bending moment, axial force, and deflection were checked by STAAD-Pro, which runs through several load combinations, in Part 3 Comparison of Manual Calculation. the highest design moments produced by the fusion of different loading scenarios.

Keywords - **Deck, Shear, Manual, Slab, STAAD-Pro, Combinations.**

I. INTRODUCTION

Bridges is the minor deck bridge. Minor bridges are typically those that are up to 60 metres long. The deck bridge is made of concrete, wooden planks, and consecutive curves of asphalt or another type of pavement. The bridge deck comes in two varieties: either it will be a crucial component of the bridge's framework or it will be supported by steel girders or I-sections. The material utilised to build a bridge's deck or the material that fits within that matter is taken into consideration. Based on the type of material used, some decks are categorised as being made of concrete, wood, reinforced concrete, girders, etc. As everyone is aware, concrete is a material that could fracture from an excessive amount of pressure. Therefore, we can utilise steel instead of concrete to increase the structure's flexibility and provide the concrete deck greater strength. We are able to provide a thick layer of concrete for the highway and a strong steel sheet underneath the load in reinforced concrete decks, as well as steel bars to sustain the tensile and compressive forces.In human history, bridges have always played a significant role. They boost the city' vibrancy, which helps the surrounding communities' cultural, social, and economic development. In times of war, bridges serve as both the nation's lifelines and its skeleton. For cities and their bridges, certain battles have been waged. It is typical for an army's mobility to be impacted by whether or not bridges are accessible during combat. Bridges stand for the hopes and ideals of humanity. Building bridges is an essential component of communication and may play a significant role in the advancement of civilisation. A bridge is a building with a length greater than 6 metres that spans a waterway, depression, road, railroad track, or other obstruction to convey traffic or other moving loads.

II. OBJECTIVES OF THE PRESENT STUDY

To study the effect of load combination applied on structure.

To study the effect of variation in vehicle position along the longitudinal direction of the structure.

Effect of maximum bending moment and shear force value due to moving vehicle over the structure.

This study is to compare analysis of solid deck slab using STAAD Pro and Manual method.

III LITERATURE SURVEY

Kumar and Sudhaman (2017) The structural behaviour is examined in this work using T-beams as a deck slab. The deck slabs are built utilising longitudinal and cross girders and a T-Beam structure. Rational Methods were used to analyse four IRC loadings and three country loadings (AASHTO, British Standard, and Saudi Arabian) (Class-AA, Class-A, Class-B, and Class-70R). The same bridge is also examined as a three-dimensional structure using the STAAD ProV8i programme, which compares all the loadings and procedure details stated previously. The moment and shear forces for each of the aforementioned loads are computed at various locations along the longitudinal and cross girders in the study of bridge girders. Additionally, just the IRC loading has been used to determine the slab's moments. For this project, using an illustration from the literature (Design of Bridges by N. Krishna Raju) would be beneficial. The same is true for graphs and curves.

Gupta et al. (2017) In non-erodible strata or areas with shallow scour depths, it is typically possible to provide shallow foundations. This is also advised when the water level is high or the perennial flow is low. In this study, box-type bridges are supported by modest foundations. It measures 132.98 metres long and is made up of eight precast RCC boxes. Each unit is made up of three cells. A raft formed by the bottom slab of a box unit is 500 millimetres below grade. Due to the raised foundation, a riverbed protection system is supplied both upstream and downstream over the whole length of the bridge. After only two years in usage, the bridge gave way during a downpour. Here I give a justification for why failure happens. The analysis of this bridge shows how crucial it is to examine bridges both before and after monsoons in areas where maintenance is a top priority. The Indian Road Congress has also included their usual guidelines for work on stream bed protection.

Saibabu (2018) The ancient bridge's state is first briefly described, then the reasons for its demolition are explained. A brief summary of the post-tensioned prestressed concrete girder that was replaced by the new (old) bridge's flexural analysis. Figures are used to explain the first stage prestressing of I-girders and the second stage prestressing of composite girders. Proof load tests, which are required by Indian standards, are used to determine the one span of the replacement bridge's weight-carrying capacity with basic supports. With regard to impact issues, sandbags were utilised to fill the bridge up to a certain service load. They tested the I-girders' deflection across and throughout the bridge's span and contrasted it with calculated values. A linear response was seen during the loading and unloading processes. Precast concrete girder bridge spans can be judged to be sufficiently capable of sustaining.

III. DESIGN METHODOLOGY

In this study solid deck slab having 8.2 m long span and the thickness of slab 0.65 m and the slab is simply supported. The bridge analyzes and design by STAAD-Pro under different loading conditions. And also the analysis results in term of shear, bending moment, axial force and deflection were checked by STAAD-Pro which is passes through many different load combinations. The maximum design moments resulting from the combinations of various loading cases.

Table:1-Dimensions of structure

	Type of Member	Dimensions or nos.
1	Slab	8.80m x 12m x 0.65m

IV. STRUCTURAL MODELING

Solid slab bridges are essentially concrete into which internal stresses of the appropriate magnitude and distribution are introduced so that stresses resulting from external loads are counterbalanced to the desired degree. Longitudinally reinforced slab bridges have the simplest superstructure configuration and the polished appearance. This type of solid slab is generally suitable for bridges with a span of up to 15 m. It is studied by using STAAD Pro program to calculate the stresses and to explain the deflection behaviour of a solid slab under variable loads under various loading condition. A RCC structure is primarily composed of slabs and this whole system behave as a one unit and transfer load finally to the footing. Normally the flow of load in the bridge is from superstructure to substructure, substructure to foundation. In the current study we have taken different type of load for different grid size and for this purpose we have utilized the STAAD Pro V8i software. We have used STAAD Pro V8i software to take different types of loads for different grid sizes in the current study. There are three different types of floors: conventional slab, flat slab, and grid slab. Use STAAD Pro's coordinate system or plot over the AUTOCAD drawings, which can be imported into STAAD-Pro as dimensions, including the clear span, the slab thickness, the overall length, and the span center to center (bearing to bearing). The following sketches show the RCC slab superstructure in detail

Step 1: First, assign various attributes to your STAAD Pro project, such as a name, unit, storage location, etc.

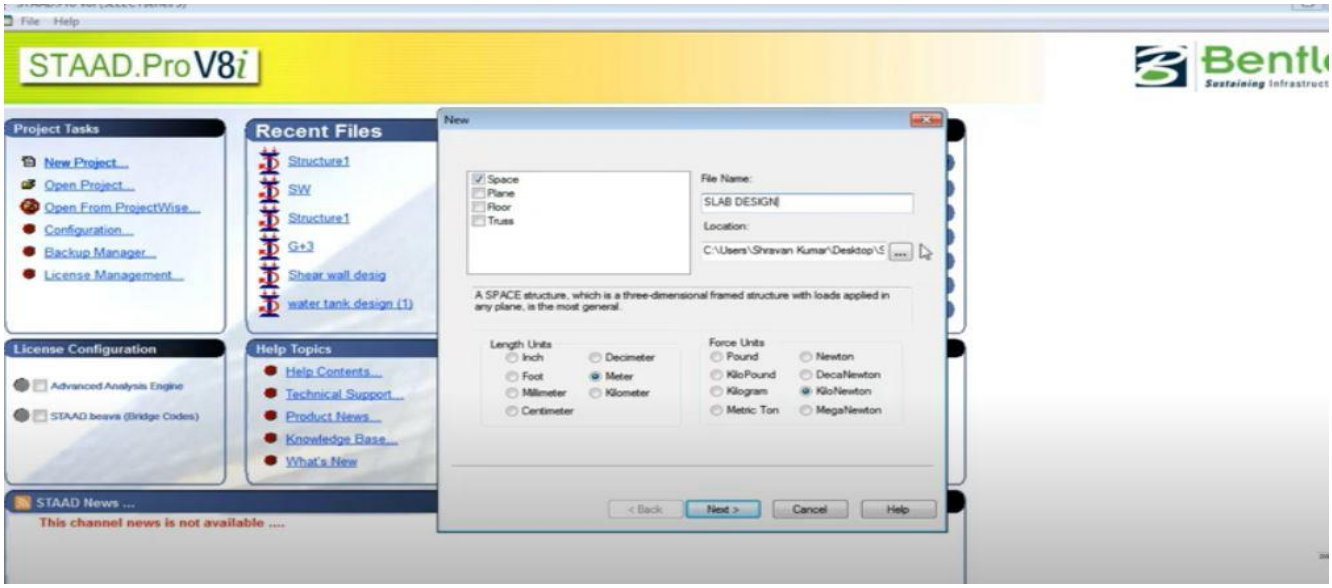

Figure 1 : Setting of units, location in STAAD Pro

V FiguresandTables

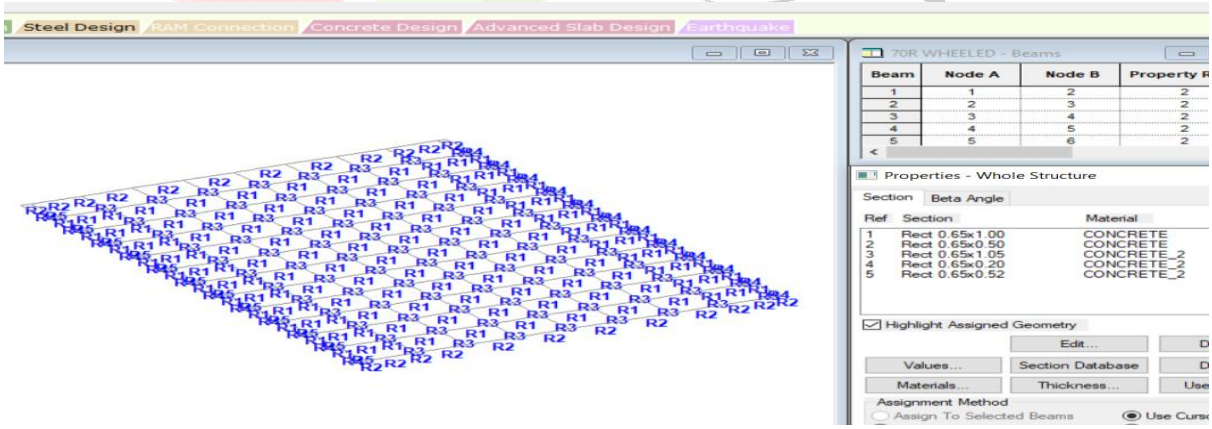

Figure 2: Assign Properties in STAAD Pro

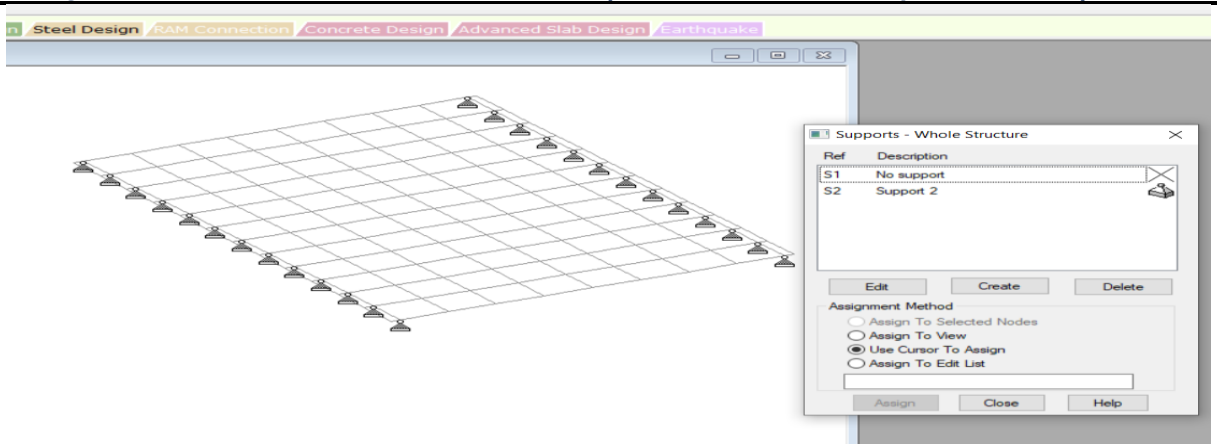

Figure 3: Provide support in STAAD Pro

VI.CONCLUSIONS

In light of the conclusions drawn from the analysis of each solid slab bridge under consideration, we have come to the conclusion that solid slab bridges are the most cost-effective option for all spans. The study reveals that when using the manual method to analyse the RCC slab system, the maximum displacement, maximum force, and maximum bending moment in the x, y, and z directions are minimal. However, when using the Staad Pro method, the maximum displacement, maximum force, and maximum bending moment are discovered to be maximal.It can be inferred from the findings and graphs created for different loading variations that: STAAD is capable of performing the analysis and design of the Deck Slab Bridge in accordance with IRC codes (in this case, IRC 70R loading). Mechanism in relation to STAAD.vi8 is widely known.

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