Editorial | The Mouse That Roared

By John Mercer, P.E., SECB

We all remember the storybook "The Three Little Pigs" and how, at an early age, we learned to difference between building with straw, sticks and bricks. I seem to remember that it was better to build with bricks. Later, during my formal education, I also learned that water runs downhill.

Experience also has given me insight into the old adages "whatever man can envision and build, nature can easily take away "or", the more beautiful something is, the greater its potential danger".

The Mighty Mouse River flows south from Canada down the Souris Valley and meanders through Minot, North Dakota. It then turns north and re-enters Canada approximately 45 miles to the east. An agreement between the United States and Canada, made in the middle '80s, resulted in the construction of two dry dams on the Canadian side of the border to control the flow of the Mouse River, sometimes called the Souris River.

The agreement stated that a maximum of 5000 cubic feet per second (cfs) would be released to maintain a level of flow in the river channel. The US Army Corps of Engineers (Corps) served as the water custodians on the US side of the border. They were inflexible in their thinking or planning for excess water releases, as they stood firm on the 5000 cfs.

The 2010-2011 winter was an extraordinary year for snowfall. Minot averages 39 inches per year, but received 84 inches. Canada had a similar winter. A snow pack of pent up water was poised to flow downstream, and the stage for a potential flood was set.

June 2011 presented water managers with the challenge of beginning the process of managing releases of the water behind the dams. They actually began releasing water during the winter months, once they recognized the snow pack melt-water potential. An unplanned 7-inch spring rain in Canada exacerbated the situation, as the dams were full and it was necessary to increase the volume of releases to approach 15,000 cfs in order to avoid structural dam failures.

The Flood of 2011 set a new record for Minot, ten (10) feet higher than the flood of 1969 and four (4) feet higher that the recorded flood of 1882. Many Canadian communities, and communities between the border and Minot, were also flooded. 4100 homes were flooded in Minot, estimated to be a $1 Billion loss.

How does a structural engineer wrap his/her head around the problem of how to help so many people to recover and get back into their homes, as well as manage risk? In North Dakota winter can come anytime, historically as early as September.

Thanks to CASE Contract Documents, there is a one-page agreement easily modifiable for the flooded homeowner. It was easy to establish a scope of services; site reconnaissance to evaluate the "basement walls", "floor framing", "wall framing", and "roof framing systems that are visible".

The deliverable consists of a short letter report outlining the observations with recommendations to remove and replace, or to repair. An indemnification clause was also added for good measure. Distraught people sometimes will do the unexpected.

My firm also established a low fixed fee that we were comfortable with, and pledged 25% of the flood related fees to be turned over the Salvation Army to support their food Canteens.

Tornados, earthquakes, hurricanes, and floods devastated our homeland this year. As in other years, the human spirit has responded to the recovery. What catastrophe is waiting to happen in your community?

Structural engineers are a key participant in the support system to help our cities and communities recover. Who else is better equipped to have the foresight and vision to be able to anticipate future worst-case scenarios? Building Codes and Standards are only guides that define minimum requirements. The structural engineer is the one who, with a critical eye, must question the design criteria to be applied to each situation.

Examples of services that clients have requested include: simple foundation evaluation to determine if it can be used to build on again, adding an additional story to the house, putting an addition on the house, and lifting the house and constructing a floodway living space under it, etc.

How would you protect yourself from the unforeseen conditions in an existing house structure? First, be aware there may be deficiencies in the construction of the existing structure. Avoid agreeing to take on the responsibility of someone else's decisions or mistakes. How many more things can you think of that you would add into your agreement to manage your risk? Do you look over the horizon to envision what *might* happen and address those situations in your agreements?

The Minot disaster response and recovery model was applauded by FEMA. The city's mayor and public works and engineering departments worked tirelessly to save the community. They had to make real time decisions to sacrifice certain portions of neighborhoods in order to save others.

> *<u>Flood Lessons Learned:</u> once an area has been flooded, consider it lost and maintain the same level of flow to drain the system as fast as possible. Don't revert back to lower flow rates, as the damage has been done. Lowering flow rates too early exacerbates the potential for increased damage from unexpected higher flows. Play what-if scenarios with the flood model and weather forecasting.*

In case you are wondering, I was fortunate to have stayed high and dry. I built high on a hill. Join CASE today.▪

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