Large Diameter Transmission Watermains – Pipe Materials Study

Current City standard

- Since 1950s, large diameter transmission watermains (750mm or larger) constructed of cement mortar lined, continuously welded steel pipe, fully encased in concrete

Issues of concern

- Significant infrastructure investment with bid prices ranging from $10M to $20M per kilometre
- Length of time required to construct current City standard watermain
Recent study

City engaged Cole Engineering Group Ltd. to review current standard and complete:

- a literature review across industry publications
- survey Durham, York and Peel Regions on their use of concrete pressure pipe (all satisfied with pipe performance)
- conduct a risk assessment workshop of design engineers

Technical conclusion: while current standard is very durable, no one pipe material is better than another
Study Recommendations

- Future construction tenders should consider multiple pipe materials promoting competition and potential savings. Pipe materials to include:
  - pre-stressed concrete cylinder pipe (PCCP)
  - steel welded pipe
  - polyvinyl chloride (PVC)
  - high density polyethylene (HDPE)
  - continuously welded steel pipe with mortar lining (current standard)
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Pre-stressed concrete cylinder pipe (PCCP)

Polyvinyl chloride (PVC)
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High density polyethylene (HDPE)

Steel welded pipe (1650 mm used for Neilson Road project)
Avenue Road watermain replacement -- continuously welded steel pipe with mortar lining (current standard)
Risk Assessment

• In critical or high risk locations, while alternative pipe materials should be allowed for larger diameter transmission watermains, it is recommended that:

  – pipe meets designed performance standards (i.e. American Water Works Association)
  – high risk locations be identified during the Environmental Assessment phase and/or pre-design phase
  – a standard be developed for locations considered high risk or operationally critical to offer a higher level of protection to ensure safe operation and security of water supply.