



## Geographical location

Winnipeg, Manitoba

## When it began or was completed

Failure 1913; righting was completed in October 1914

## Why a Canadian geotechnical achievement?

The foundation failure and righting of the Transcona Grain Elevator is a geotechnical achievement. The failure occurred during loading, after bearing pressures exceeded the limiting shear resistance of the underlying clay foundation soil. While the mat foundation for the elevator was likely designed to tolerate large settlements, its susceptibility to a deep-seated base shear failure was neither understood nor expected (Allaire, 1916). Early foundation engineers recognized this unique opportunity to compare the loading at failure with that predicted by classical bearing capacity formulae (Skempton, 1951). Subsequent studies demonstrated that the ultimate theoretical bearing capacity of 6,420 psf (307.4 kPa) was remarkably close to the actual observed bearing capacity at failure of 6,200 psf (296.9 kPa) (Blatz and Skaftfeld, 2003).

More remarkable was the effort to right the elevator by excavating under and lowering the high side and gradually raising the low side. Initially, a trench was excavated along the high side of the structure to the underside of the mat foundation. Drifts were then excavated beneath the mat foundation and a row of 14 piers was sunk to bedrock. The structure was raised using shoring screws and timber rockers installed on the tops of successive rows of piers. To assist, twelve timber pushers were placed against the side of the bins. On October 17, 1914, two days behind schedule, the elevator was back in its vertical position having been raised about 12 feet (3.7 m).

The elevator has been successfully used since this time and is now owned and operated by Parrish and Heimbecker Limited.

## Submitted by

Ken Skaftfeld, Winnipeg, Manitoba

## Key References

Allaire, A. 1916. **The failure and righting of a million – bushel grain elevator**, Transactions of the ASCE, Vol 80, pp 799-832.

Blatz, J and Skaftfeld, K. 2003. **The Transcona grain elevator failure: a modern perspective 90 years later**. Proceedings, 56<sup>th</sup> Canadian Geotechnical Conference, Winnipeg, MB, pp 8-22 to 8-29.

Skempton, AW. 1951. **The bearing capacity of clays**. Division I, Building Research Congress. London, England, pp 180-189.

See also:

[http://cgs.ca/virtual\\_archives\\_projects.php?lang=en](http://cgs.ca/virtual_archives_projects.php?lang=en)

## Photographs



Elevator after failure.



Shoring screws used to lift structure.