Understanding the Mexican Canyon Trestle

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Cloudcroft, NM
September 2009

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This presentation results from my observations over several weeks of the restoration of the Mexican Canyon Trestle. There are many photographs at my website http://www.lincoln-nf-trails.org.

Mexican Canyon Trestle

September 3, 2009

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The Mexican Canyon Trestle, over 100 years old and not regularly maintained since the end of the Alamogordo & Sacramento Railroad in 1947, has sagged in recent years. In 2009 the US Forest Service obtained funding for partial restoration (Bents 1-9), and Osmose Railroad Service, Inc. is carry out the restoration. The intent is to reuse as much of the original material as possible. In this photograph, the dark material (near) is new, and the gray material (far) is original.

What's Coming?

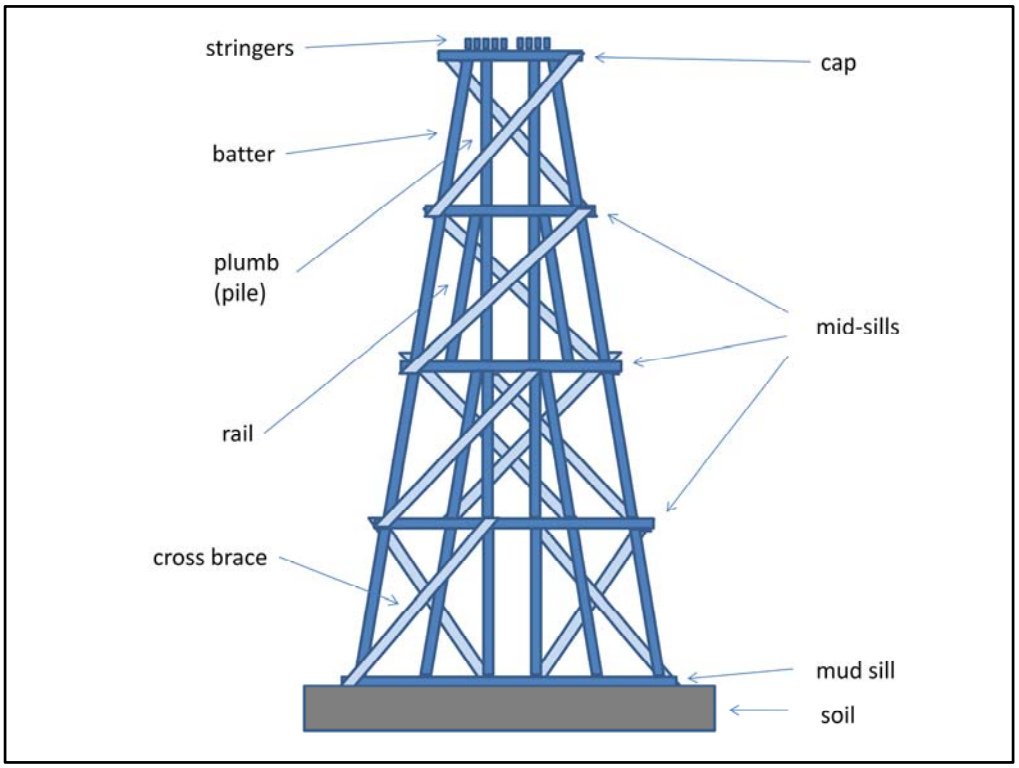
- What words should I know?
- How does a trestle support a train?
- How does one restore a trestle?
- Can I build a model of the Mexican Canyon Trestle?
- After I build a bent, what do I do?
- Who would help me?

This presentation should help to answer these questions, section by section.

What words do I need to know?

- The next slide shows a sketch of Bent #9 in the Mexican Canyon Trestle and labels the parts.
- There will not be test over these terms.

No test, but you do need to learn the terms.



This might be Bent #9, near the center of the Mexican Canyon Trestle.

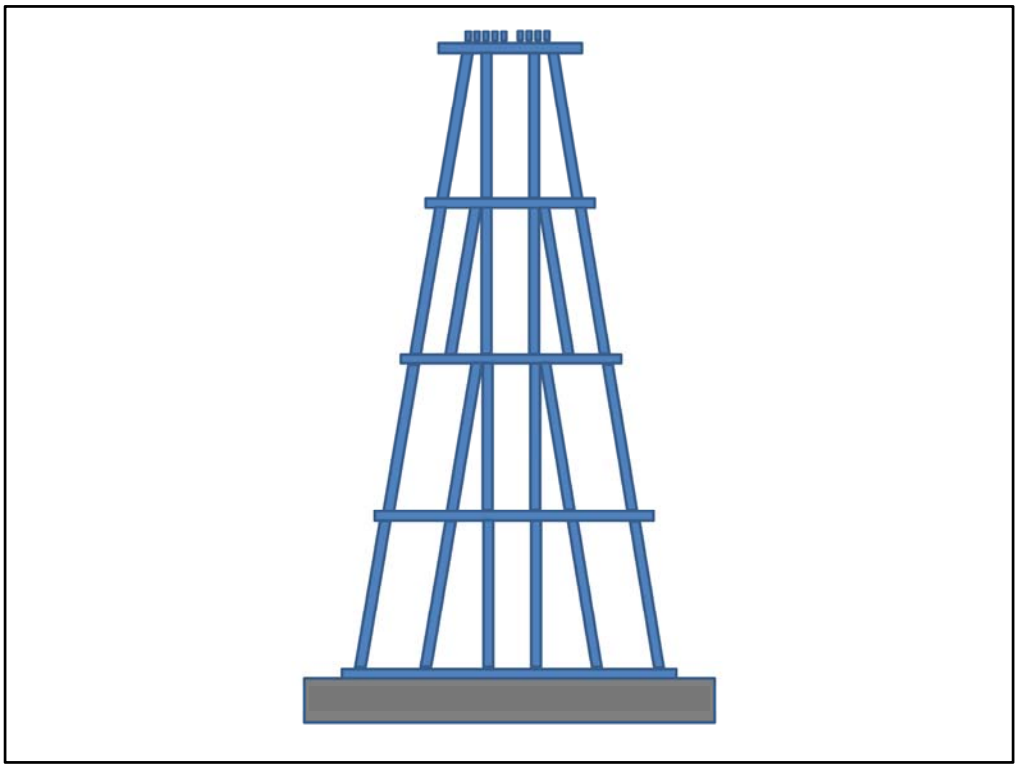
Each of the vertical structures in the picture in Slide 2 is a *bent*. The horizontal beams along the top are *stringers*. The stringers rest on the top of the bent, the *cap*. The horizontal beams below the cap are *sills*; the sill that rests on the ground is the *mud sill*. The vertical supports are *plumbs*. The angled supports at the outside of the trestle are *batters.* The angled supports within the trestle are *rails*. The diagonal beams are *cross braces*. The bents are connected by horizontal *braces* and diagonal cross braces.

This might be Bent #9, near the center of the trestle.

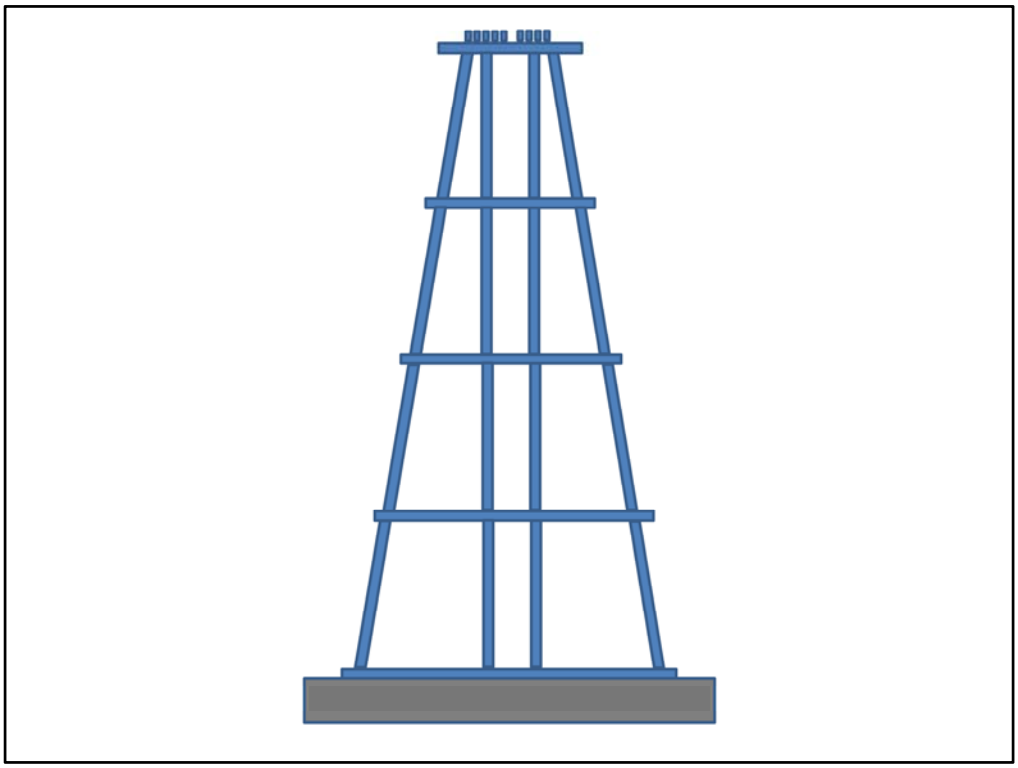
How does a trestle support a train?

- The plumbs can support the weight of the train, if the weight is directed straight into the beam.
- The rest of the trestle is there to keep the plumbs vertical.

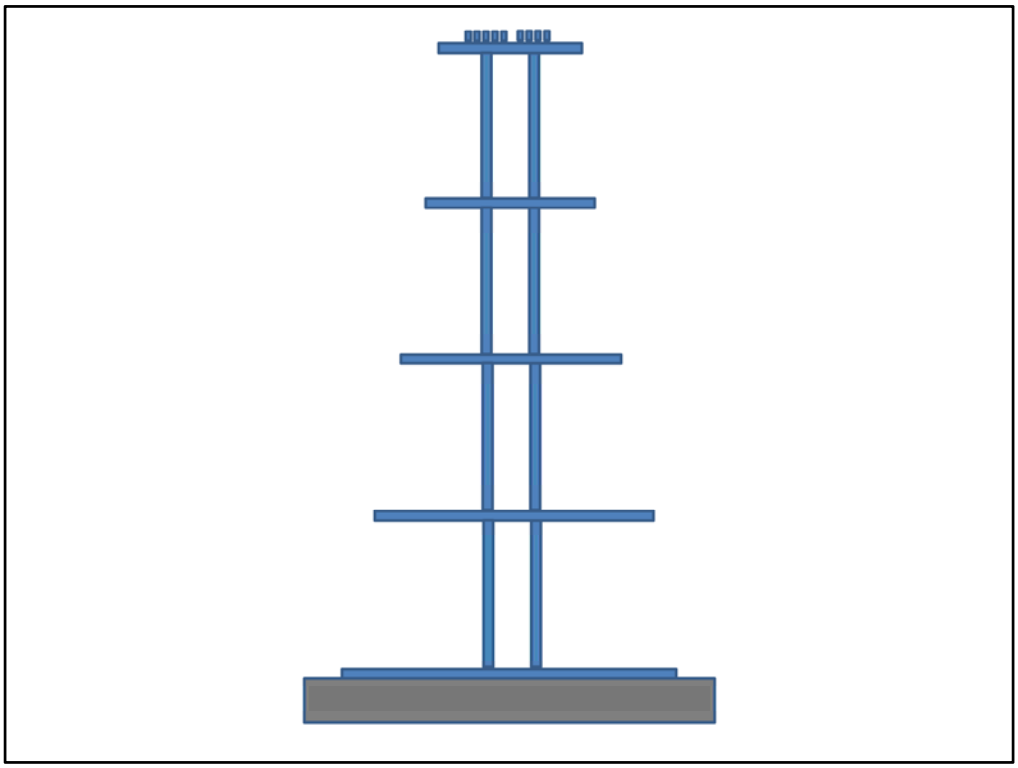
The key is that the force is along the plums and batters. By design, there is very little bending force.



This is a sketch of Bent #9 of the Mexican Canyon Trestle (counting from the north – Hwy 82 – end). There are 22 bents in the trestle, with each of the ends counting as a bent. The cross braces have been removed to show the structure that is made out of 1 foot x 1 foot x 12 foot long inland Douglas fir wood – the basic piece used. The distance between mid-sills is 12 feet. Note that the plumbs and batters are set so that the force is directed along the assembly.



Let’s get rid of the wood rails. Perhaps we can build a strong trestle with less wood. Would you be comfortable riding a train over a trestle with this construction?



Now let’s get rid of the batters, and save on that expense. The plumbs can support the weight of the train. Would you be comfortable riding a train over a trestle with this construction?

How does one restore a trestle?

- A trestle is actually made up of modules, and it can be taken apart in sections.
- For the Mexican Canyon Trestle, almost all of the mud sills have weakened due to rot, and need replacement.
- Solution: Take the trestle apart, replace the mud sills, and put the (repaired) sections back in place.

The modular construction means that one can build a trestle relatively quickly. Once the lower sections are in place, the workers build and put in place the same units, all the way across a level of the trestle.

Lifting a Section

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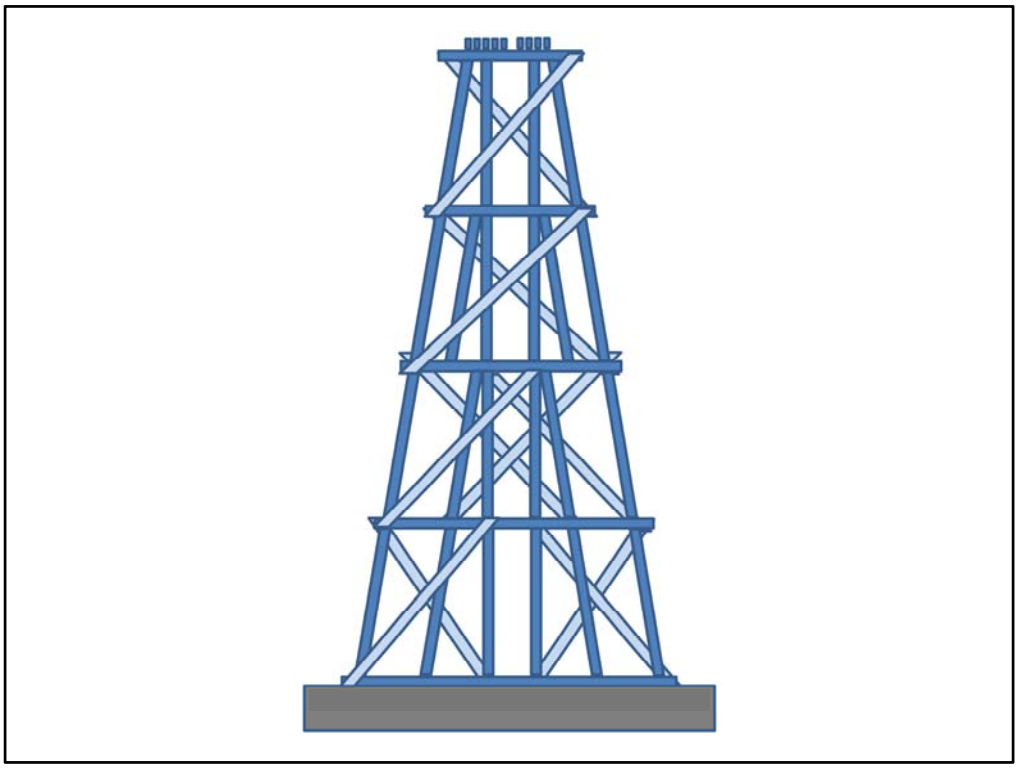
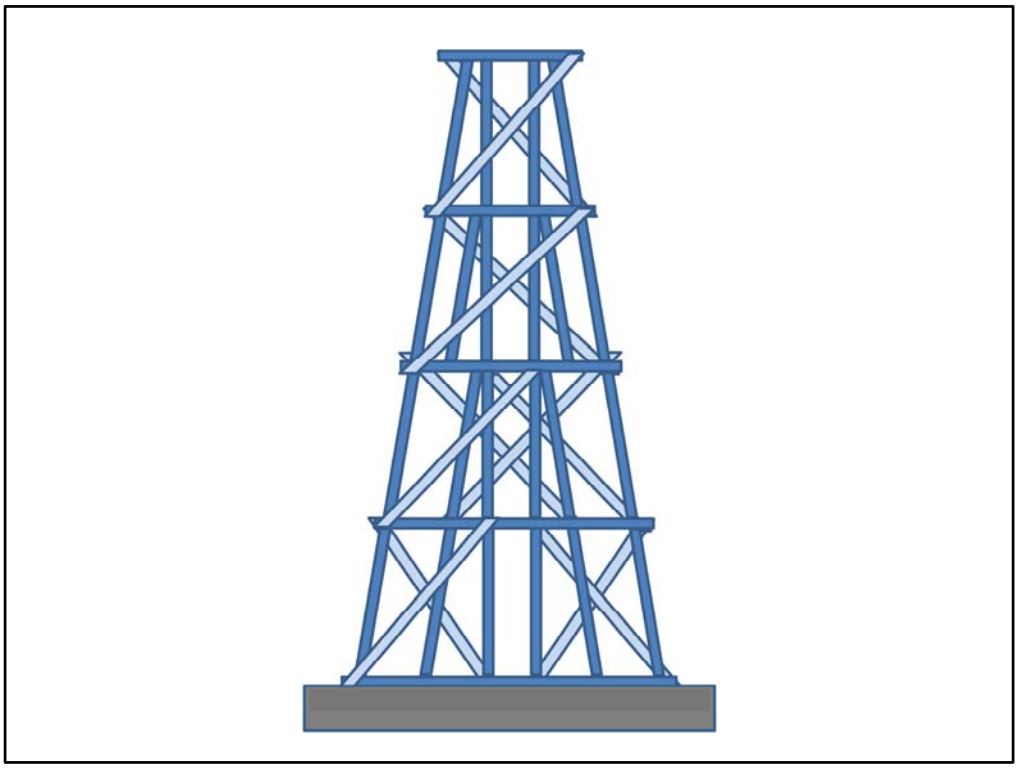
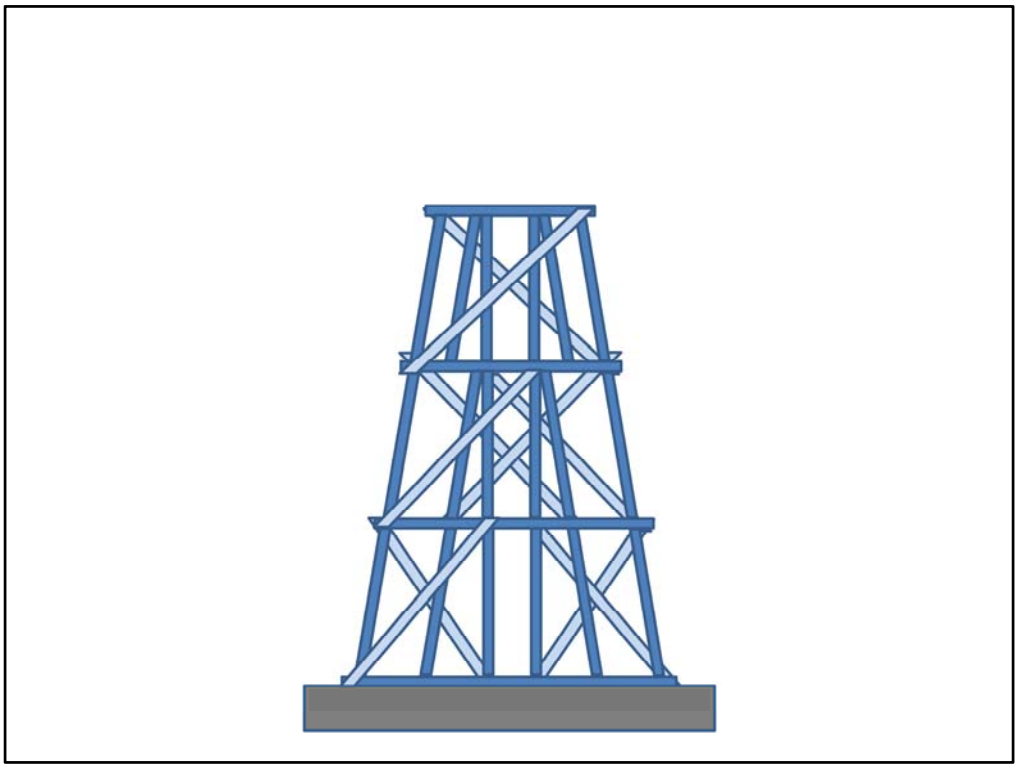
The upper section of Bent #9 is lifted by the crane. The section will be set aside and re-installed later. The wood ins in good shape, and probably a it will not be necessary to replace any beams in this section.



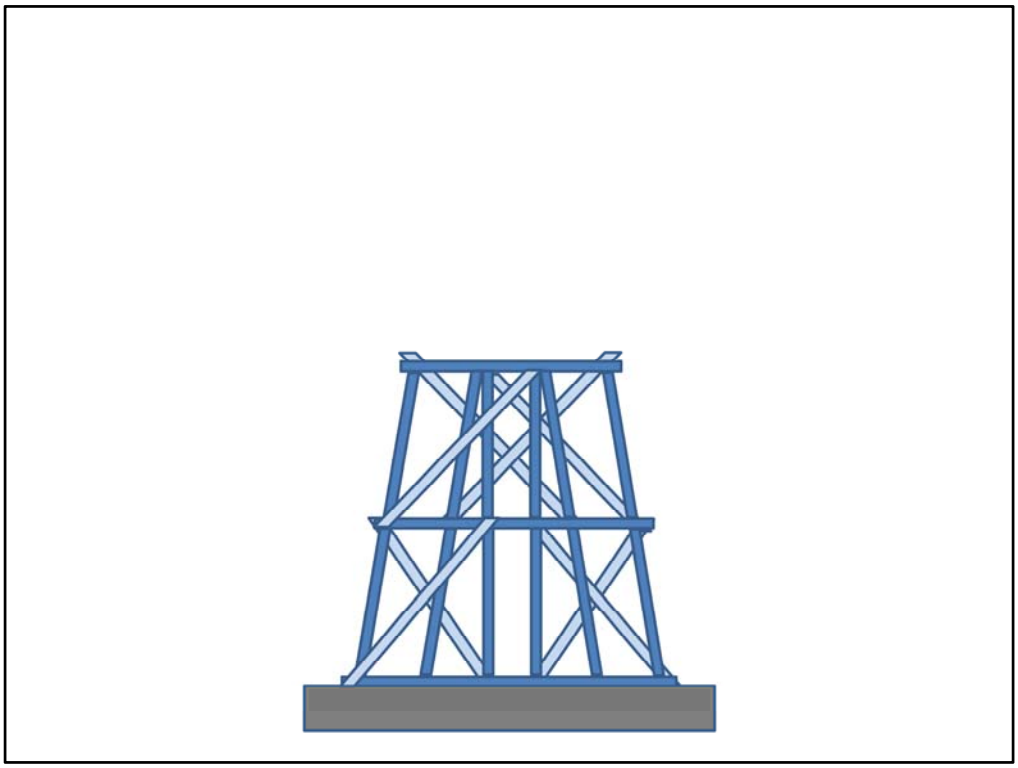
Let’s pretend that we have a crane, and we will take Bent #9 apart, replace the mud sill, and put it back together. The sequence runs through slide 25.



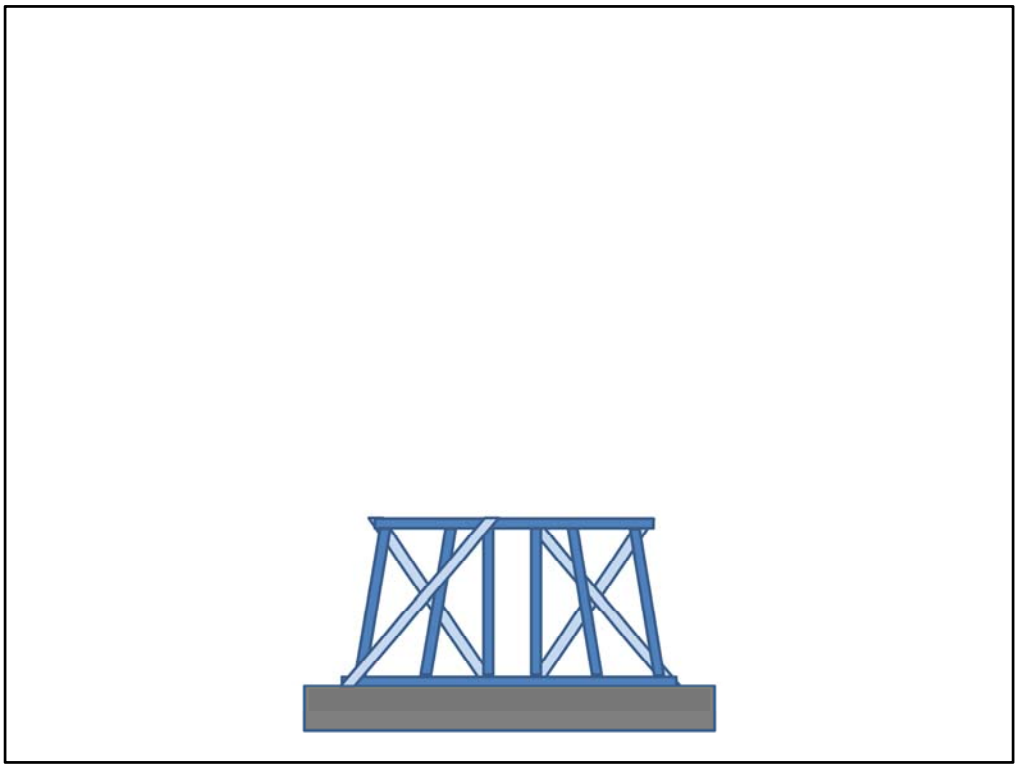
Remove the stringers.



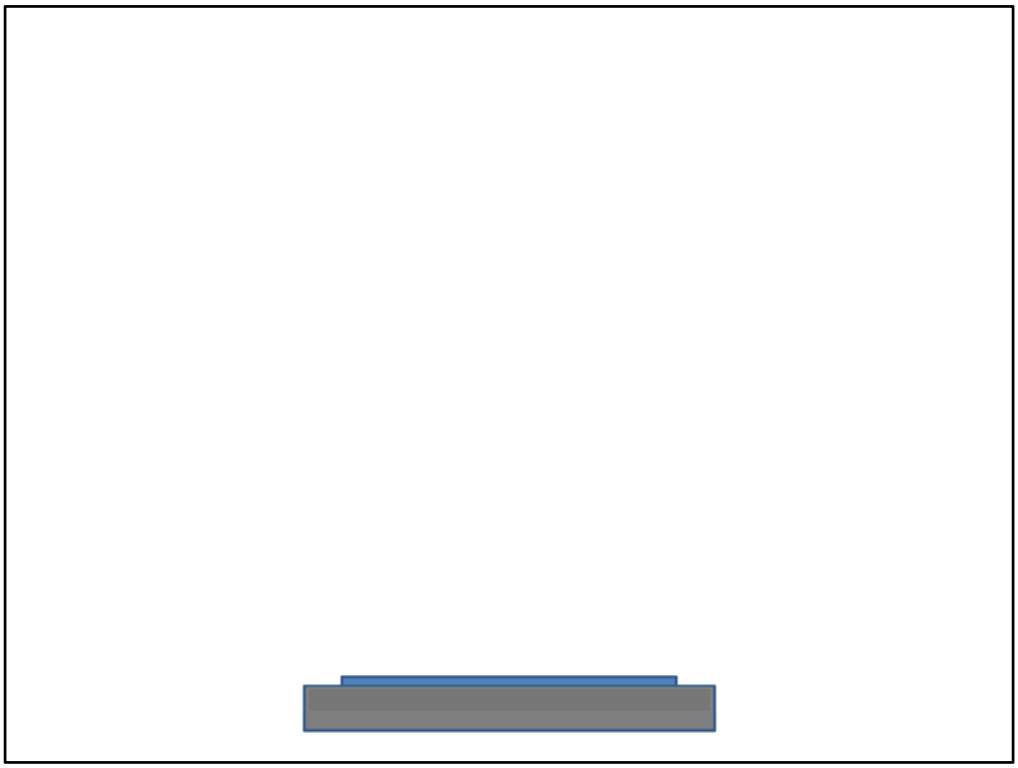
Take off the top section.



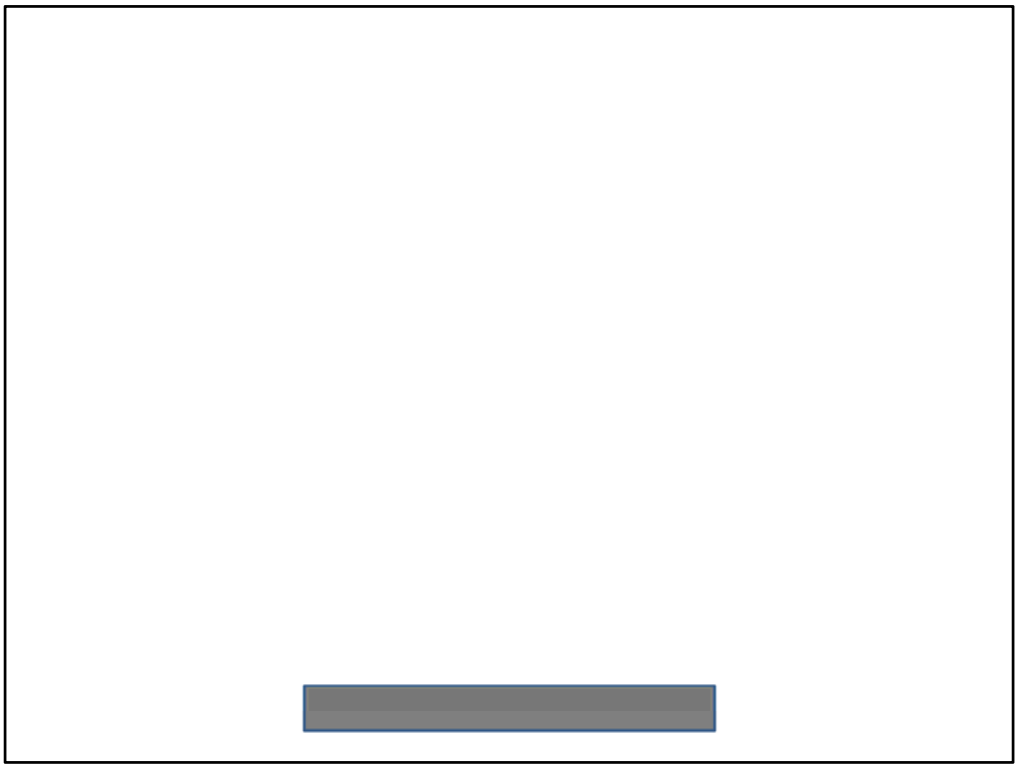
Take off the upper middle section.



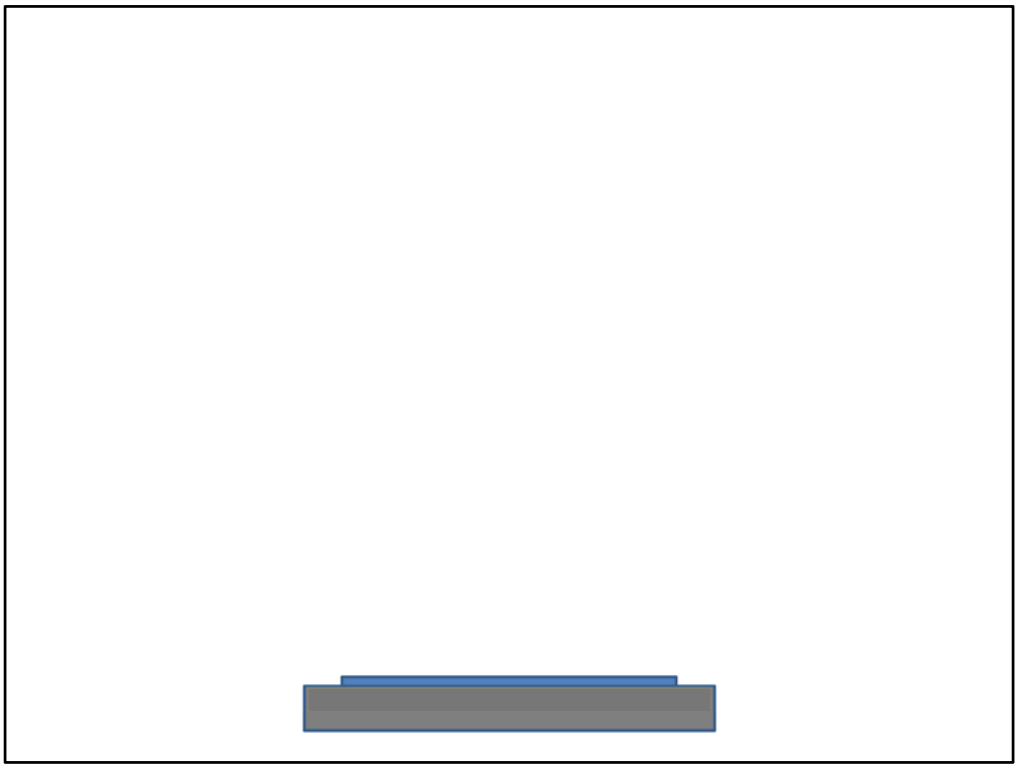
Take off the lower middle section.



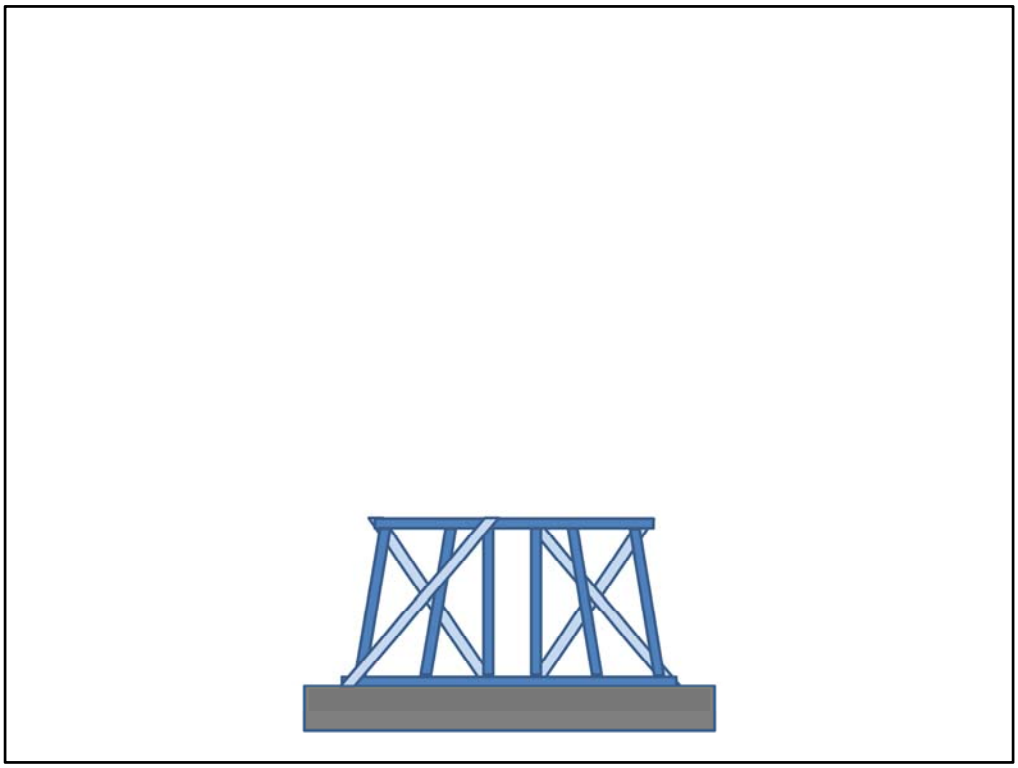
Remove the lowest section.



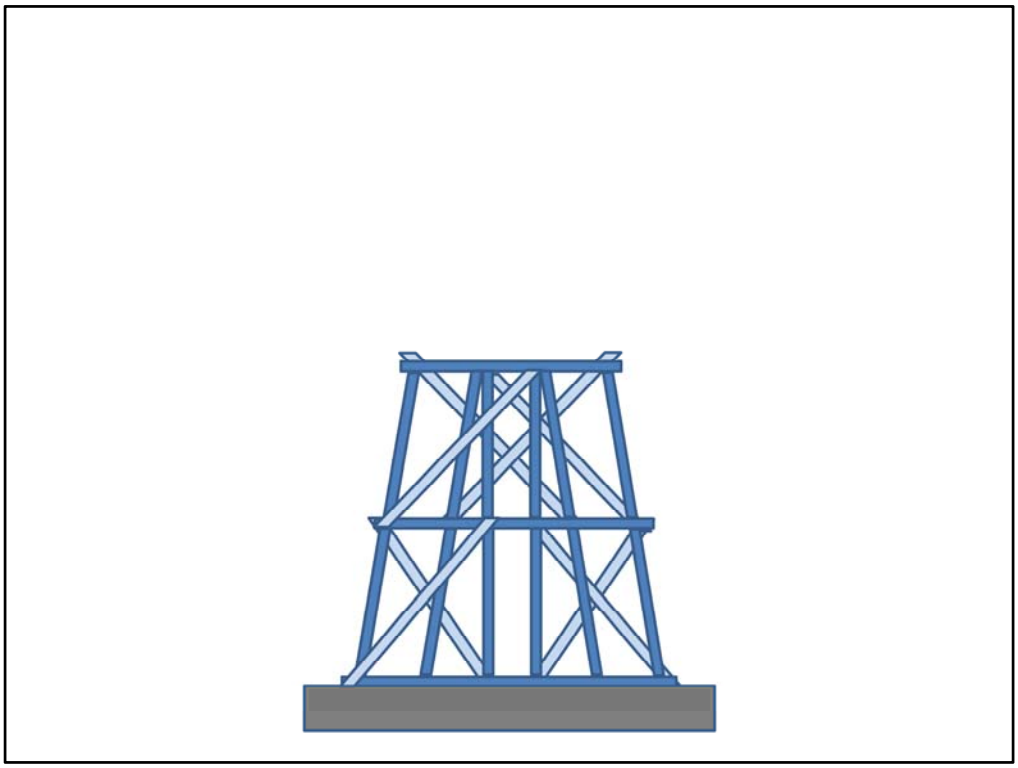
Remove the old mud sill.



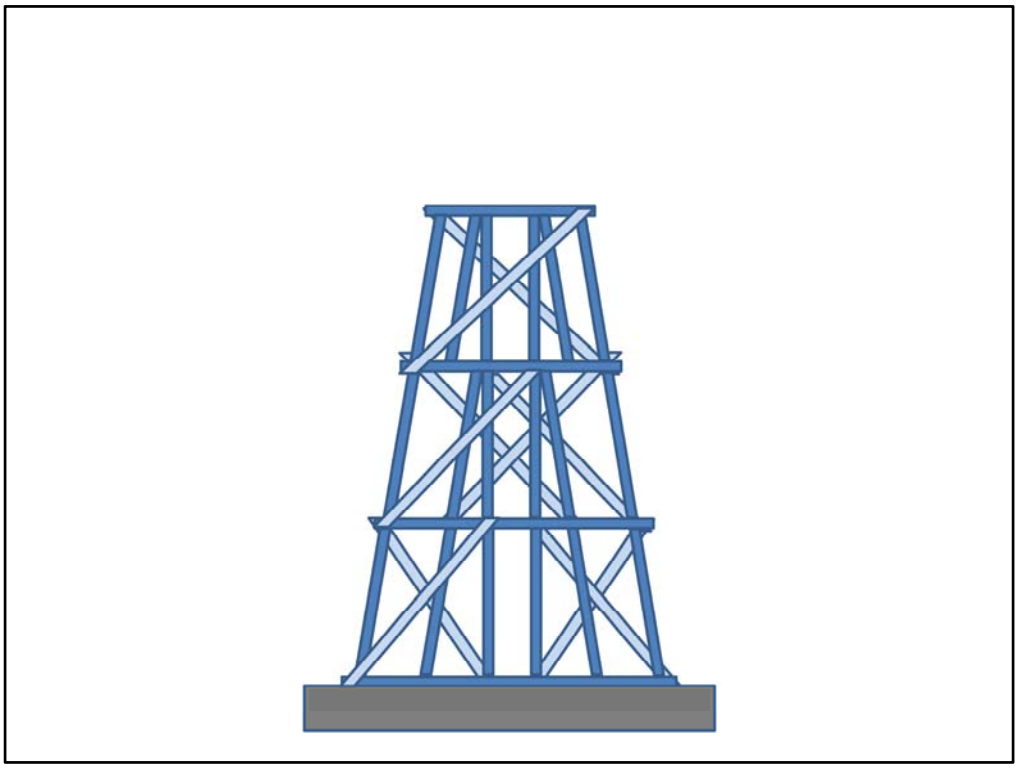
Replace the mud sill with new wood.



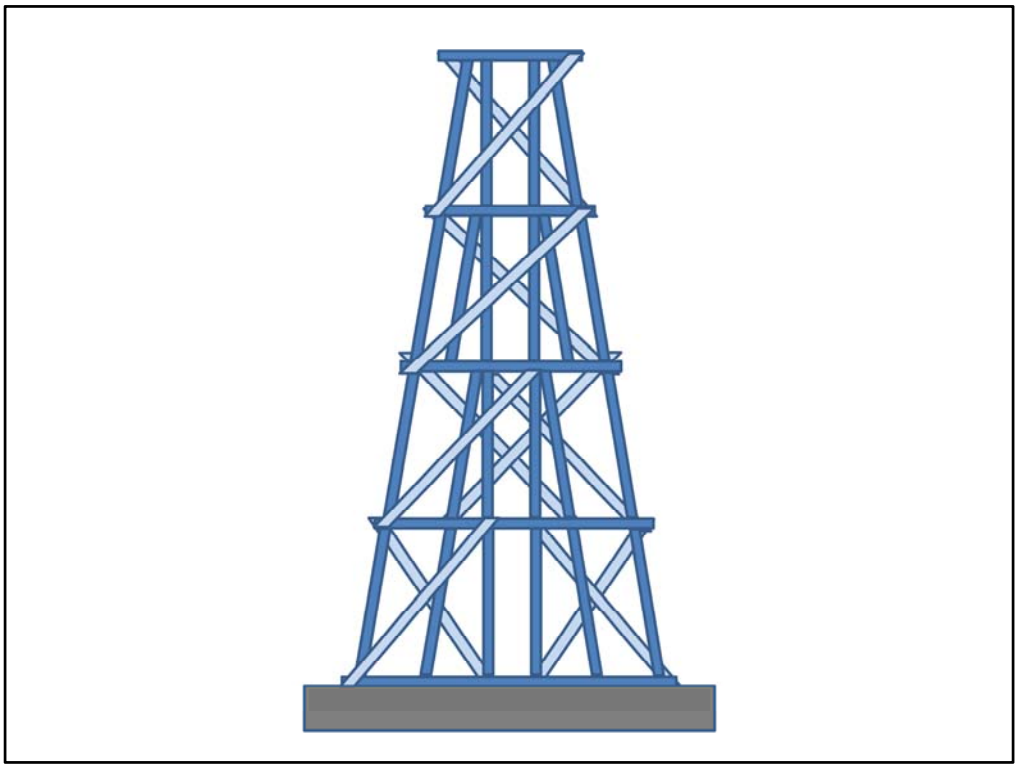
Re-install the lowest section. Be sure to replace any rotted timbers.



Re-install the lower mid-section section. Be sure to replace any rotted timbers.



Re-install the upper mid-section section. Be sure to replace any rotted timbers.



Re-install the top section. Be sure to replace any rotted timbers.

Bent #8

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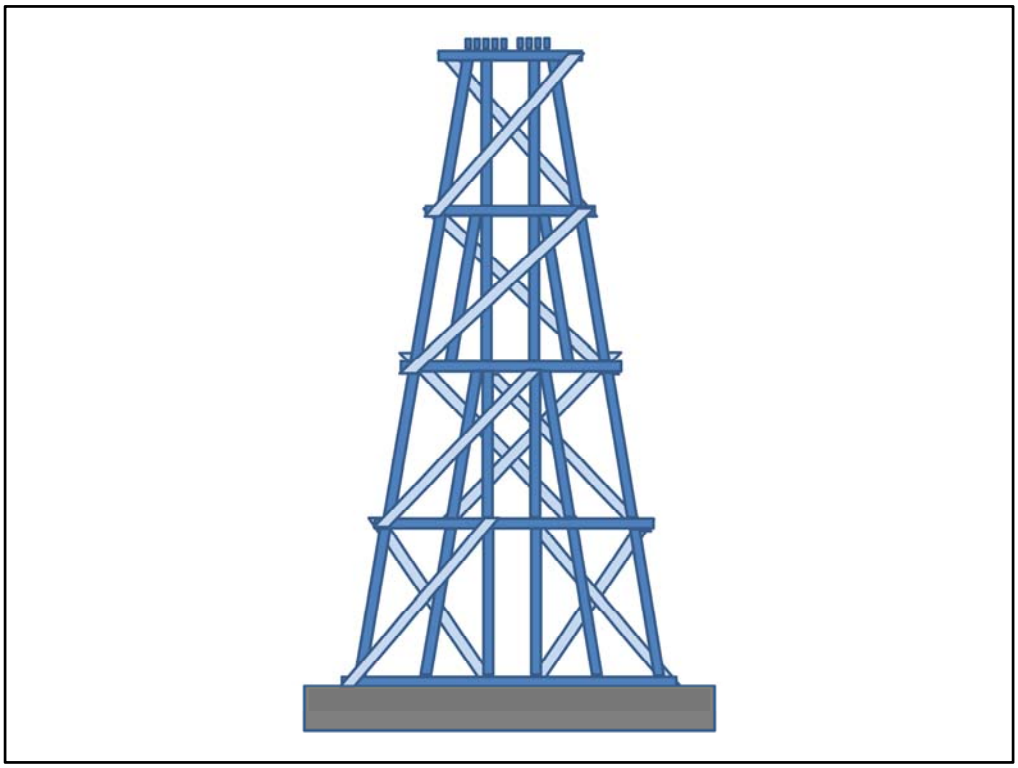
Reassembly of Bent #8. The lower mid-sill and the cap had to be replaced, but the rest of the timbers were in good shape.

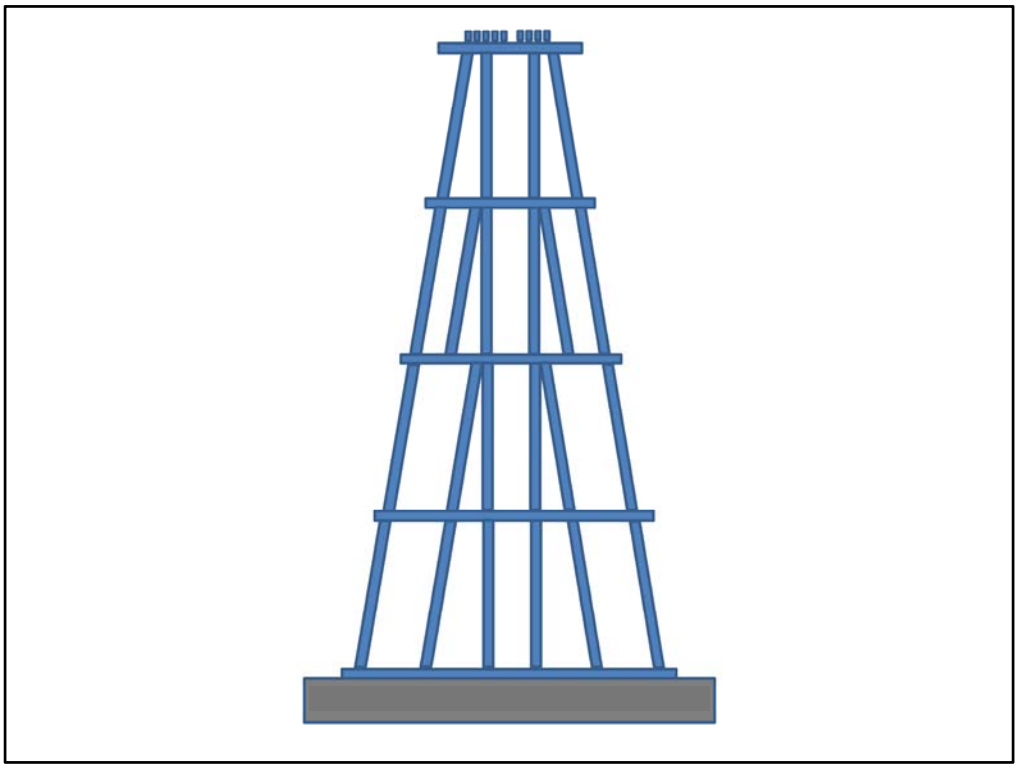


When adjacent bents have been restored, install the stringers.

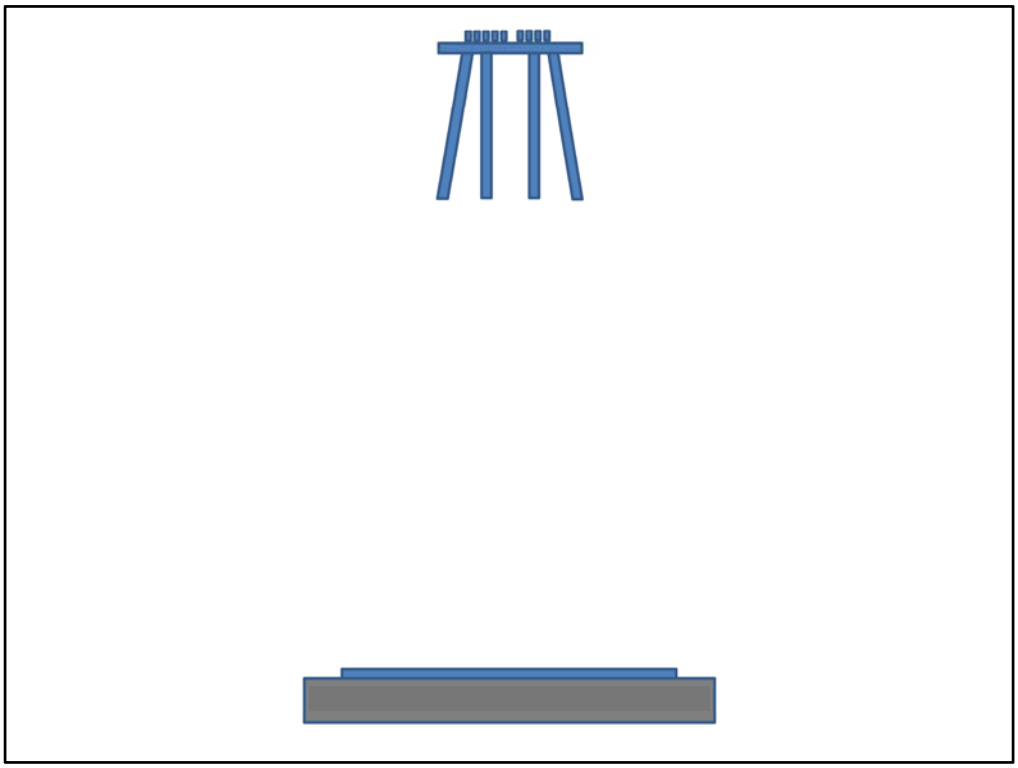
Can I build a model of the Mexican Canyon Trestle?

- Yes
- But you need to know how to determine the size of the parts that you need.
- And you need to know how to assemble the parts
- If you know the dimensions of the top section, you can determine how to build each of the lower sections, as shows on the following slides..

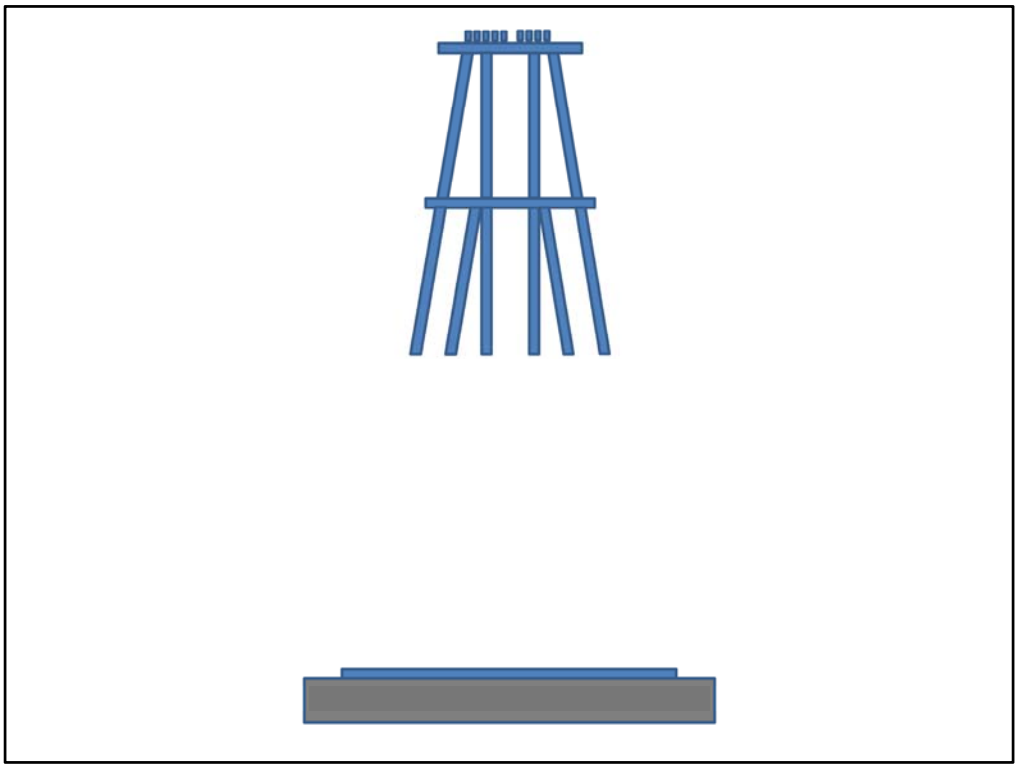
Also, think ahead. The Mexican Canyon Trestle is 300 feet long, so a 1/50 scale model will be 6 feet long.



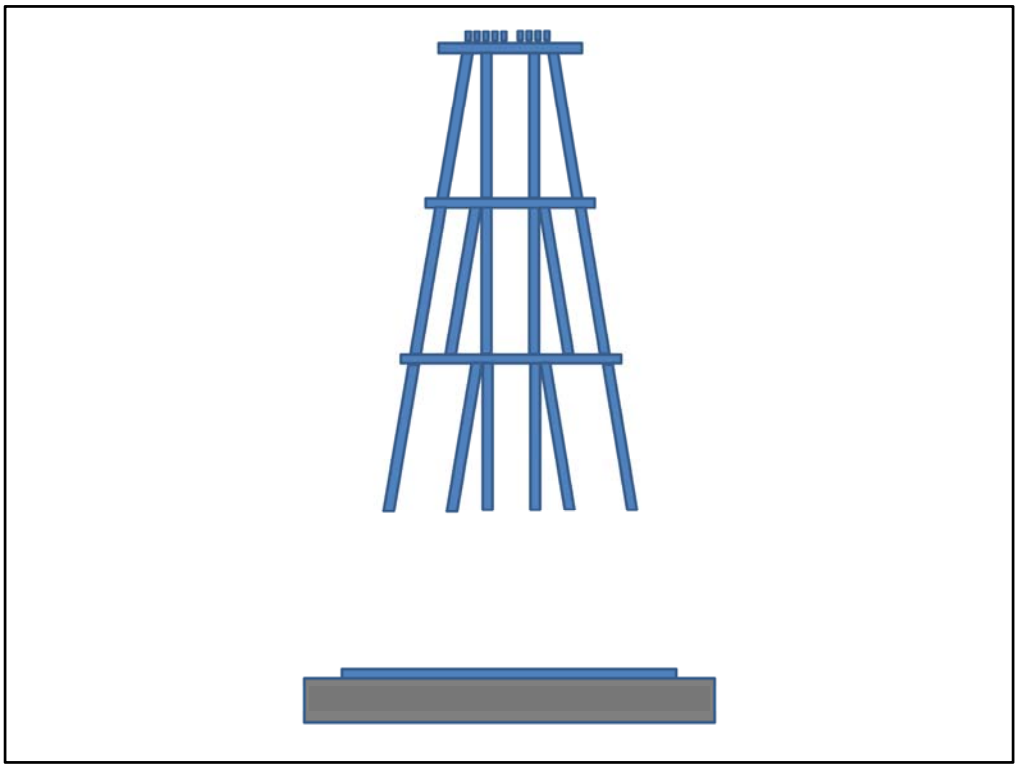
Now we will show you how to determined the sizes of parts that you will need. Here is Bent #9, without the cross-braces.



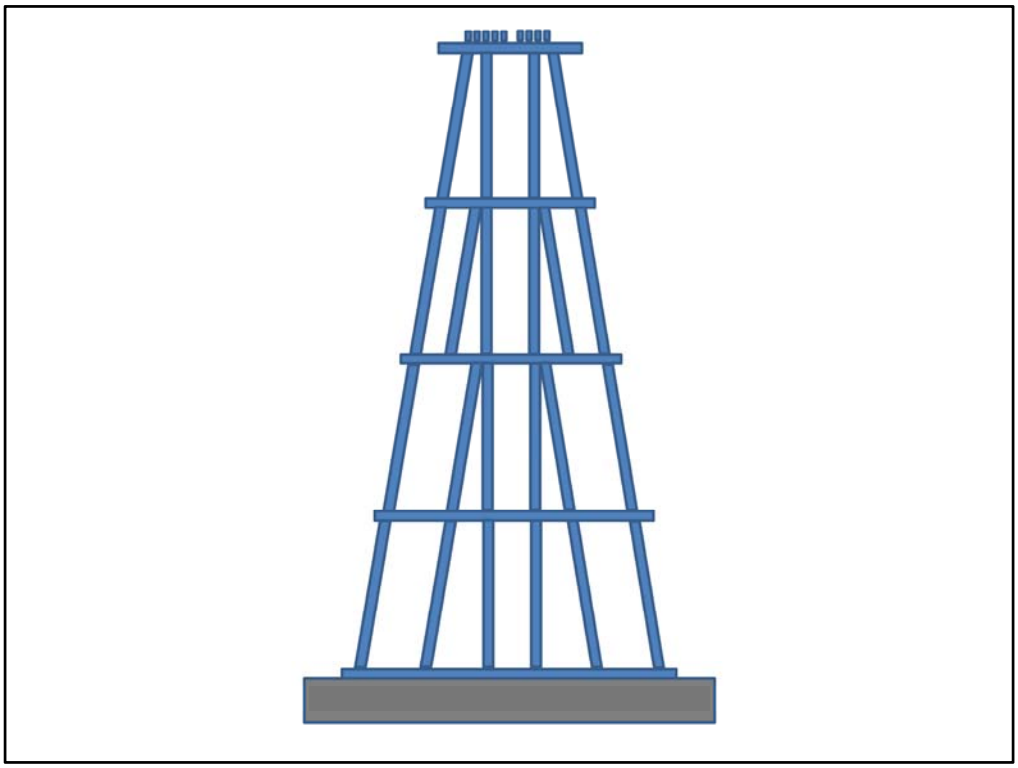
You should not start with pieces up the air, but the top section is the key.



The batters for the upper mid-section are placed as extensions of the batters for the top section. The rails are parallel to the batters.



The batters for the lower mid-section are placed as extensions of the batters for the upper mid-section. The rails are parallel to the batters.



The batters for the lowest section are placed as extensions of the batters for the lower mid-section section. The rails are parallel to the batters, but the rails in this section are extensions of the rails in the lower mid-section.

Building a Trestle

- The following link is for model railroad trestles
  http://*www.blackbearcc.com/**trestle**building_barrett.pdf*
- They recommend gluing the pieces, but the Mexican Canyon Trestle was not glued. The batters, plumbs, and rails are held in place by the weight of the structure and by bolt pins (¾" diameter, 24" long). The braces are held in place by bolts.

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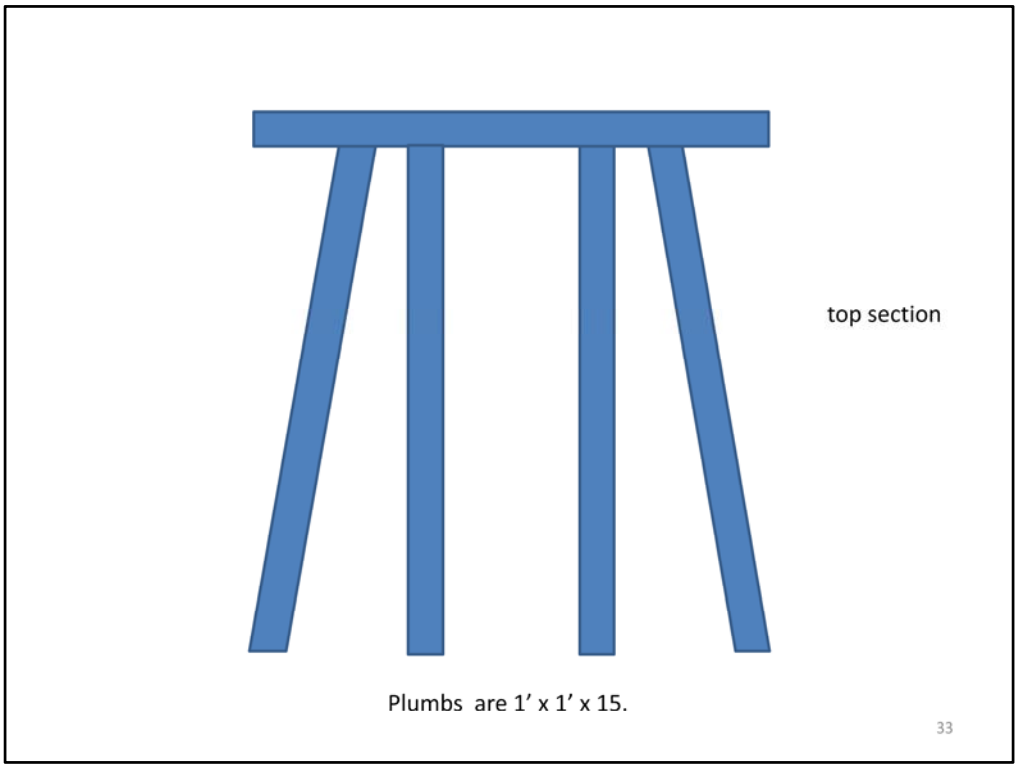
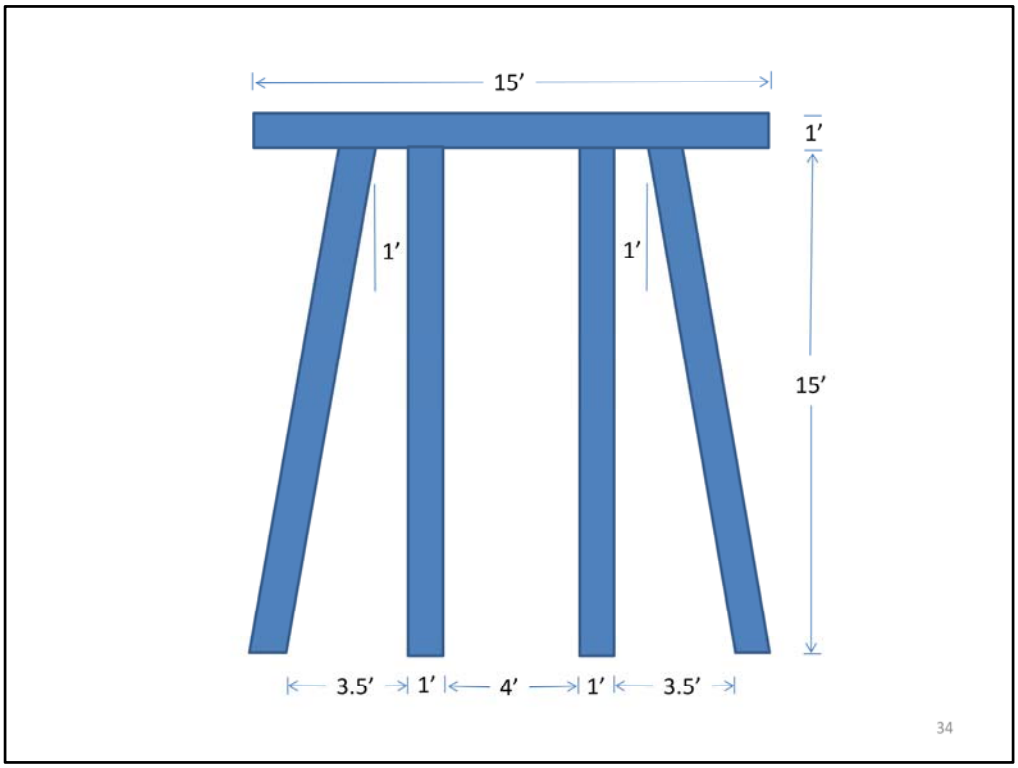
Bolt pins are not nails. Large nails would split the wood. A hole is drilled for the bolt pin, and then it is driven into the hole.



The dimensions of the top section are the key. From these dimensions, one can calculate all the other dimensions. Be sure to make the supporting sill extend 1 foot past the base of the batter (on each side) so that the cross braces can be attached.



The dimensions of the top section are the key. From these dimensions, one can calculate all the other dimensions. Be sure to make the supporting sill extend 1 foot past the base of the batter (on each side) so that the cross braces can be attached.

Bent #20

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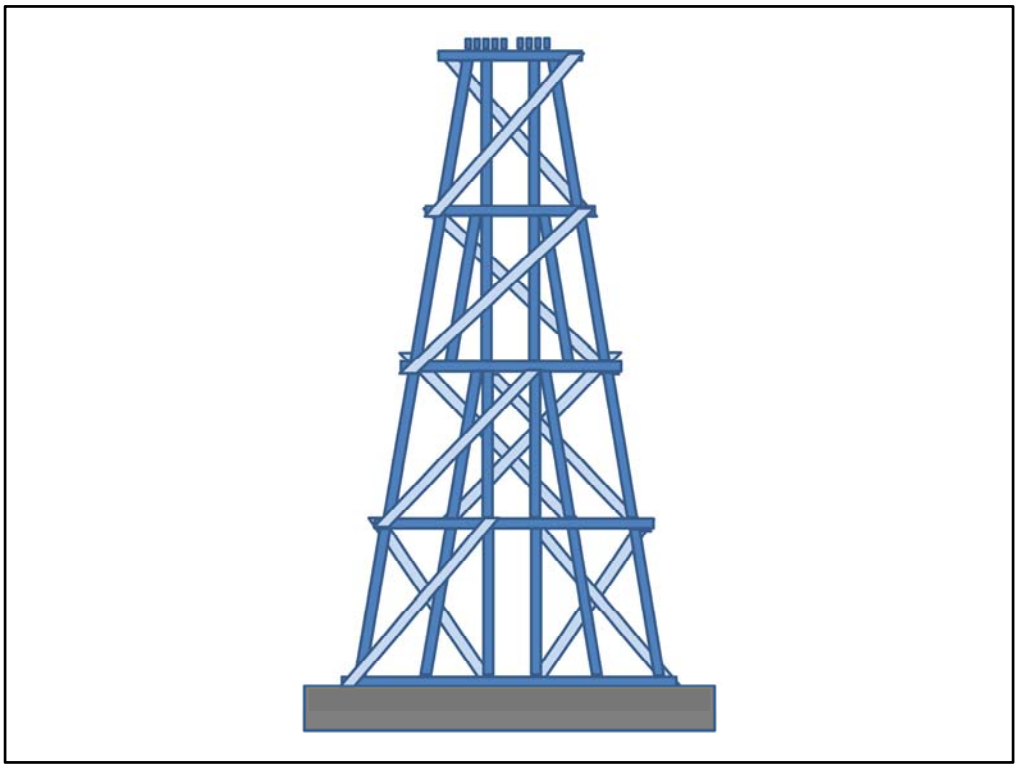
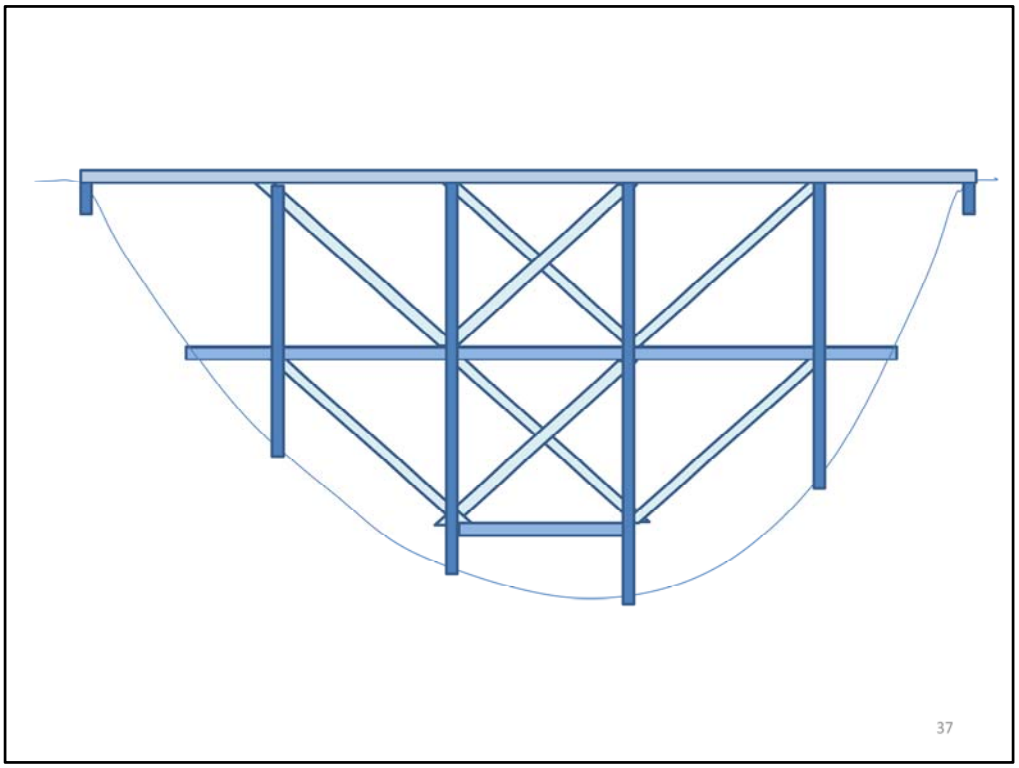
Picture taken from the Mexican Canyon Trestle Overlook. The plumbs are 1 foot x 1 foot x 15 feet. The vertical dimension appears shortened because of the camera angle.



A fully constructed bent. What should you do now?



Be sure to put in the horizontal braces (girts) [1 foot x 1 foot x 15 feet (maybe)] between the bents. Also put in diagonal cross braces. If the diagonal braces are inside the trestle structure, they are “kickers”. If they are outside they are “tower braces”. The next time that you are in Lowe’s grocery store in Alamogordo, mosey over to the “cake display” section and examine the cross bracing in the picture on the wall.

This is not the Mexican Canyon Trestle. This ravine requires only 6 bents.

Who would help me?

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I have a soft spot for kids and teachers who want to try something.

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Go for it! Build a model trestle!