HOW TO BUILD A TOOTHPICK BRIDGE

BEFORE YOU START

The procedure provided in this document is only one of many ways to build a bridge out of toothpicks. There are plenty of videos and resources on the Internet to learn about how to build one. We encourage you to use this as a learning opportunity to do some research and learn about engineering and bridges!

Engineering is often times done using a trial and error process and designs improve over time as you learn from experience. As you build your bridge and test it, see how the bridge behaves and note down what can be done to improve it. Implement these in your next design and work towards a better and better design. Focus on getting a feel for the structures' behavior, step by step improvement and the process of learning over getting it right the first time!

WHAT YOU WILL NEED

1. Toothpicks
2. Six copies of the template provided in the last page (This is optional)
3. Adhesive Tape
4. Glue - You can use your glue of choice but we have used wood glue here
5. Parchment Paper
6. White board Marker or Highlighter

STEP 1

The first 4 steps are to create a template for design. The template provided in the last page is optional. You can create your own template with different shapes if you like.

Grab 3 sheets of the Template, line them up as shown and use the tape to stick them together. Use the grid lines and the alignment circles in the corner to easily line them up before you stick them together.
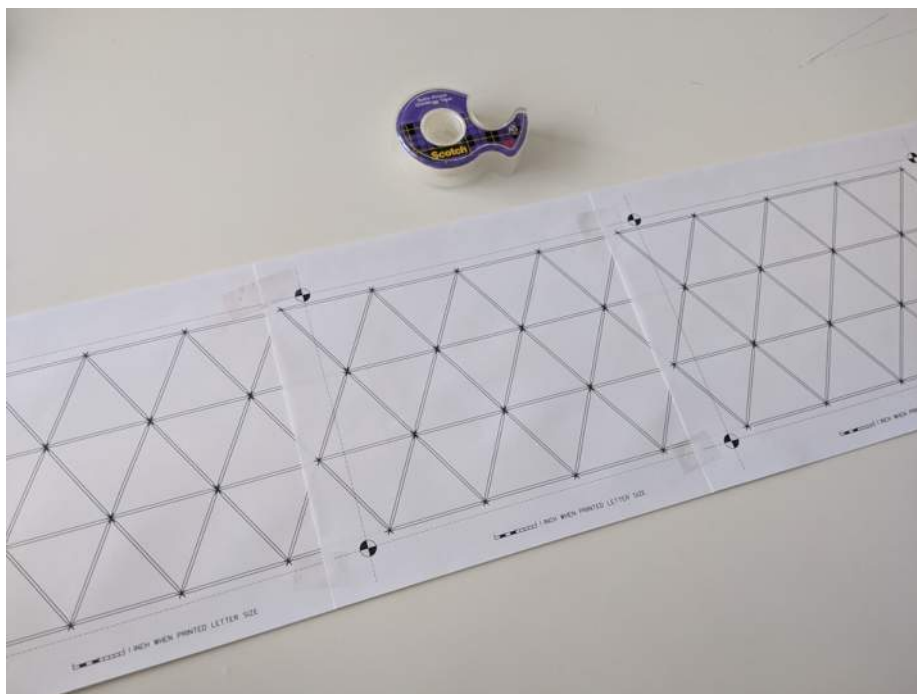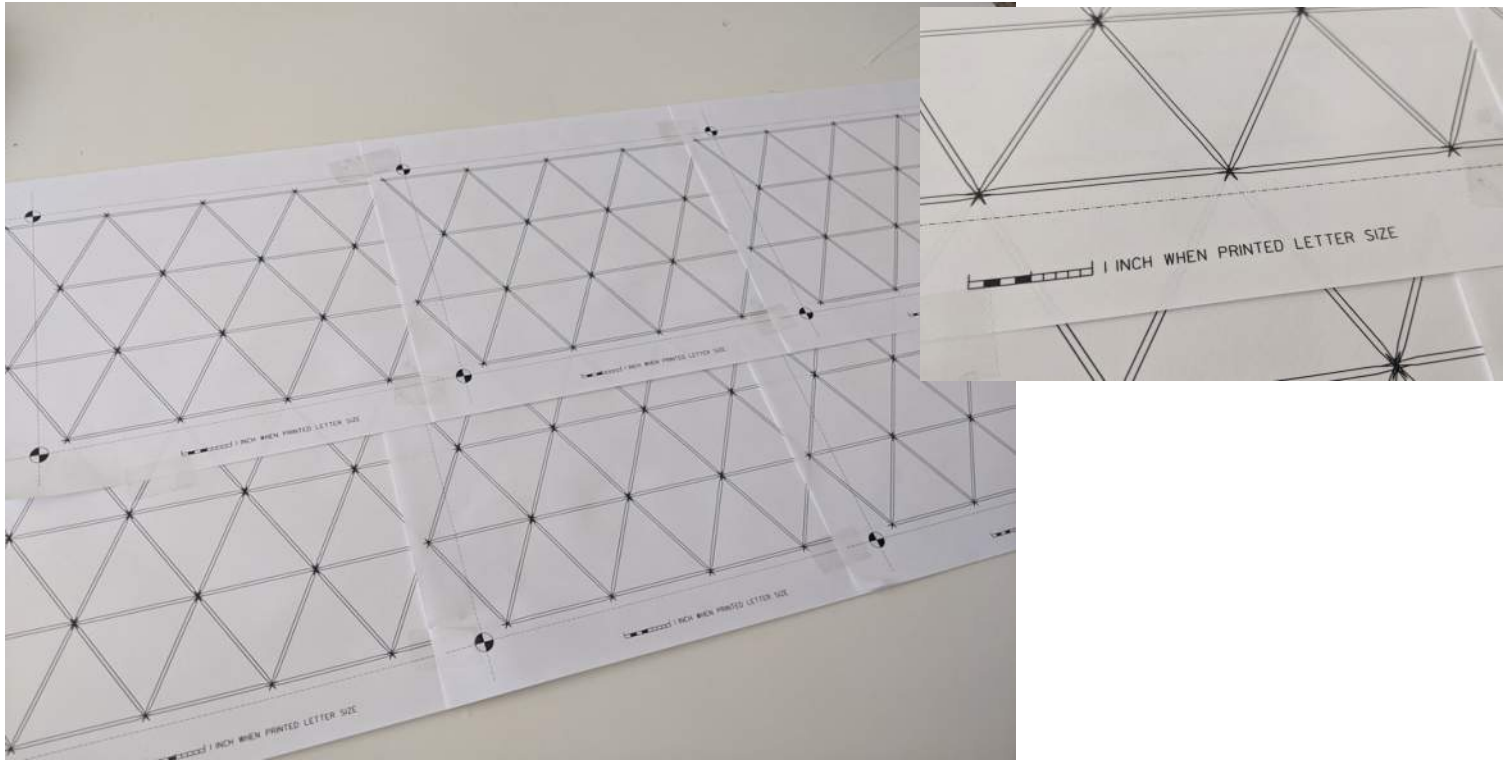

STEP 2

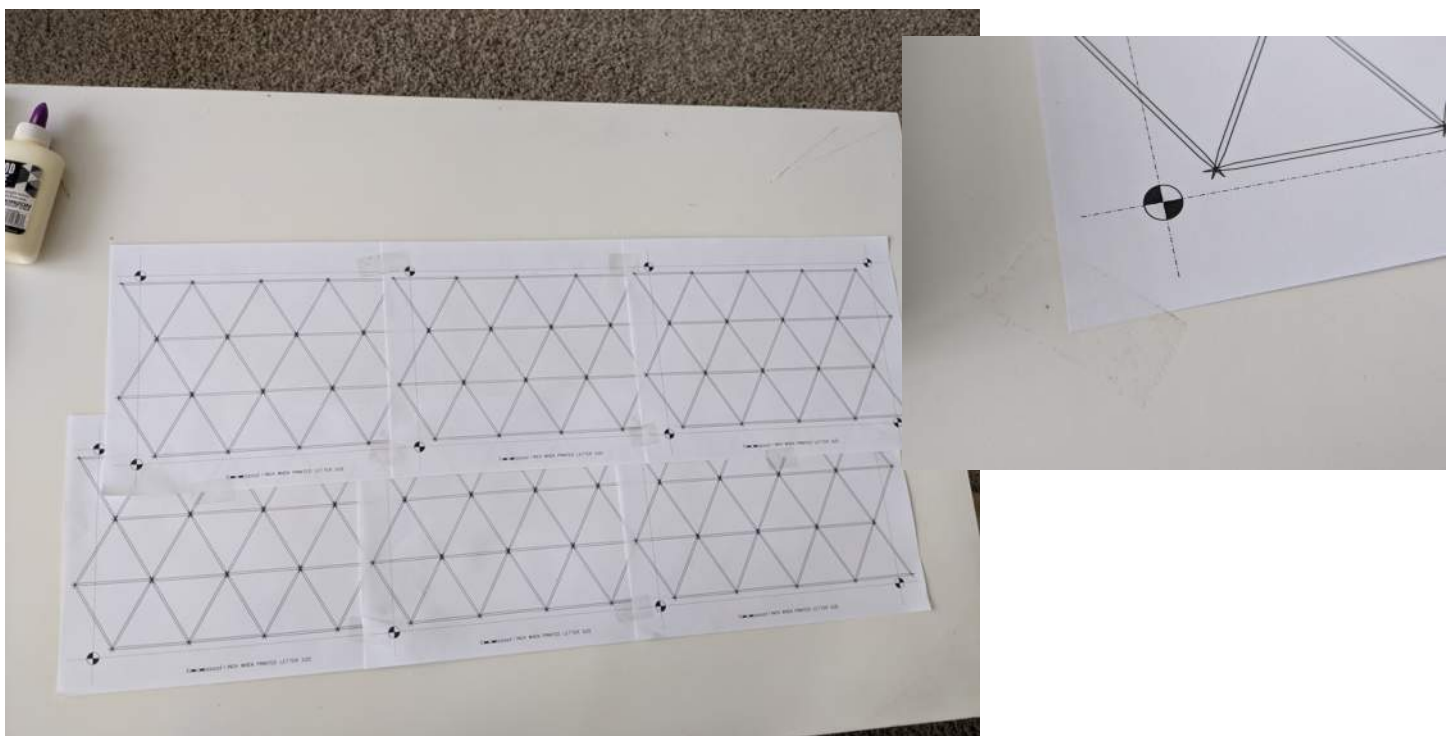 Repeat this with the other 3 sheets of the Template
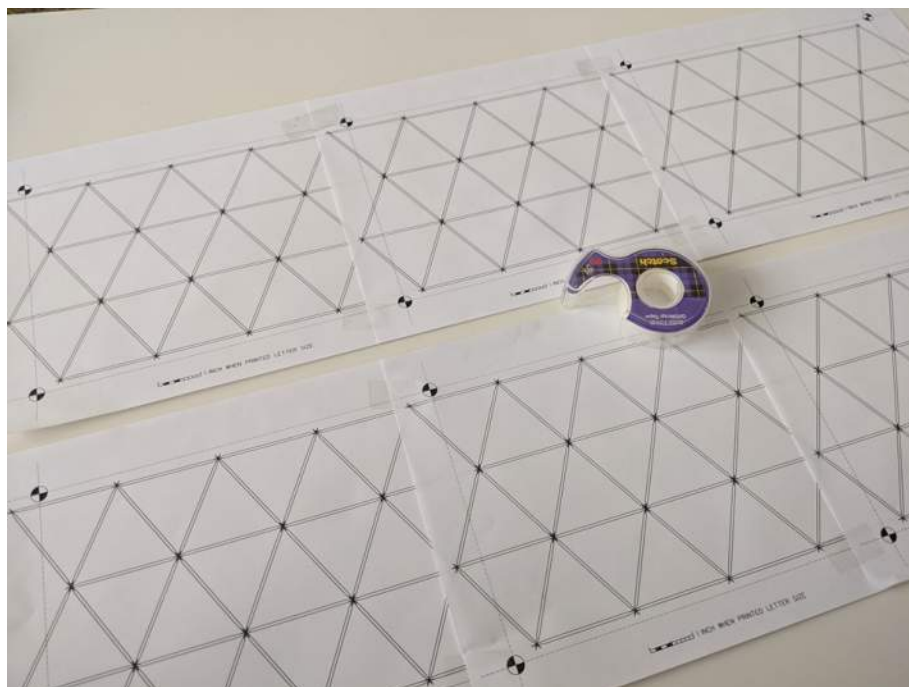
STEP 3

Now line the top of the first set and the bottom of the second set together to form a big template. Use the Toothpick outlines to line them up. Stick them together to form one big template.
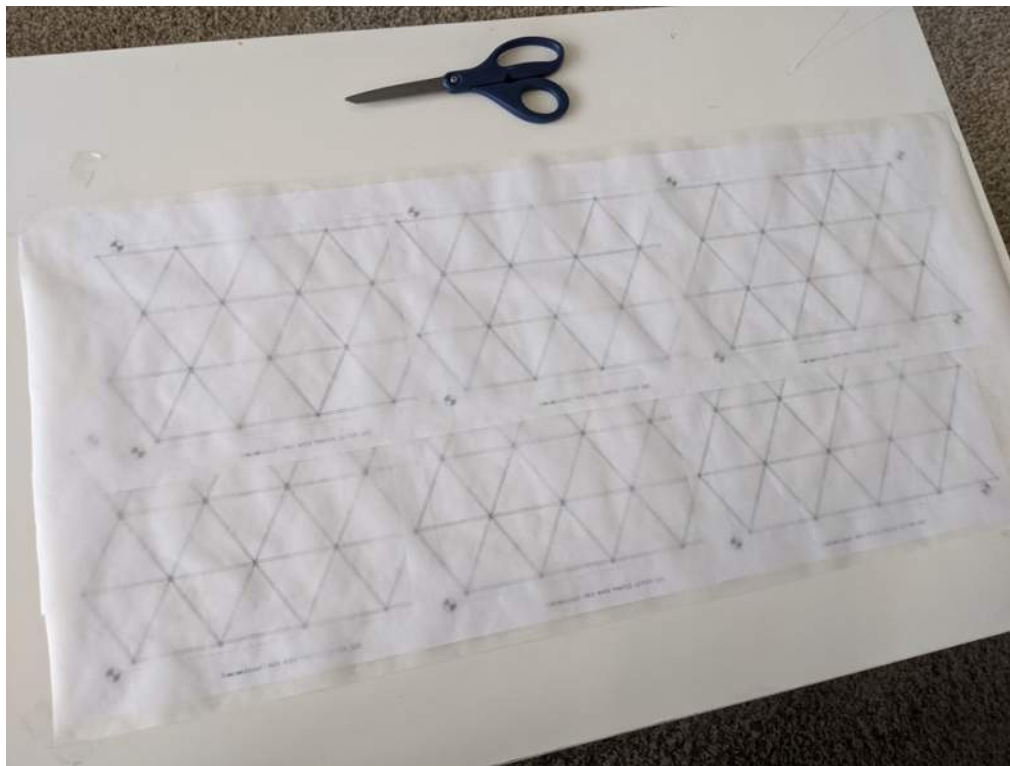

STEP 4

Stick this template to your working surface. We used a coffee table here but any large flat surface works.

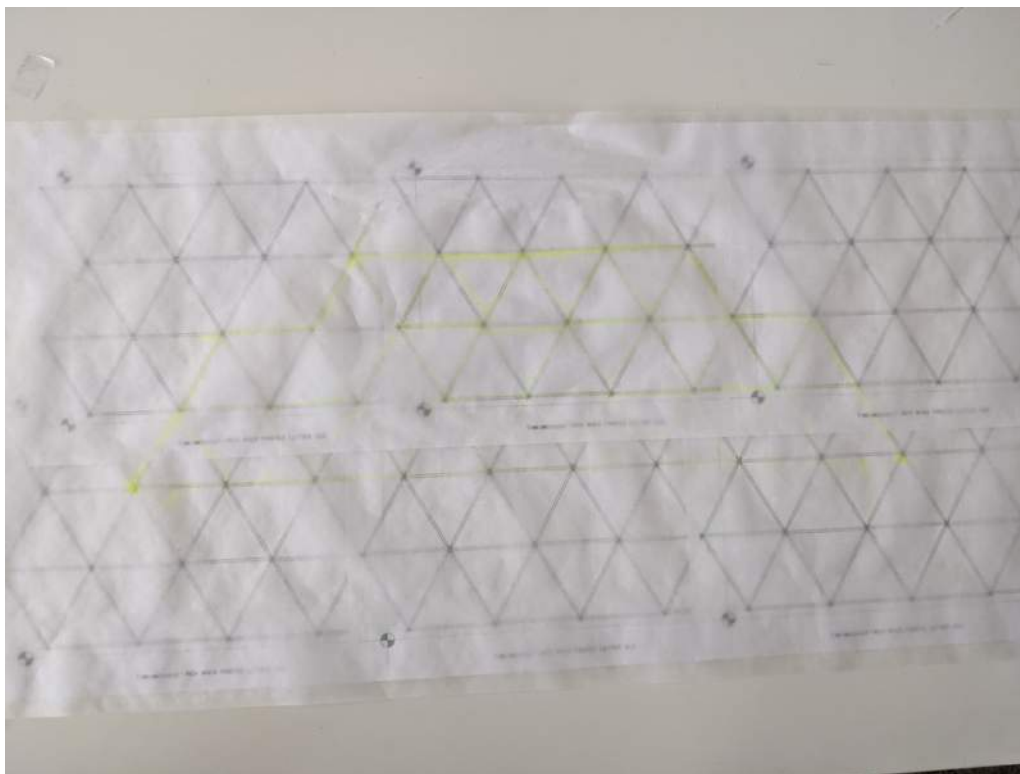# STEP 5

Cut a sheet of parchment paper or wax paper, place it over your template and stick it to the work surface also. The parchment paper will ensure that the glue will not stick and will release easily as you build your bridge.
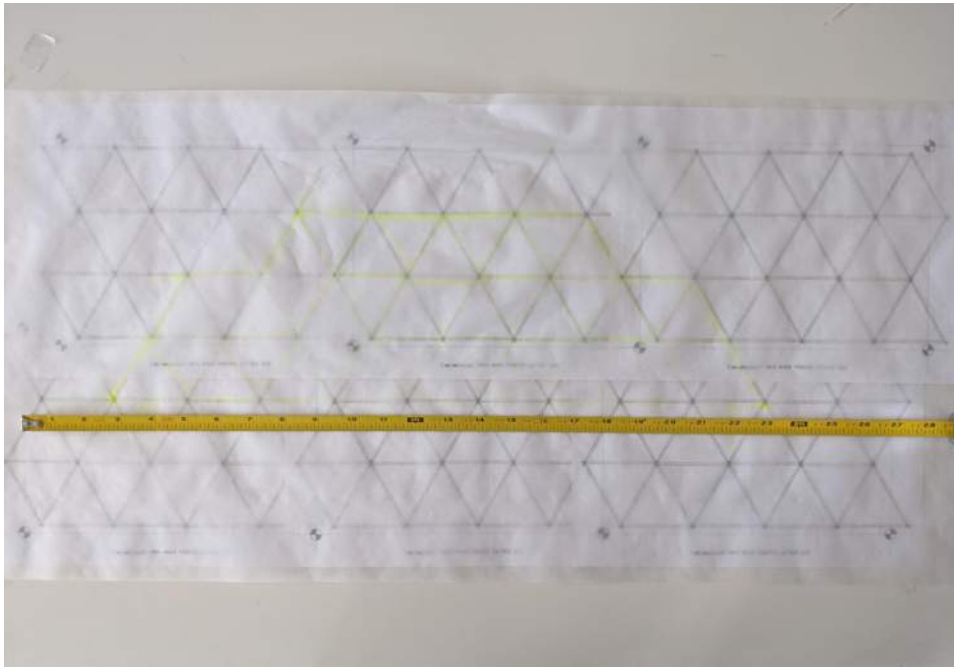

STEP 6

It's time to design your bridge! Use a highlighter or marker and sketch out the outline of your bridge on the template.

STEP 7

Make sure to measure your design and ensure that it is within the allowable dimensions in the rules and specifications.


STEP 8

Start by laying down all the horizontal pieces of the bridge. The toothpicks need to overlap a little as shown in the template to have adequate surface area for the glue to stick to. Apply a drop of glue at each of the "nodes" where the toothpicks join. Let it dry for ATLEAST 2 HOURS before proceeding to the next step and subsequent steps.
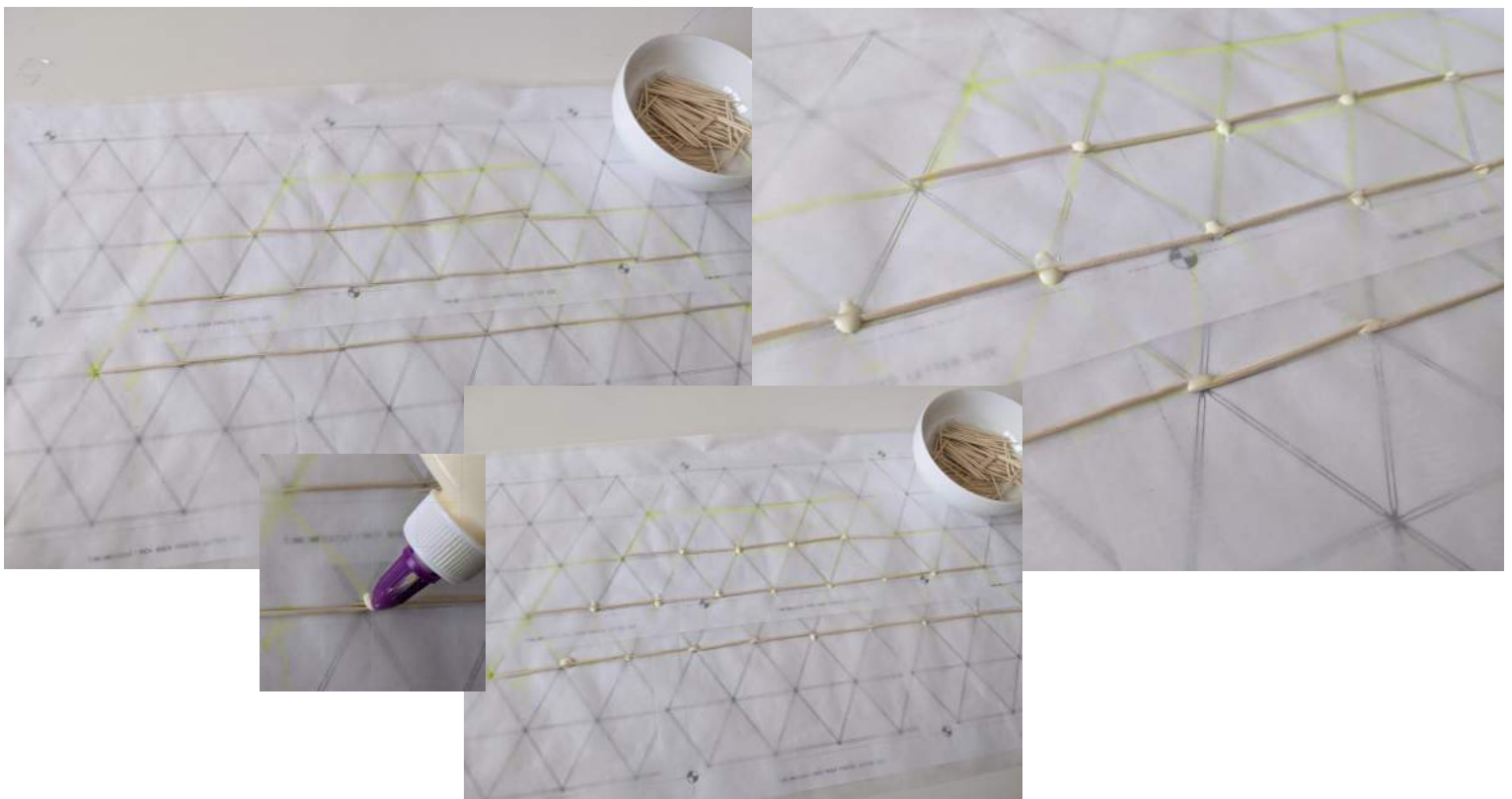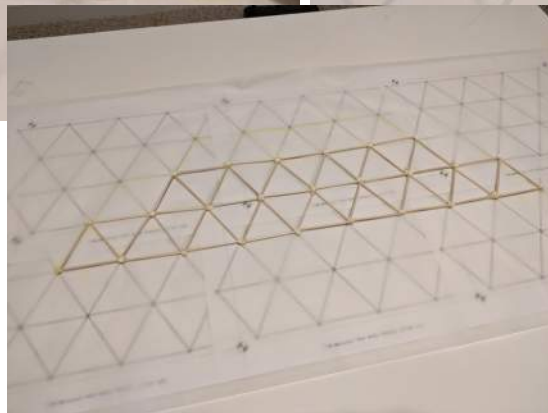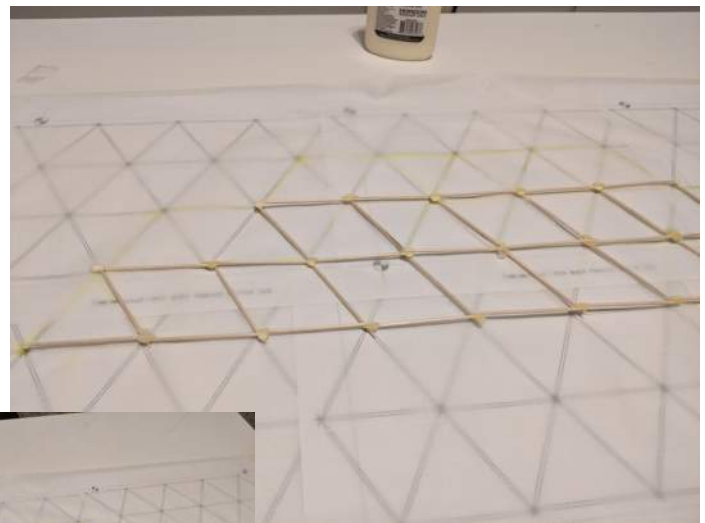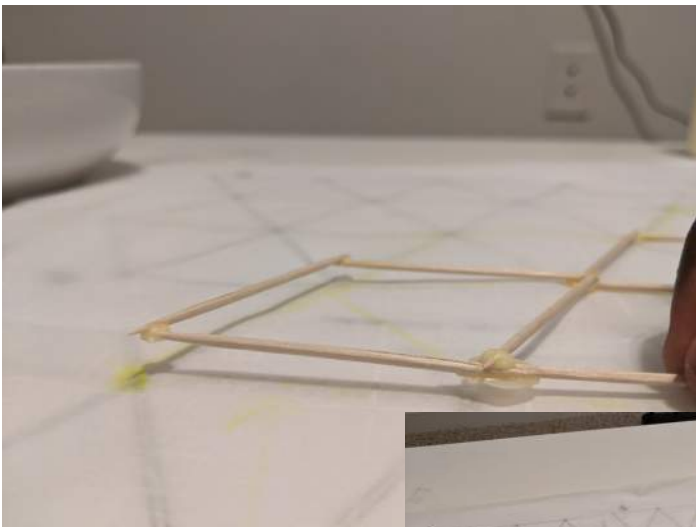
STEP 9

Lay down all the diagonals on one side on top of the horizontal elements and apply glue to the nodes.
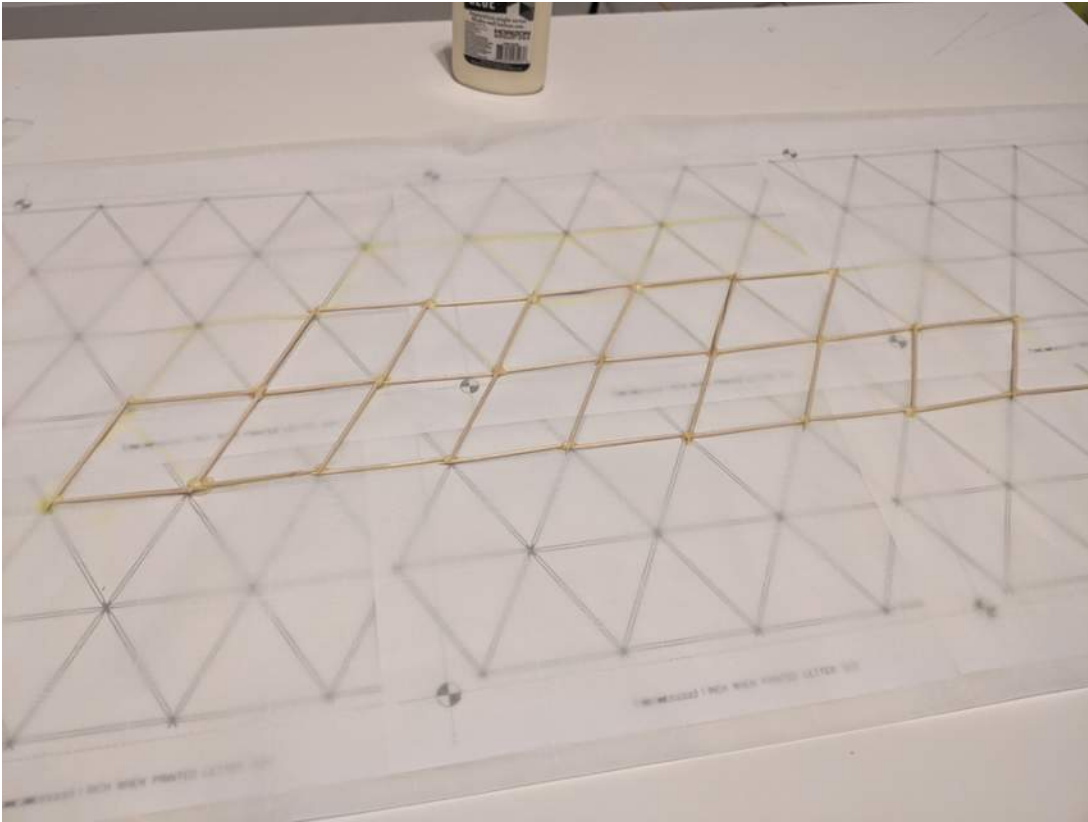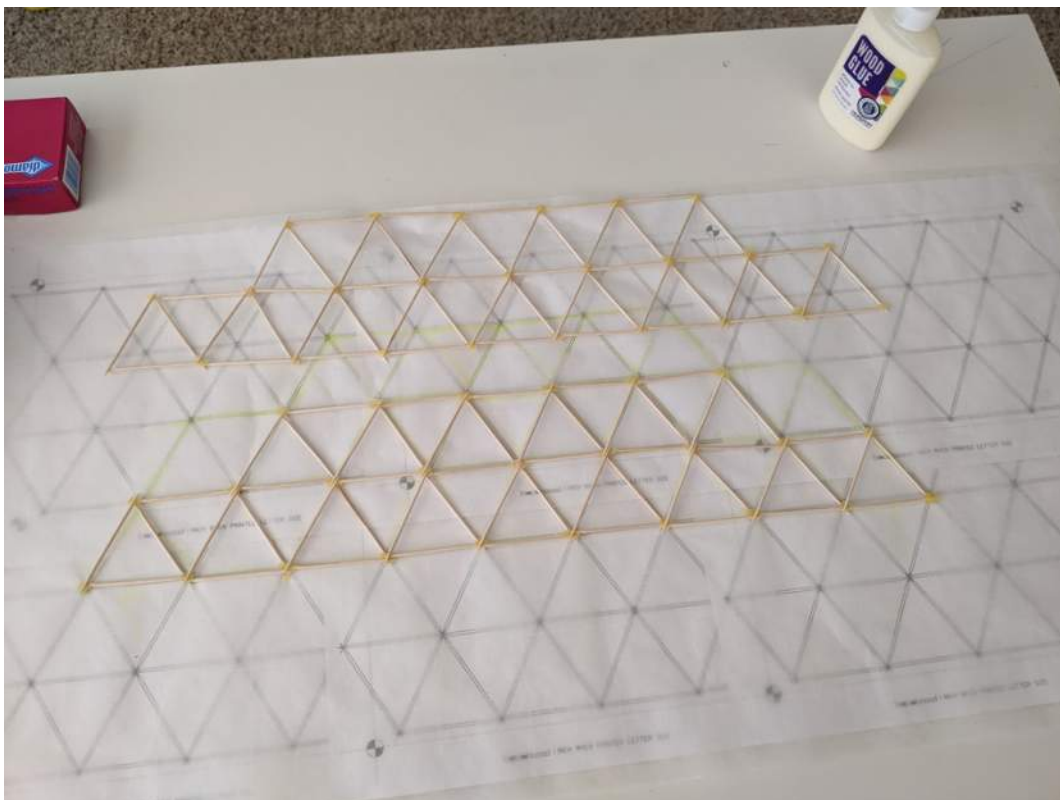

STEP 10

When the glue has adequately dried, gently release the structure from the parchment paper and flip it over and place it over the template. Place all the diagonals on the other remaining side and glue the nodes.

STEP 11
Repeat the steps to make the replicate the structure layer that you have made.

STEP 12
Prop the 2 sides that you have made vertically using some books for support.
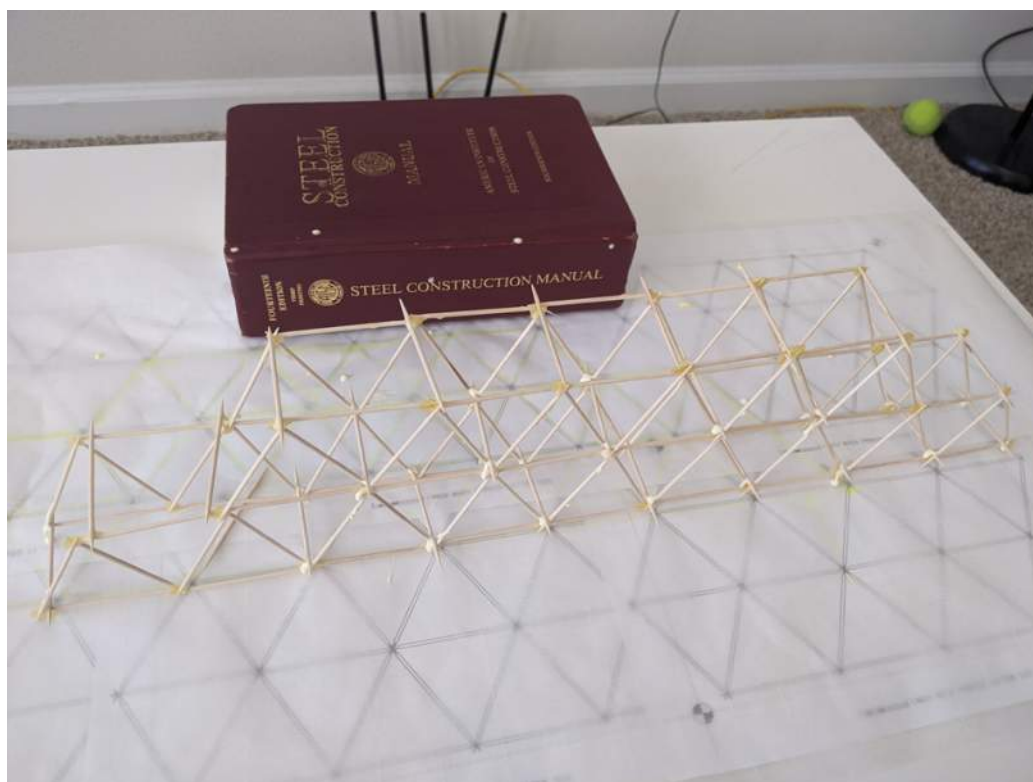
STEP 13

Lay all the horizontal elements on the top of of the bridge as shown and glue the nodes again.
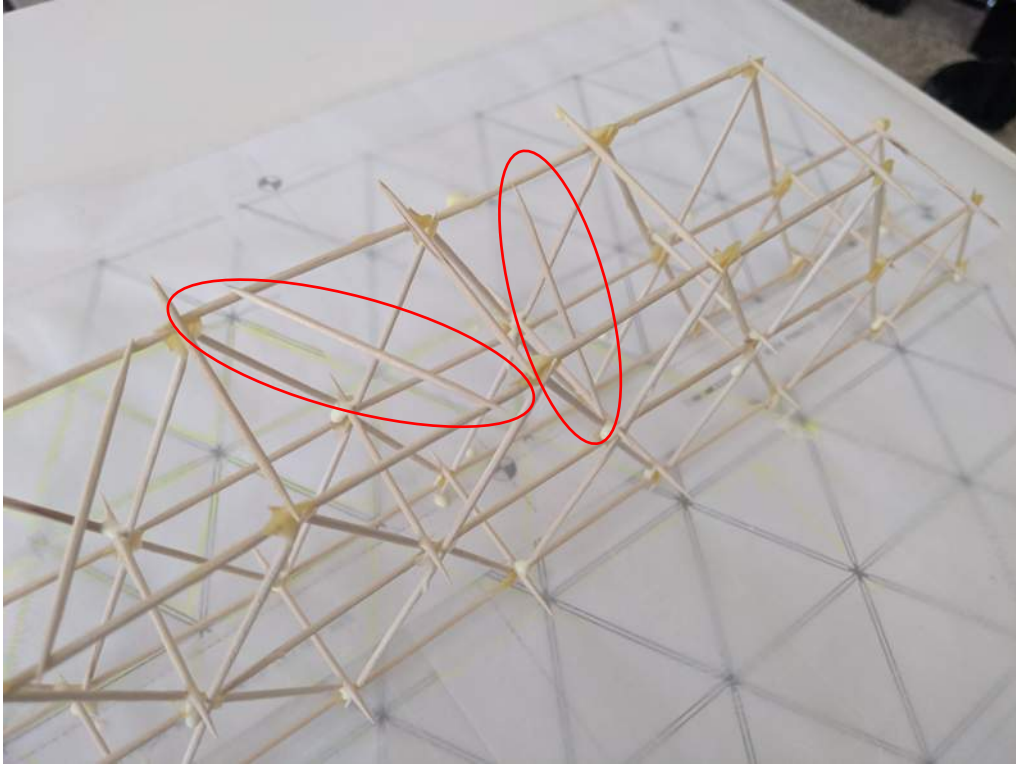

STEP 14

After the glue has adequately dried, you can remove the books and glue the remaining horizontal elements.

STEP 15

Add diagonals as shown as you feel is necessary to strengthen the bridge. These are called "bracing".
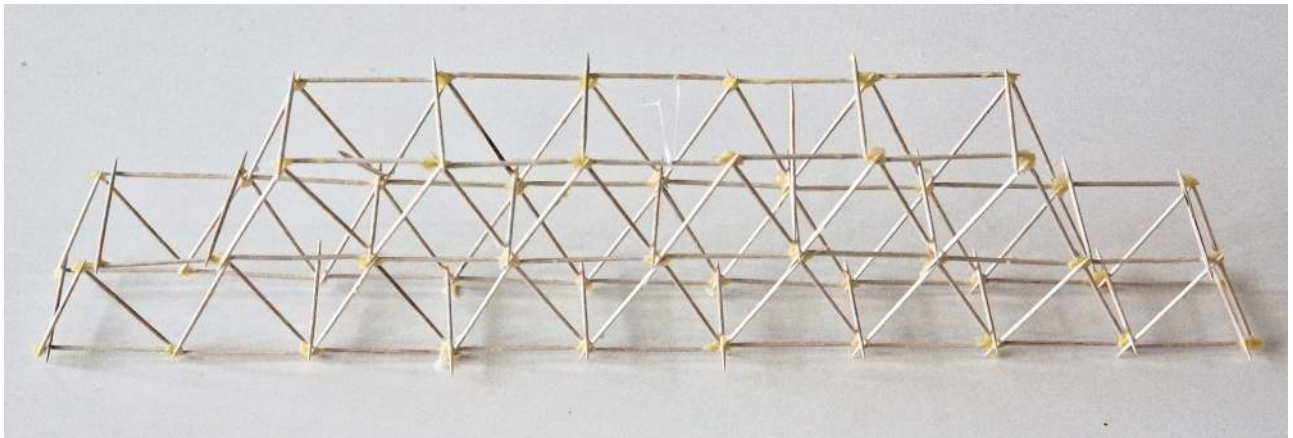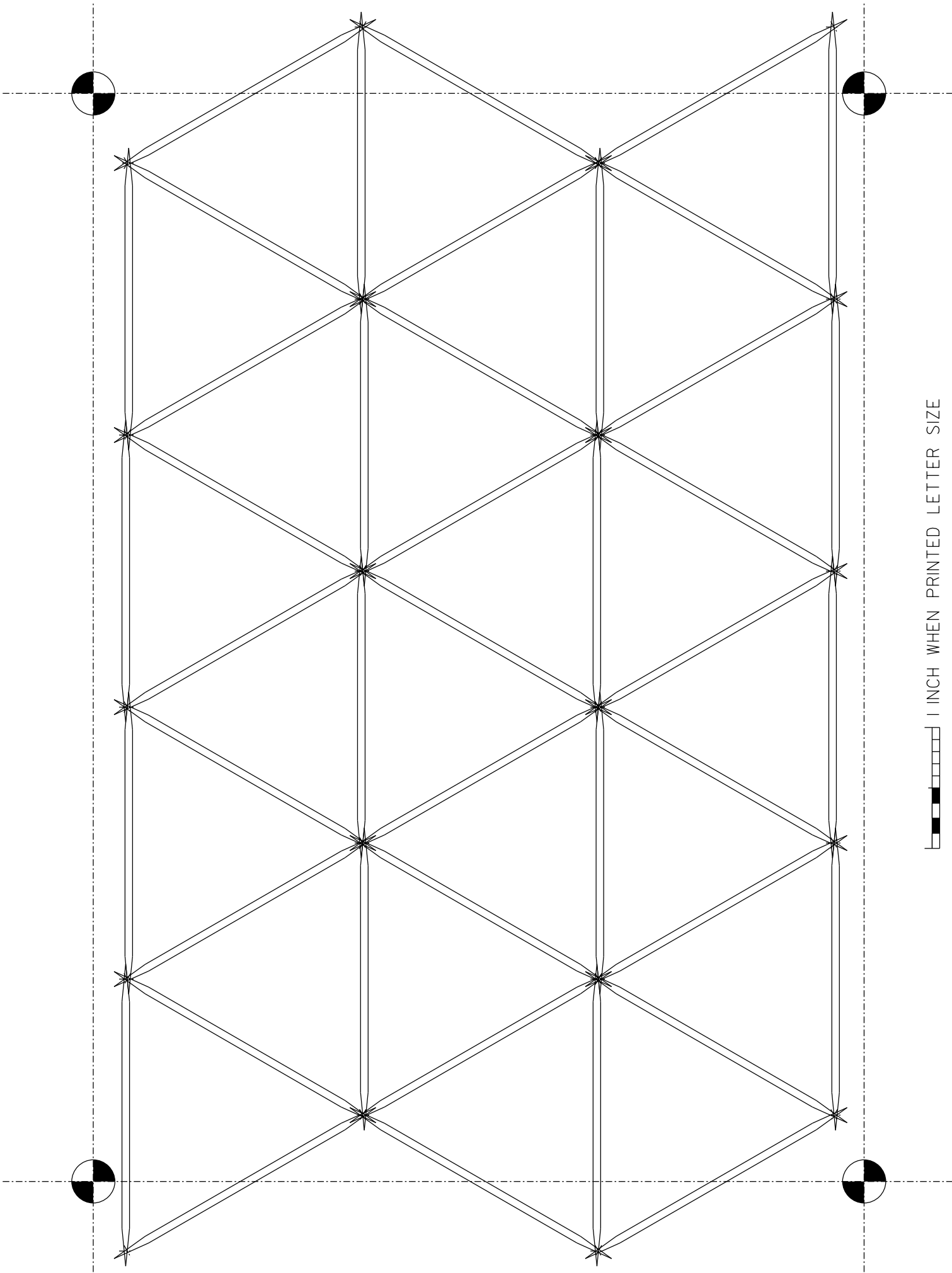

STEP 16

You can add a 3rd layer and repeat steps 11 - 14 to it to make the bridge wider but make sure you're with the maximum width. You can obviously change the design shown here to make the bridge taller or a different shape!

Your Bridge is now complete!!

Place light loads on it and see how it performs and add bracing as required. You can also start from scratch and build another one!

I INCH WHEN PRINTED LETTER SIZE