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Industrial structure design on the edge of seismic performance: Lessons learned from three little pigs

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ABSTRACT:

Three little pigs designed three low-ductility industrial agriculture buildings. Two collapsed under a known extreme hazard. Fortunately, there was no loss of life, but two livelihoods were destroyed. Was the subpar straw and wood material to blame? Were the designers to be held accountable? History seems to have concluded thus. On the contrary, our recent investigations conclusively show that it was only a case of well-meaning engineers, who were betrayed by a well-meaning design code. They were misled to place their trust on a thought-up q-factor of 1.5 to 2.0 for brittle system design that had been calibrated for the limit-state of severe damage. The code implied that this would automatically mean satisfying collapse prevention. It was a notion that was transferred without much scrutiny from ductile capacity-designed systems, such as moment-resisting frames or shear walls. Instead, by never being properly verified, it could not provide an adequate safety margin for collapse of brittle systems under extreme loads. Two, admittedly swine, engineers were framed by the powers that be. Follow us on the journey to uncover one of the greatest misdeeds of history that is still being taught to our children.

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