

NHM Truss Bridge

(Nick's Home Made Truss Bridge)



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11/17/2012

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Abstract

The NHM (Nick's Home Made) Truss Bridge is a model that was drafted using AutoCAD, implemented using two species of wood and is not an actual existing bridge. The design comes from characteristic of a Truss bridge, and has been altered to be a unique bridge. Pre-construction material stress tests were carried out and a final structure strength test was implemented.



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Figure 1.....page 3 is a picture of the NHM Truss Bridge in action.

Figure 2.....page 4 is a screen shot of the original draft of the NHM Truss Bridge.



Objective

The goal of this project is to build a physical model of a bridge or structure. The NHM Truss Bridge is a small scale idea of a Truss bridge. A Truss bridge is supported by a complex system of beams, adding structural support. When downward force is applied from crossing traffic, the truss system limits the flex in the material. To achieve this objective ideas were drafted in AutoCAD, material pre-stress tests were applied, and through the modeling process changes were made. The final outcome is a life-like model of the NHM (Nick's Home Made) Truss bridge (see Figure 1).



Figure 1 NHM Truss Bridge concept picture.

Discussion

The design process began by drawing some ideas in AutoCAD (see figure 2). After the frame was drafted and the trusses began to form lumber was added according to stress caused by nature. After the draft satisfied the designer's needs, the project moved to physical modeling.

Building the model proved that drafting the idea is just one part of design. In construction, design flaws became obvious, and changes were made. For example, in drafting, large spaces in the truss resulted in failure of the truss system at 50 pounds when applied to the top of the structure. Therefore, two horizontal braces and four vertical braces were added resulting in no failure even at 100 pounds.

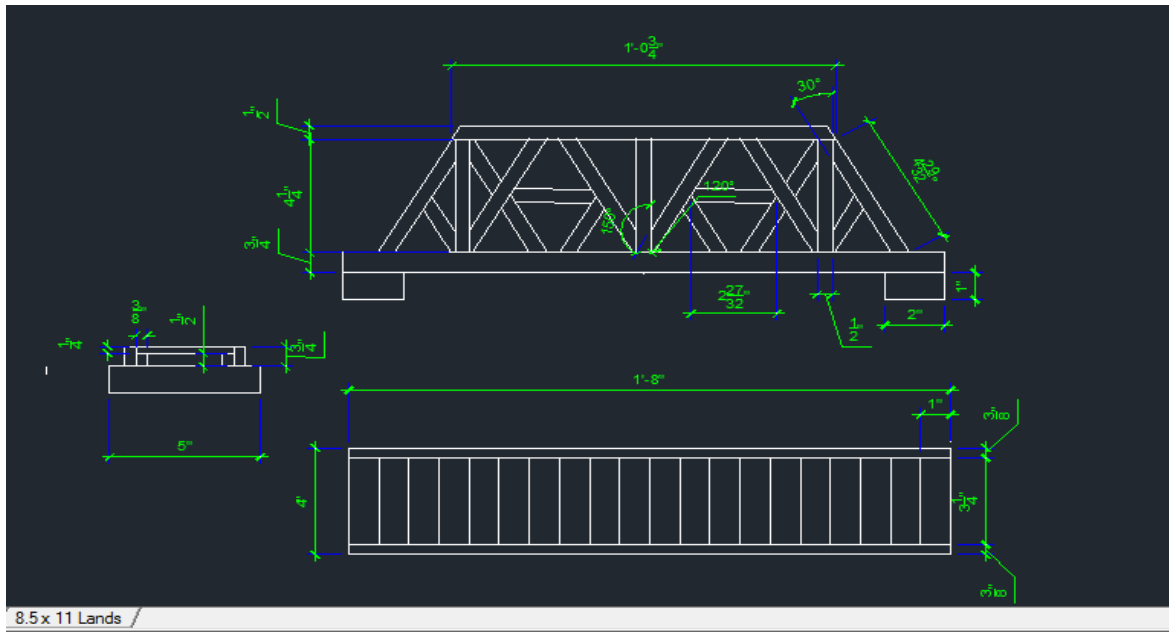


Figure 2: AutoCAD NHM Truss bridge original design.

The NHM Truss bridge model is constructed of two species of wood. The deck is cherry and the frame is pine. In order to produce the one-quarter inch pine planks, strips were cut from 2x4's on a table saw. The deck is custom made molding produced by Specialized Cabinets LLC.

Problems again appeared when attaching each piece together. The truss system is generally strapped to each other to bind them. In the NHM Truss Bridge module wood glue was the only choice, nails curved or went all the way through or was too long and hung out of the structure. The final module is 18" long, 5" wide, and 8" tall.

Conclusion

The project took about 20 hours including drafting, building the bridge, finish painting, and taking pictures. The designer is confident in the model and is satisfied with all changes made throughout the project. The final result is the NHM Truss Bridge model, which seems it could be reality. The NHM Truss Bridge if properly anchored to each bank would make for a reasonable walkway over a small river. The project was a

great learning experience in selecting the proper material and testing. The bridge is just a model and for any idea to become reality hundreds of research development hours are important.

Recommendations

Pre-construction stress tests helped selecting the best lumber for the bridge. The stress test was applied to one foot sections by twisting the lumber. Stress was applied by flexing the material to almost failure and then stressed in the opposing direction. It is very important to allocate the strongest material with in the limitation of the project. On large scale projects it is also imperative to seek review of any final construction projects that may harm or kill innocent people.

Finally, when using glue allow for proper drying time. Wood glue takes several hours to cure and clamping each section is a must. However, superglue and an accelerator will dry instantly, allowing for faster truss construction. Furthermore, in order for each truss to be mirror images it is important to create a template to build each section to.

References

N/A

Bibliography

N/A

Sample Calculations

Crude structural tests were implemented, the bridge was placed on a household scale and pressure was applied up to 100 pounds. The original design failed at 50 pounds, but the current structure remained in tacked at 100 pounds. However, actual strength remains unknown and further tests are possible.

