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RESEARCH ON THE KEY COMPONENTS OF AN ELEVATED METRO BRIDGE

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ABSTRACT:

A city system is a train transportation system with high capacity, regularity, and grade separation from other web traffic in a metropolitan area. To move huge numbers of people, cities, conurbations, and metropolitan areas use the City System. Due to less construction and the fact that it makes metropolitan areas much more accessible without any construction issues, an elevated metro system is the most favoured type of city system. Bridges are the backbones and supporters of the roadway network's improvisation. The bridges maintain the safety of the roads in addition to assisting in smooth internet traffic flow. This is why the bridges fashion has truly grown in relevance. This project primarily focuses on the analysis and design of a raised metro bridge using STAAD Pro and IRC Loading. It features a 4-girder system and a period of 100m X 16m? The approach was taken from the AASHTO basic layout with the intention of checking the results for certain input designs, buildings, and factors. The analysis and design method makes it simple to determine the nodal variation, light beam structure, vehicle loading information, and concrete style.

AASHTO, STAAD pro, City structure, and analysis are search terms.

1. INTRODUCTION:

A metro system is a network of electrical passenger trains that transports people across urban areas with high capacity, frequency, and grade separation from other forms of transportation. Metro systems are used in cities, lots, and other locations to move large numbers of people often. The quality separation permits the city to move more freely, generally at higher rates, and with fewer interruptions. Metro systems are typically found in underground tunnels, elevated viaducts over roads, or buildings that are separated from one another on the ground. A raised metro structure system is more preferred

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since it reduces the need for construction and also makes metropolitan regions more accessible without creating an issue with building and construction. The advantage of an elevated city structure system is that it is considerably more financially feasible and takes much less time to build than a below-ground metro system.

Metro networks

A metro system is a network of electrified passenger trains in a major city. A city system's great capacity and frequency of delivery of people, as well as its superior isolation from other forms of traffic, are its characteristics. The grade separation makes city relocation simple, less disruptive, and also more cost-effective overall. Additionally, there are fewer conflicts between traffic motions on the web, which lowers the amount of collisions and makes it a safer mode of transportation. By putting it in underground passages, elevated above street level, or quality segregated at ground level, grade dividing up for city systems is made aware. A metro system typically combines these three options. One can now find systems using magnetic levitation or monorails in addition to the conventional metro, which runs electric multiple devices on tracks. Variations on typical cities, such as light metros, have emerged by changing the train's capacity, frequency, and distance between terminals. New autonomous systems and also lines have also been made possible by technical advancements. It can be challenging to determine to what type a city system belongs with all these variations. Despite these differences, they all have one thing in common: elevated trains are being used more and more in densely populated places.

Pier and box girder are the two main components of an elevated metro system. Number 1.1 depicts a typical raised city bridge design (a). A city bridge's viaduct or box girder requires piers to support both the terminal structures and each of the bridge's spans.

Fig.1.1. Typical Elevated Metro Bridge.

OBJECTIVE:

The project provides insight into the study and design of a raised metro bridge using STAAD.Pro V8i's IRC Filling 70R.

The version being constructed right now complies with IRC 70R loading, which is appropriate for all roads where long-term bridges and culverts can be built.

Performance of Frameworks is determined by STAAD Pro's analysis and design processes. We can quickly check the security of the framework because the designing done by the software programme saves time on layout.

2. A STUDY OF LITERARY WORKS:

Actually, Khaled et al. (2001, 2002) conducted a thorough literature review on the evaluation of box girder bridges. According to Khaled et al. (2001, 2002), an analysis of the following literary works has been completed and is also available. Shear lag sensations in steel box-girder bridges were investigated by Malcolm and Redwood (1970) and Moffatt and Dowling (1975). Sisodiya et al. (1970) used a set of identical ogramelements to approximate the curved boundaries of the finite elements used to construct bent box-girder bridges. For this approximation to produce an adequate cure, many factors would be required. Particularly for extremely curved box bridges, such an approach is impractical.

Komatsu and Nakai [1] (1966, 1970). given several investigations on the unforced and forced vibration of horizontally bent single, twin, and box-girder bridges using the fundamental equation of motion in addition to Vlahos' thin-walled light beam theory. Field testing on bridges excited by a shaker or a car travelling at various speeds showed reasonable agreement between the theory and hypothetical results.

Chu and Pinjarkar [2] (1971). Proposed a restricted element formulation for rounded box-girder bridges made up of vertical cylindrical shell aspects and straight sector plates. Simply sustained bridges without intermediary diaphragms can use the method. The effect of intermediate diaphragms on warping and distortional concerns was studied using a limited aspect evaluation on steel and concrete box-girder bridges. A component with a beam-like in-plane variation field is advised. The element fits a trapezoid, making it useful for analysing straight, skewed, or curved box-girder bridges with constant depth and dimension.

[3] Scordelis and William both (1972). presented a flexible analysis using quadrilateral elements of mobile structures with consistent depth and approximative geometry in the plane. It was described how to use the finite-strip method to resolve the vibrational natural patterns and mode forms of straight and curved beam-slab or box-girder bridges. used the thin-walled beam of light idea to calculate the natural settings and regularities of a curved, slender, multicellular girder. The suggested method was validated using data from two rounded mobile Plexiglas models that were utilised to study the behaviour of rounded box-girder bridges using the finite-element method for used vibrant tonnes. The proposed method was validated using data from a single-cell Plexiglas version with high curvature.

[4] Bazant and El Nimeiri both (1974).

The issues with the design of bent box beams that result from the disregard of curvilinear borders include the loss of continuity at the end cross sections of two complement pieces that meet at an angle. They used straight components to create a skew-ended finite element with shear deformation, and they used a more precise notion that allows for transverse shear contortions.

[5] Fam in addition to Turkstra (1975), described a four-node plate flexing annular aspect with two straight radial borders for the top and lower flanges and conical aspects for the likely internet members for the fixed as well as free vibration evaluation of box girders with orthogonal limits and approximate mixtures of straight and flat bent sections. performed a finite-element technique for the dynamic analysis of bent multiple box-girder bridges, laying the groundwork for the impact element that AASHTO has since accepted (1980). Two sets of concentrated pressures with components in the radial and transverse directions and moving with constant angular velocities around the circumference of the bridge were used to imitate the truck.

3. RESOURCES AND METHOD.

Hyderabad is a sizable city with a metropolitan area of 6852 sq. km. and a community company area of 625 sq. km. It is quickly establishing itself as the hub of the IT, biotech, Parma, and tourism industries. It is an appealing site for corporate, business owners, academicians, and homeowners alike due to its strategic geographical location, multilingual and also international society, great growth potential, and investment-friendly financial plan. Hyderabad's transportation system is constantly under pressure from the growing demands of the city's expanding population. An effective system that is reliable, comfortable, affordable, and sustainable is urgently needed. Currently 8 million strong, it is expected to reach 13.64 million people by 2021. Currently, with an addition of 0.20 million vehicles yearly, Hyderabad's roads are used by over 2.8 million

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customised lorries. Approximately 3.36 million or 42% of the 8 million automated journeys conducted each day—i.e., the buses and local trains—are made by the mass transport system (PTS). That implies that the remaining trips are taken in individual vehicles, which would result in severe traffic jams, high levels of contaminant exposure, and an increase in fuel usage.

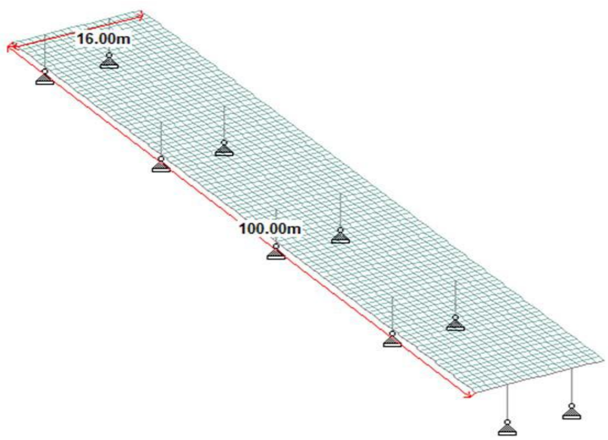

Fig.3.1. Staad pro model.

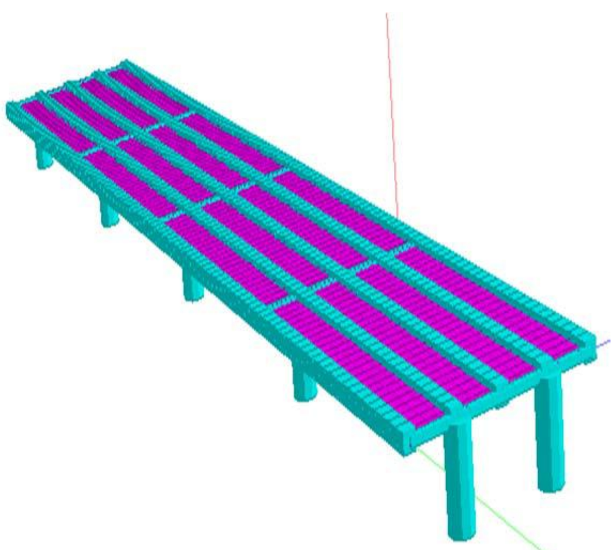

Fig.3.2. 3D Rendering View.

STAAD Pro V8i is used to analyse the output data for the IRC Class 70R bogie loadings, which includes nodal variation, nodal variation recap, beam of light forces, light beam end displacements, light beam end displacement summary, responses, reaction summaries, axial forces, light beam moments, live lots effect, and many more. Due to the size of the data result tables and the inability to explain them all in this project, a glimpse of the outcome lead to the tabular forms is provided below.

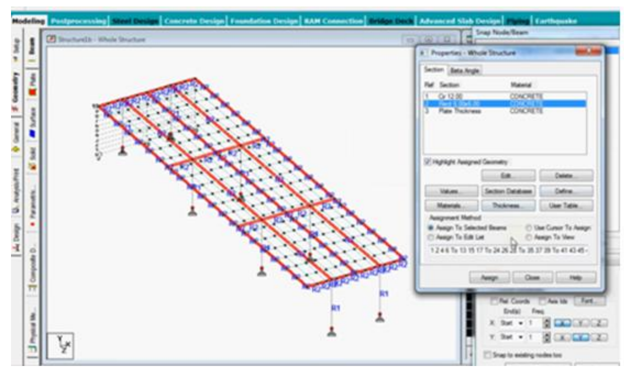

Fig.3.3. Whole structure.

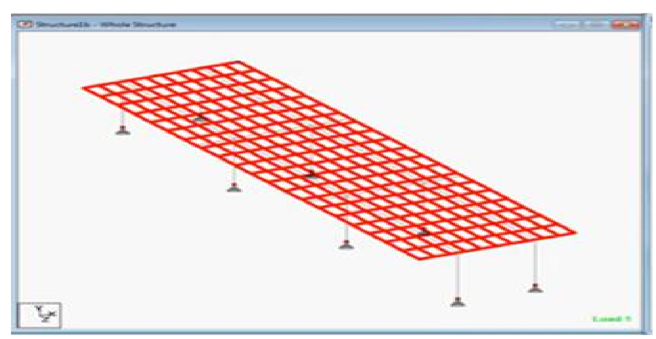

Fig.3.4. Load impact of the hole structure.

CONCLUSION

1. STAAD can easily evaluate and construct the elevated Metro Bridge in accordance with IRC

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regulations (in this case, IRC 70R filling). The STAAD.beava. system is well understood.

2. Node 1529 has the best resulting nodal displacement: -.287 mm in x, -51.203 mm in y, and -.015 mm in x.

3. For light beam 1930 and node 1529, the maximum resultant beam of light end displacement is 51.204.

4. For axial, shear, and flexing forces, the maximum and minimum values for beam of light maximum forces by area residential or commercial property are determined.

5. The impact of upright loading for six traffic lanes can be determined by looking at the width, front clearance, back clearance, number of axles, position in x, setting in y, and alignment. The range of placement is 0 to 1.5708

6. The concrete design for element 61 provides 0.540 and 0.545 for the top and bottom longitudinal supports, respectively. For part 61, the top and bottom transverse supports are 0.540 and 0.780 respectively. Similar lessons can be learned for other aspects.

7. It is essential for today's designers, developers, and researchers to effectively consider the goals of each high-quality style and the restoration of the environment that all of us live in. To ensure that it meets the needs of the beneficiaries, software application evolution must be employed properly.

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