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DESIGN AND ANALYSIS OF STEEL BRIDGE BY USING STAAD PRO

G. JANARDHAN REDDY 1, A. RANJITH KUMAR 2, CH. SRISANIDH 3, G. VASANTH KUMAR 4,

S. SAIVARDHAN 5

1 Assistant Professor, Department of Civil Engineering, Guru Nanak Institute of Technology, Hyderabad
2,3,4,5 UG Scholar, Department of Civil Engineering, Guru Nanak Institute of Technology, Hyderabad

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Abstract – *Steel and steel-concrete composite bridges are commonly used all over the world, owing to the fact that they combine both magnificent aesthetic appearance and efficient structural competence. Their construction in a country not only resembles the vision and inspiration of their architects but also represents the country's existing development and dream of a better future. Compared to traditional reinforced concrete (RC) bridges, steel bridges offer many advantages, comprising high strength-to-self weight ratio, speed of construction, flexibility of construction, flexibility to modify, repair and recycle, durability, and artistic appearance. The high strength-to-self weight ratio of steel bridges minimizes dead loads of the bridges, which is particularly beneficial in poor ground conditions. Also, the high strength to self-weight ratio of steel bridges makes it easy to transport, handle, and erect the bridge components. Furthermore, high strength-to-self weight ratio of steel bridges permits the erection of large components, and in special circumstances, complete bridges may be installed in quite short periods. The bridge components can be sized to suit access restrictions at the site, and once erected, the steel girders provide a platform for subsequent operations.*

INTRODUCTION

In reviewing (and choosing) the methods listed below, keep in mind the value of performing independent verification analyses. As a general rule, it is good practice to perform some kind of simplified verification of the results of more complex analysis models by means of simpler analysis models or hand calculation, or both. Though this may sometimes seem to be easier said than done (due to the level of complexity of the structure), nonetheless, these types of checks are extremely valuable in that they allow the designer an opportunity to better understand the anticipated behavior of the structure and a method to validate the correctness of the more complicated analysis. It is also very advisable for designers to perform a number of simple check calculations directly based on the analysis results. For instance, when performing a 3D finite element method (FEM) analysis, the designer should check that the summation of dead load reactions equals the summation of the applied dead loads, and that the distribution of dead load reactions among the various support points matches the anticipated internal load distribution in the structure. 4 1.1 Hand Analysis Methods 1.1.1 Beam Charts There are a number of standard beam design charts and other design aids which can be of use to the designer. For example, the AISC Manual includes a table of beam shear, moment, deflection, and reaction graphs and formulas for the cases of uniform load and point load. While these patterns of loading are typically too simplified to be of direct benefit to the practicing bridge engineer, these design aids can still serve a valuable purpose by providing a handy resource for finding approximate analysis methods for use in preliminary design or in the checking of more complicated analyses. 1.1.2 Line Girder Analysis Method The line girder analysis method uses load distribution factors to isolate a single girder from the rest of the superstructure system and evaluates that girder individually. The load distribution factors can be simply determined by some approximate formulae for both straight bridges (7) and curved bridges (63, 92). 1.1.3 V-LOAD Method The V-LOAD method (71, 80) is a widely used approximate method for analyzing horizontally curved I-girder bridges. The method assumes that the internal torsional load on the bridge—— RESULTING solely from the curvature——is resisted by self-equilibrating sets of shear responses (Referred to as secondary) between adjacent girders. The final response in the curved girder is the sum of the secondary response and the respective straight girder primary response. 1.1.4 M/R-Load Method The M/R Method (78) is a method for analyzing horizontally curved steel box girders. This method, similar to the V-LOAD method, is based on the principles of statics and can be used to estimate the torsional load and associated twist deformations in a curved box girder

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CONCLUSION:

The following summary statements regarding structural characteristics for metal truss bridges, key periods of significance for metal truss bridges in Maryland, and the earliest known documented examples of metal truss bridges in the state are based solely on documentary research. Metal truss bridges comprise two parallel trusses and a floor system supported on a concrete or masonry substructure. Each metal truss consists of individual components connected in a series of triangles. The particular type of metal truss bridge is defined by the arrangement of individual members, and the way in which those members are stressed (compression or tension); a wide variety of configurations is possible, many of which were proprietary, or patented variants, such as the commonly known Pratt and Warren types. Individual members form the horizontal portions of the truss, called top and bottom chords, and the vertical and diagonal web members. The verticals and diagonals are connected to the top and bottom chords at joints (pin connections or rivet connections are possible). Minor web components may include sub-struts or sub-ties. Members may be in tension or compression, depending on the variety of truss. Other basic components include the portal, stringers, floor beams, and deck. Portal bracing provides lateral bracing for the two parallel trusses at the top of the end posts. Stringers are longitudinal members which transmit loads to the floor beams, which in turn transmit loads to the trusses at each panel point (joint connection) where the floor beams, the chord, and the verticals and diagonals are connected.

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