

An Exploratory Study of the Impact and Construction of Billboards and Signage Structures

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ABSTRACT

Many typhoons struck the Philippines and damaged the billboard structures and signage structures. These structures are currently designed with dynamic wind effects neglected, although the National Structural Code of the Philippines (NSCP) code requires or to use a flexible-structure Gust Effect Factor (GEF), for structures with such aspect ratios. This flexible-structure GEF should be appropriate for the structure and compatible with the NSCP. This is a new requirement in the current NSCP that was not included in the previous NSCP and earlier versions use a rigid design. This study aims to propose structural analysis and design of latticed billboard structures and closed signage structures to be able to promote and encourage joint undertaking among the academe in the conduct of wind modeling researches and testing for the Philippines

1. INTRODUCTION

An outdoor advertising sign in the form of a billboard consists of light a structural steel wide flange (WF) and angular members so interconnected with each other forming a series of triangles and quadrilaterals. They are either welded or bolted together to form the desired structure. Modern billboards conform to engineering standards and are constructed of steel, while older billboard structures are made of wood or angle iron frames. A billboard may be smaller than the permitted size. This allows for the addition of a cutout or extension within the square foot envelope of the permitted area. Signage structures are normally single-post or double-post structures made either of closed or boxed structural steel sections. Due to the very light material construction and competitive cost, structural steel WF and angular sections are the logical favorites of billboard structures and signage structure owners are those of reinforced concrete structures. Because of its higher costs and the requirement of different construction skills and equipment, aluminum sections

are not common in billboard construction in the Philippines. The Department of Public Works and Highways made an inventory of billboards damaged and affected by every year typhoon in the Philippines. Most of the tragic and well publicized billboard occurred in Metro Manila. The need for maintenance and design review may be considered by other sectors in the billboard industry as unimportant. By including these two points as vital in the consideration of the overall planning and implementation of billboard and other signage structure, the researcher will be able to address the objective of this manuscript. Why did we conclude that maintenance and design review were considered unimportant by some sectors of the billboard industry? This conclusion came basically from members made by practising structural engineers, construction engineers, building officials, municipal/city engineers and the public in general. Whether these observations are correct or not, people in the industry has to prove the skeptics wrong. Billboards are "erect and forget" type of structures (ASEP, 2001). It is a common impression that billboard structures receive the mandatory primer and finish painting only before erection, and paint touch-up of welded joints after erection. The repainting is not normally done on regular basis arrest corrosion that will cause the deterioration of the structure. Some billboards were "designed" by inexperienced structural engineers or in some instances by the structure fabricators themselves, based on previous experiences, and signed by civil engineers willing to risk their profession and integrity for a few thousand pesos. The use of non-standard materials for billboard is rampant. This is also a serious problem that need to be addressed. It is common knowledge that some local steel manufacturers are still producing angular sections with lower strength, i.e., A-7 steel ($f_y=33000$ psi), and are being used by fabricators, with the obvious reasons of meeting deadlines and reducing the costs.

The minimum specification shall be A-36 ($f_y=3600$ psi). A lot of undersized angles are also being used without the knowledge of the designer (ASEP, 2001). The use of common machine bolts instead of high strength bolts, e.g., A-325, A-449, A-490 is also a practise. Moreover, the non-use of proper joint connections for billboard is also observed. The use of gusset plates, proper sizes and lengths of welds for joints is also a common practise. Sometime, no gusset plates are used at all. The use of single angles for long members, and the use of double angles, instead of wide flanged sections, for major vertical members may be indications of an inadequate design of structure. Non-traditional construction practices are prevalent in the industry, like the use of acetylene torches in cutting sections or providing holes for erection bolts, instead of using the proper tools (Armijos, 2008). It is also a common observation that foundations are inadequate and were deisgned without the use of the correct soil bearing properties taken from the recommendation of a soils or foundation engineer through a site geotechnical investigation. This situation is made worse by the use of inadequate base plates, or the non-use of non-shrink grout, base plate andf anchor bolts. Actual collapsed billboard structures were observed with pulled-out vertical members without any base plates or anchor bolts, sometimes with a lump of concrete that passed as concrete pedestals. It is also common to hear comments from people in the industry that billboards and other signage structures can be designed using "reduced" wind loads, since it is a common practise to roll-up the tarpulin before a typhoon comes to relieve the structure of excessive stresses. Billboard structures msut be designed using the National Structural Code of the Philippines. This study aims to design billboard and signage structures that will not cause any adverse traffic hazard to motorists, cyclists and pedestrians and achieves a high level of quality in terms of its strength as barriers to natural disasters such as typhoons and earthquake. The design should be in accordance to the design of buildings and streetscape character of a particular locality.

2. CONCLUSIONS

In these trying times, most billboards operators in the Philippines feel that the future of the industry has become bleak This is just the growing pains of the industry which shall soon establish itself as force in advertising media. Philippine Congress deliberates on

various drafted house bills in relation to billboards. Through some issues involve zoning, content and even in the environment, the question of size limitation is a substantial concern which the industry must resolve. In the course of these Congress hearings, the following principles should be given emphasis. (a) Every roadway in the country is unique. The limitation of size reduces the effectively of the medium. The sizes should be dependent on the geographical and architectural landscape of each city or region. (b) In formulating, amending and implementing legislation on billboard sizes, the sectors which are directly affected should be involved in the deliberation, billboard operators, advertising agencies, government units, property owners and the advertisers themselves. (c) The expertise of engineers and architects should be given proper due. They should be empowered in exploring their technical creativity in which size is not a controlling factor.

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