Comparative Study of Road Sign Gantries With Different Structural Arrangement

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Abstract- *The objective of the study is to presents the simultaneous cost, weight and standard cross-section optimizationation of road sign gantry.*

These provisions differ considerably from those in previous editions of the specifications, and have remained relatively unchanged in the 2009 edition.The impact of the fatigue criteria on the design of overhead sign structures has not been fully evaluated. The fatigue design loads do not adequately reflect the stresses generated on these structures from wind-induced fatigue loading.

This research follows two consecutive steps: the first one aims at developing an optimized procedure of preliminary designs forroad sign gantry the second one focuses on the study of wind action on these structures.

I. INTRODUCTION

The American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals has been revised in its entirety through a major research project conducted under the auspices of the National Cooperative Highway Research Program . A major part of the revision included updated provisions and criteria for extreme wind loads and new provisions and criteria on fatigue design.These provisions differ considerably from those in previous editions of the specifications, and have remained relatively unchanged in the 2009 edition.The impact of the fatigue criteria on the design of overhead sign structures has not been fully evaluated. The fatigue design loads do not adequately reflect the stresses generated on these structures from wind-induced fatigue loading. In addition, the provisions do not account for the variety of support structures in design, each with different configuration, sizes, shapes, and material properties that influence vibration behavior. As a result, the vulnerability of sign support structures to wind-induced fatigue loading is not fully realized.

II. LITERATURE REVIEW

Jennifer Kacin , Piervincenzo Rizzo (2015) studied This paper presents the results of a methodology aimed at determining the fatigue life of critical structural members in overhead sign structures. Particularly, a four-chord box truss Deployed in the State of Pennsylvania ,was studied. The structure was modeled using the finite element program ANSYS, and a dynamic structural analysis was conducted to evaluate the effect of natural wind on the fatigue life of five critical elements of the truss.

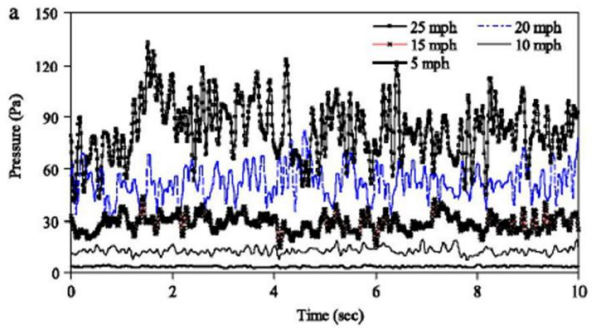


Fig. : Wind pressur applied to sign board

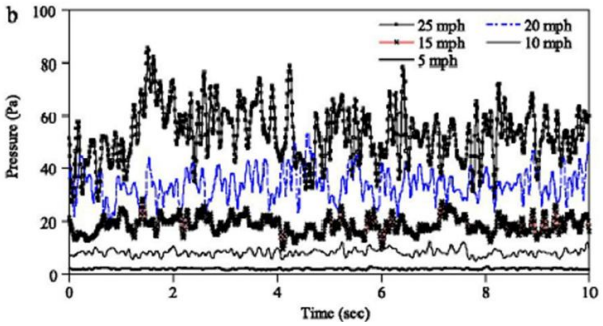


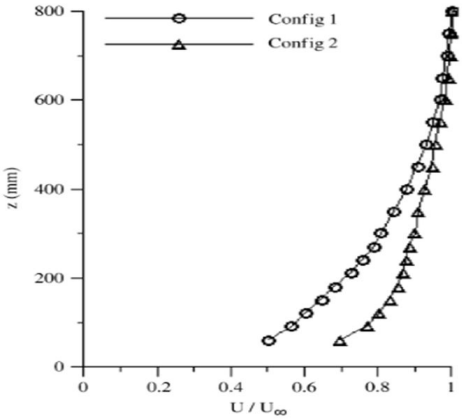
Fig : Wind Pressure Applied To Truss

The data from the Pittsburgh International Airport were considered Sign structures stand along highways and roadways to guide motorists to their destination. Such structures are repeatedly subjected to natural wind load and gusts from vehicles passing underneath. Over time, the members within the structure may begin to succumb to fatigue due to cyclical loading.

Guiron Shirley Dyke, Ayhan Irfanoglu(2012)has studied "the previously developed ASH flexibility-based method was extended to detect damage occurring in sign support truss structures. The pseudo ASH flexibility-based
damage detection approach was developed to address thebchallenges of damage detection in practical applications. Experimental tests were conducted on a full-scale sign support truss structure to validate the proposed approach. Realistic damage scenarios were considered: bolts on the connection plates were loosened and a cut was made through the weld of one diagonal member. In these tests, only a small number of sensors were available; the truss was assumed to be excited by ambient excitation; only measured structural responses were used for damage detection. Experimental results demonstrated that the proposed approach could accurately locate damage at bay level with a few sensors and without measuring the excitation. This result was successfully demonstrated for both single and multiple damage scenarios. Field testing will be further conducted to demonstrate and examine the effectiveness of the proposed approach. In addition, a full three-dimensional examination of the behavior of the truss will be performed in the laboratory with a more extensive set of sensors and additional damage cases. Because the effectiveness of the proposed approach depends on the identification accuracy of modal parameters, appropriate excitation acting on the structures and accurate measurement of structural responses are required. In the field, tests will be conducted using realistic ambient excitations and responses, facilitating validation of this approach.

Ennifer A. Rice,Douglas A. Foutch, James M. LaFave (2014) has studied This Paper Presents the Using a combined analytical and full-scale experimental approach, four representative IDOT sign trusses have been evaluated to assess their AASHTO design load capacity and fatigue resistance. The experimental aspect of the study utilized a variety of instrumentation to capture the structural response (including damping) of the trusses under manual excitation, wind loading, and truck gust excitation. Analytical models were created for each of the trusses and adjusted based on experimental results to most accuratelyrepresent the truss behaviour.

Carlo, Marcello, Giuliano Augusti(2015) In this paper, the wind action on a frame-type signboard either free standing or embedded in an urban canopy layer has been studied experimentally. Only the mean values of the pressure field acting on the signboard have been considered. Consequently, only he mean values of the aerodynamic coefficientsCp andCf have been investigated and compared with Code and other experimental values. This research has not dealt with the ''peak'' coefficients that are necessary to establish the design values. Although further research is necessary, the results of the illustrated tests already allow the following preliminary indications:



III. STUDY AREA

- Design of any structure require to check number of criteria road sign gantries has so many designs.
- In this report I have work on to find out criteria for optimized design of road sign gantries.
- Any ganrty structure design has process to calculate loads working on it.

IV. CONCLUSION

Followings are the major conclusion of the study

1. In this paper, after the study of different literature review by using proper selection of material truss gantry can be economical..
2. Methodology of SP:38 should be reviewed with IS:875 in relative to wind load criteria.
3. When large area should be covered and large unsupported length can be assigned with tubular section which will be find overall economy. The tubular steel section are structurally more efficient than conventional section because its resistance of torsional is very high and high strength to weight ratio. So main aim of the study Analysis of optimized design road sign gantry ranging from 20 mtrs to 45 mtrs with help of Staad-Pro.

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