Bridge analysis

Entertainment, Movie

The overall goal in completing this project of bridge analyses was to come up with a framework or model of a bridge that is structured in order to meet supreme standards of practicable performance and fortitude. In realizing this goal, in depth research was completed analyzing preceding bridge contests in order to determine which style of bridge withstood numerous tests and has exhibited the best results in terms of its achieving quality of standards.

The results of the research study and bridge analysis revealed that the W-shape style of bridge is the most stable and highly favorable model or structure, considering concepts regarding the true truss formation. The design of the W-shape truss enables the walls of the test jig to endure the bridge’s load. Summary Several tests were conducted in order to finalize the design of the W-shape style, including the integration of matching members of the same dimensions, and subsequently the use of three trusses. However, both tests failed the standards set regarding member sizes and considerations of geometrical dimensions.

In the end, the most favorable conditions were exhibited by the W-shape style designed with two trusses. The Performance Rating and the weight of Load atFailurewere obtained from comprehensive analysis of bridges in preceding contests. The former was utilized in order to come up with rough calculations predicting what the Load at Failure will be, while the latter was concluded based on factual evidences that prove how the Performance Rating of the bridge is influenced by the dimensions and figures of the members.

The Performance Rating is adjusted by keeping in mind that cross-sectional areas should be proportional to the load to be carried. Interpretations

Several trials were conducted in order to test the influence of the main compression members and the member cross-sections to the stability of the bridge. The first trial instituted a bridge design with two main compression members and a cross-sectional area with dimensions equal to 8x20 mm. Three brace supports were integrated into the design.

The results of the first trial have revealed how the number of brace supports influenced the internal forces acting on the main compression members. To determine how the stability of the bridge is to be maintained while decreasing the load or weight, the reduction of the number of cross-sectional area of the main compression members was conducted. The second trial integrated the addition of bracing members, which changed the displacement values and axial compression on the main compression members.

After several trials, putting into consideration the dimensions and figures of the main compression members, the number of brace supports, and the dimensions of the cross-sectional areas in order to decrease the internal forces acting on the main compression members, the reduction of displacement values and axial compression acting on the main compression members, the decrease of the load or weight, and the sustenance of stability and fortitude of the bridge, the final design constituted main compression members with cross-sections of dimensions that are equal to 8 x 20 mm up to 6 x 10 mm.

Conclusion Information obtained from in depth analysis of the results, the final dimensions and structure of the W-bridge, the results of the calculations that will be found at the end of this text utilizing the S-Frame, the bridge is

able to withstand increased weight of load in contrast to the results of the calculations obtained through the S-Frame framework.

Discrepancies between the result of the trials and calculations, the ideal structure of the bridge, and the actual structure of the bridge, were caused by the inability to follow the supposed dimensions of the members and the location of the forces that are intended to act on the members. The actual design of the bridge, slightly differing from the ideal dimensions and specifications presented on the first table are illustrated below. Estimated Weight of the Bridge 1 stick – approximately 1 g. 35g.

– support 8g. – cross bracing 18g – angled bracings & centre brace 35g – side tension members 85 g – main compression members SUM: 181g (sticks) Weight of Glue Used: approximately 20g or more Weight of Sticks and Glue Combined: approximately 201g or more Estimated Performance Rating & Load Failure Weight of Bridge 201 g. or 0. 443 lbs. Load at Failure 1672 lbs. or 7. 5 KN Performance Rating 3800 lbs/lb Performance Rating = Load at Failure (lbs) = 1672 lbs. = 3774 lbs. Weight of Bridge (lbs) 0. 443 lbs.