

1 Problem

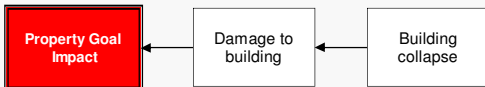
What	Problem(s)	Building collapses
When	Date	New York State 1999; Wisconsin 2010; England (2010/2011)
	Different, unusual, unique	High accumulation of snow & ice; buildings exempt from code
Where	State, city	World-wide
	Facility, site	Agricultural buildings
	Task being performed	Housing livestock, agricultural equipment

Impact to the Goals

Safety	Risk for serious injury, loss of life
Environmental	N/A
Customer Service	?
Production-Schedule	Risk for loss of livestock
Property, Equip, Mtls	Damage to property
Labor, Time	Cleanup, repairs, etc.

2 Analysis

Basic Level Cause Map - Start with simple Why questions.



Basic Cause-and-Effect

Every winter there are pockets of agricultural building collapses in areas that have seen heavy snow and ice accumulation. These collapses risk human and animal life and can cause significant financial loss to a farm.

More Detailed Cause-and-Effect

The collapse of an agricultural building carries with it the risk of human injury or loss of life, as well as potential loss of livestock. A building collapse results in property damage as well as time spent on cleanup, repairs, and anything else that needs to be done to get the facility up and running again.

These impacts to the goals are all related to the collapse of an agricultural building. The collapse of a building results when the stress (in this case, the structural load) exceeds the strength. The structural loads in the case of the collapsed buildings generally result from accumulation of ice and snow, which may be unevenly distributed, increasing local load, due to drifting, and an improperly engineered building. Agricultural buildings are more likely to collapse due to structural loads because they are exempt from codes in most of the US and unregulated in England. If engineering is desired, a properly engineered building may be scaled up or altered, resulting in changing loads and strengths, meaning the engineering review may no longer be valid to protect the building. Although engineering is frequently skipped due to cost measures, experts say that proper engineering can save money by ensuring that supports are put in only where they're needed (and, of course, reducing the risk of a collapse.)

Generally the collapsed buildings are found to have inadequate bracing, which reduces the strength of the building to the point of collapse. If the buildings are not properly engineered, bracing may be inadequate for the design of the building. Another issue frequently seen is that the trusses are engineered, but are not reviewed with respect to the overall building design, leading to an insufficient analysis that does not take into account all of the factors that impact building loads and strength.

3 Solutions

Although states and countries could elect to consider agricultural buildings in their codes, farmers don't need to wait. If you are building an agricultural building (or any building that may be exempt from code), ensure it's adequately structurally engineered. It may save a life.

BARN COLLAPSE

Most agricultural buildings exempt from building code

Every winter, many agricultural buildings fail under heavy snow fall. However, other buildings remain standing. Many agricultural buildings are exempt from building codes which would ensure they could stand up to a region's typical snow load.

"Telling a consumer they do not need to have their building engineered if it is exempt from the building code is no different than telling a person they do not need to wear a seat belt or a bike helmet if the law doesn't require it."

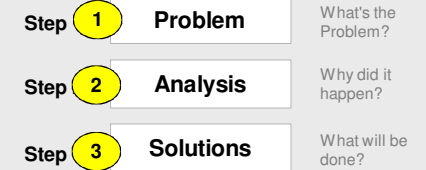
David Bohnhoff, P.E., Professor at UW-Madison

Cause Map

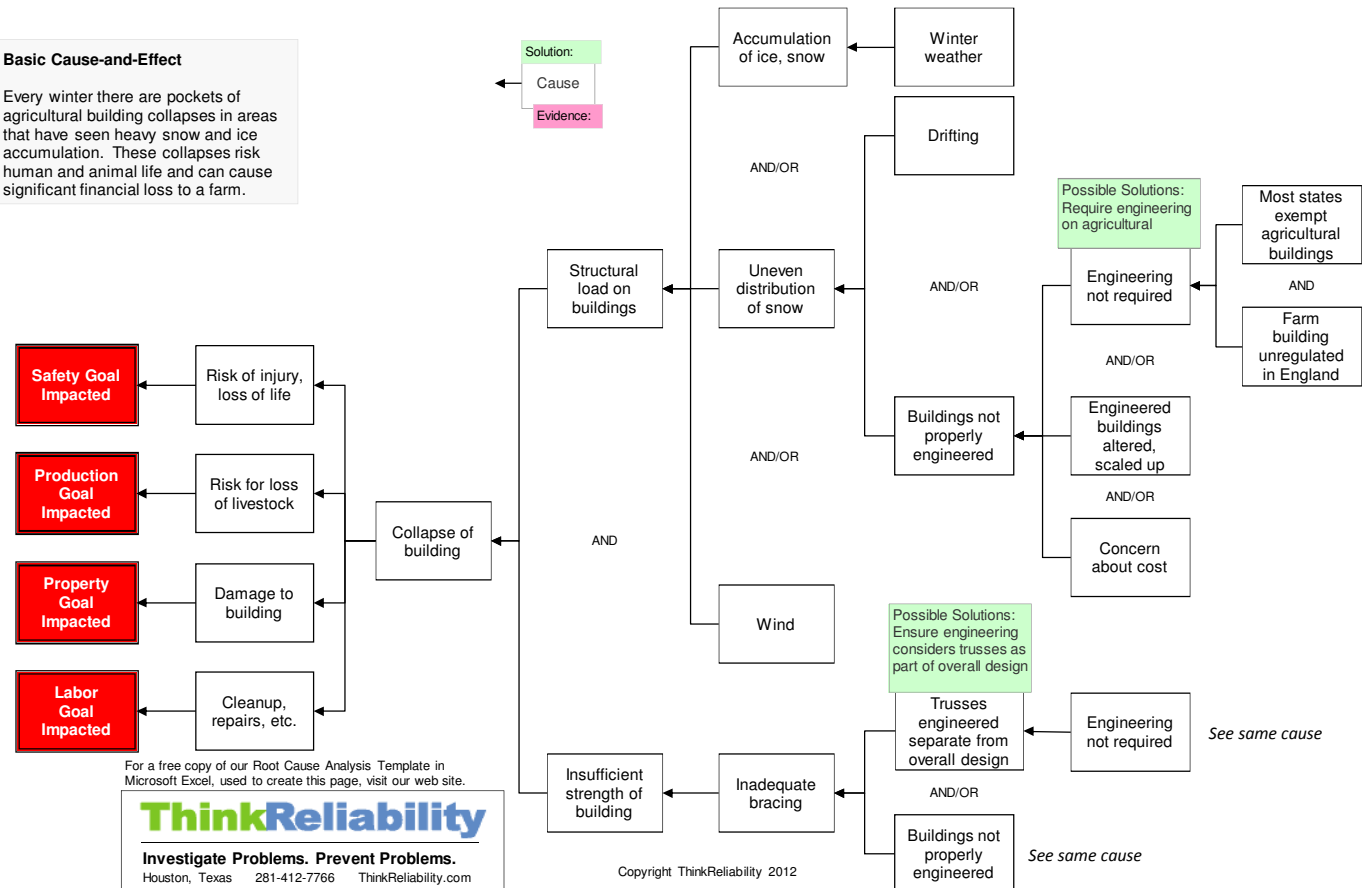
Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.

CAUSE MAPPING

Problem Solving • Incident Investigation • Root Cause Analysis



More Detailed Cause Map - Add detail as information becomes available.



For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our web site.

ThinkReliability
 Investigate Problems. Prevent Problems.
 Houston, Texas 281-412-7766 ThinkReliability.com

Copyright ThinkReliability 2012