

## HEATHER MCLEOD, MSC (2008)

### RESEARCH SUMMARY

**FIELDWORK IN OTTAWA ONTARIO AND AURORA ILLINOIS**

**MONITORING OF SURFACE MOVEMENTS DURING PIPE BURSTING**

**EXAMINED DIFFERENT BURIAL DEPTHS AND PIPE IN A TRENCH**

**MEASUREMENTS ALSO SHOW EFFECT OF AN OVERLYING PAVEMENT**

**VERTICAL AND HORIZONTAL GROUND MOVEMENTS RECORDED**

**MEASURED USING TOTAL STATION & PARTICLE IMAGE VELOCIMETRY**

### HIGHLIGHTS

- Project supported by NSERC and industry in Canada and the US
- Data provides new information on rehabilitation of pipes in clay and effect of trench width
- With Golder Associates in Kelowna B.C., since January 2009.

### GROUND MOVEMENTS WHEN PIPE BURSTING IN CLAY

During static pipe bursting, a conical bursting head is pulled through an existing pipe, breaking it, enlarging the cavity, and pulling a replacement pipe into place. Issues of interest during pipe bursting include ground movements resulting from enlargement of the soil cavity around the old pipe, which can damage other infrastructure in the vicinity.

Heather McLeod conducted three experiments replacing clay pipes in Illinois and she monitored replacement of five sewers at the RCMP Academy in Ottawa to measure the magnitude and pattern of surface movements. This provides information on vertical movements (uplift) as well as forward and lateral ground deformations. Each of these is associated with different types of potential distress in other infrastructure (overlying pavements, other pipes, or foundations nearby).

Heather used a servo-controlled total station and Particle Image Velocimetry (with assistance from Dr Andy Take) to establish the pattern of vertical and lateral soil movements when replacing rigid pipes buried in clay soils. The data is being used by PhD student Kazi Rahman who is developing three dimensional modeling techniques using ABAQUS to improve predictive methods for ground movements associated with Pipe Bursting.

### SUPPORT FROM MARATHON DRILLING AND TT TECHNOLOGIES.

Pipe bursting operations were provided by Canadian trenchless contactor Marathon Drilling and US trenchless equipment developer and supplier TT Technologies.

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Heather and the rest of the team in Aurora, IL, 2008.

PIV targets and surveying prisms prior to testing.

