Volume
02
August
2015

Midwest Engineering

Bi-Monthly Newsletter

this issue

Uplift of Pole Barns

and

Lateral Wind Considerations

Midwest Engineering Company was formed to provide professional design and owner representation services with a clientele based delivery methodology. We believe that you are more than just a client, you are our neighbor. *Midwest Engineering* offers a variety of services from owner representation to structural engineering design.

ME

Uplift on Pole Barns

"Looks like a kite" is a common phrase I hear when I drive by large monoslope pole barns in the country. Unfortunately, some barns take flight- putting the Wright Brothers at Kitty Hawk to shame. Designing for wind loads is difficult, but crucial for the structural integrity of pole barns. The building in the picture failed after the support poles pulled out, which were not attached to a foundation. After reviewing the failed building, the following chart was developed (Shown with MN ag adjustment factors and 2009 IBC design requirements). At the 2009 IBC code wind design load of 90 mph, it was determined the building required 2720 lbs. of additional resistance. This building failed with winds as low as 30 mph, much lower than code required.

DESIGN WIND SPEED	30 mph	40 mph	50 mph	60 mph	70 mph	80 mph	90 mph
UPLIFT PER BUILDING CODE	-2.1 psf	-3.7 psf	-5.7 psf	-8.2 psf	-11.2 psf	-14.7 psf	-18.6 psf
UPLIFT WITH AGRICULTURAL ADJUSTMENT FACTORS	-1.8 psf	-3.2 psf	-5.0 psf	-7.1 psf	-9.7 psf	-12.8 psf	-16.2 psf
NET UPLIFT LESS DEAD WEIGHT ON EAST COLUMNS	80 lb.	340 lb.	660 lb.	1060 lb.	1540 lb.	2100 lb	2720 lb.

ME

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Interesting Facts:

Wood (Fir)

46 lb/ cubic ft

Concrete

150 lb/cubic ft

Steel

490 lb/cubic ft

Gold

1207 lb/cubic ft

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This project was completed for an insurance company, who then held responsible parties liable for the loss of the building. SD, MN, IA, NE, and ND all have adopted IBC as their standard building code. With a state code requiring minimum design requirements, building designers/ builders are required to ensure that the building meets code—even though there may not be a local jurisdiction issuing building permits. As a licensed professional, I would rather help you design your pole barns versus being hired by an insurance company to analyze a failed building that you constructed.

Robbie Veurink, Partner at ME

Lateral Wind Considerations

With the recent wind storms in the Midwest, I thought it would be beneficial to talk about lateral wind loads. Everyone is accustomed to thinking about gravity loads, such as dead and snow loads, but rarely do individuals understand wind loads and the transfer mechanisms for adequate load paths. For simplicity, lets talk about wind loads for a typical agriculture building. The case building will be a 84' x 120' shed with 20' side walls, with no walls in the interior. Using ASCE 7-10, IBC wind design loads, storage occupancy, category 1 building classification, and horizontal MWFRS simple diaphragm pressures; design wind loads perpendicular to the long wall would apply 70,600 lbs. of force on the building. That's nearly the weight of a loaded semi parked on the side of your building! With the high cost of machinery and livestock, an unnecessary failure of a building from wind is not an event most individuals want to experience. With proper upfront design and construction techniques, premature building failures can be avoided—saving time and money in the future.

Robbie Veurink, Partner at ME