

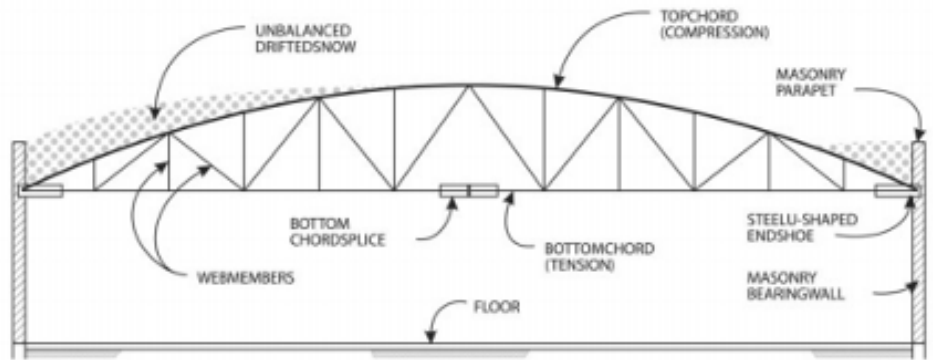
Wood Bowstring Truss Roof Systems



Buildings with heavy timber wood bowstring roof systems were common from the 1920s to the 1960s. These types of roof systems consist of large pieces of wood bolted together to form open spans. They can be longer than 70 feet and can be found in many types of buildings. Typically, however, you'll see them in industrial or commercial buildings that require a large open floor area, like manufacturing facilities, warehouses, grocery stores, bowling alleys, restaurants, car dealerships, and roller rinks.



Bowstring roof systems are known for their large size, long uninterrupted roof spans, and the likelihood of sagging or collapsing due to roof loads. These problems arise because of deficiencies in the design of the trusses, as well as damage to the trusses caused by exposure and age. The trusses eventually become overstressed and are known to collapse, especially when the roof is covered with snow and ice. Sometimes this damage is evident; other times, it's inside the trusses (dry rot). Many times, you'll see rotting or moisture where the truss sits on the wall. In addition to these issues, it's important to note that fire departments don't like to enter buildings that have bowstring truss roofs.



Reasons why these roofs are known to fail

There are many reasons why the roofs fail, but these are the most common:

- Between 1920-1960, many people didn't understand wood stress levels as well as they do today. Experts have determined that many of these roofs are overstressed and are likely to collapse.
- Its curved nature allows snow and water weight to cause uneven loading on the roof. This creates additional stress on the wood structures and cause the wood joints to weaken.
- Over the years, wood trusses become compromised due to water leakage. Decay develops in the trusses because they're exposed to moisture or extreme environmental conditions.
- Improper modifications may be made to the roof, like adding rooftop mechanicals, or suspending ceiling tiles or other items not included in the original design. These modifications can add stress to the trusses.
- Some trusses can also be damaged by "hits" from forklifts or items stored in the building. This can cause nicks in the wood which can lead to collapse.



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How to avoid collapse

Here are some suggestions to help a building owner ensure their wood bowstring truss roof won't collapse. It's important to note that buildings with this type of roof system will need extra maintenance and, in some cases, rebuilding or replacement.

- Have the trusses inspected by a **licensed structural engineer** with wood bowstring truss experience. Reinspections should occur **every five years**.
- Never cut, modify, or hang equipment from the trusses.
- Regularly clear snow, debris, and ice from roof drains to prevent standing water or ice damming.
- Institute a **quarterly inspection** plan to look for these conditions: water staining, deformation, dry rot, and damaged joints.

