

Lidar monitoring of ground movements associated with frost heave over leaking cast iron water pipes

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This presentation describes fieldwork conducted to investigate the links between frost heave above cast iron water pipes, leakage of those pipes, and development of ring fractures during very cold events. Investigations started with three dimensional computer analysis, which showed that longitudinal bending associated with frost heave can produce moments sufficient to produce ring fractures. A few field sites were then identified, where small diameter cast iron water distribution pipes have an ongoing history of breaks. Acoustic methods were then used to locate water leaks, and provide estimates of average remaining wall thickness. Lidar and total station measurements used from winter to summer to monitor the amounts of vertical surface movement of pavements located above the water pipes. Measurements show how leaks lead to additional frost heave. While no new breaks occurred along the pipelines being monitored over the course of the study, it is now clear that watermain breaks during cold weather events can be preceded by leaks in the cast iron water pipe, and that proactive repair of those leaks may reduce costs associated with watermain repair. Research is ongoing regarding the use of Lidar to identify the most critical pipes for repair.

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