



**Environmental  
Hydraulics  
Group**

**Hydraulic Transients (HT)  
- Water & Sewage**

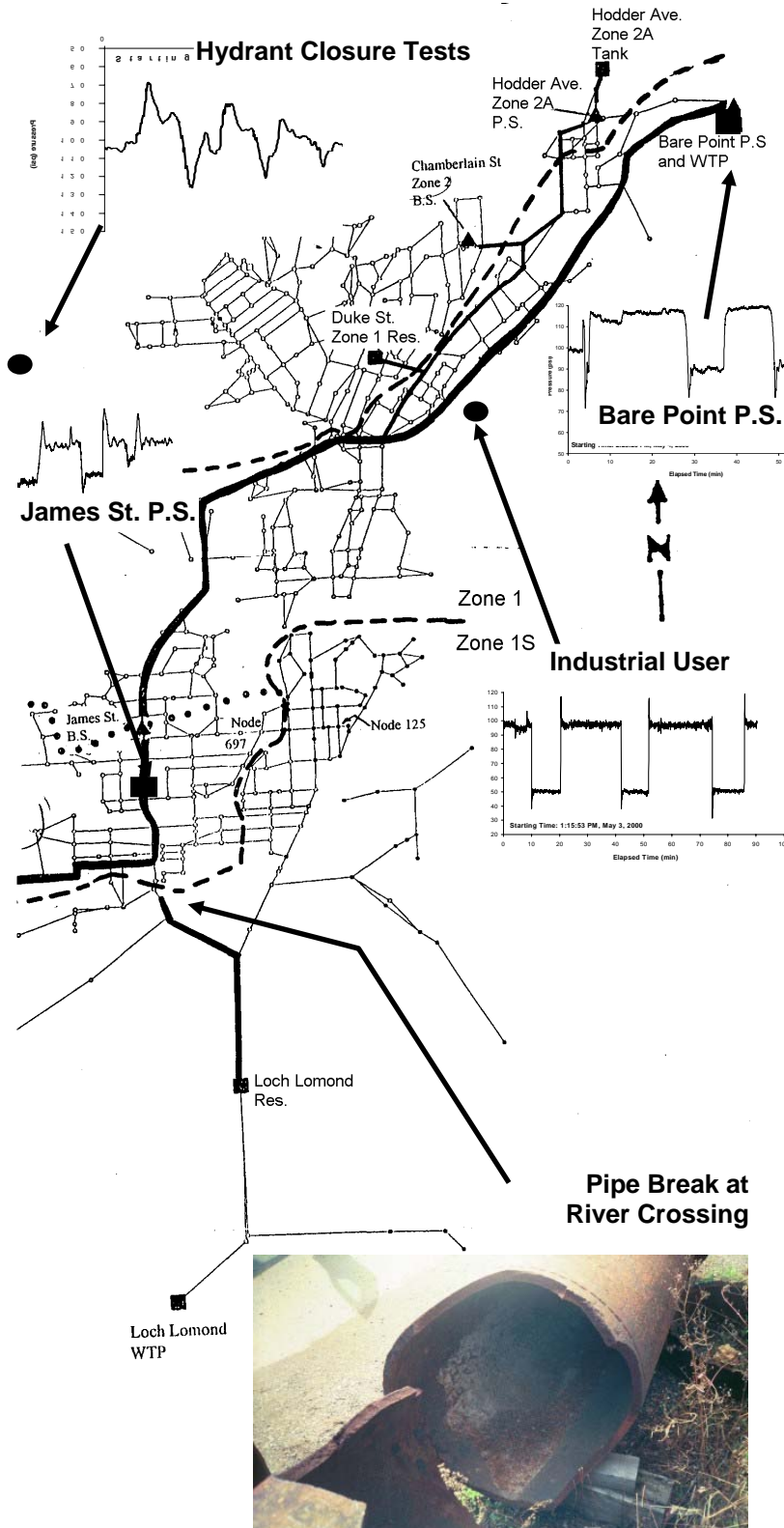
**Project: Transient Analysis of Entire Water  
Distribution Network (& Crossings)**

**2000-011**

**Location: Thunder Bay, Ontario, Canada**

**Client: Earth Tech Canada Inc.**

**Completed: October 2000**



In 1998, EHG was retained to investigate the transient impact of a new booster pumping station in the city (James Street). EHG was retained again in 1999 to complete a detailed computer model and analysis for the entire water network. A number of issues were identified:

- i) Two existing and separate pressure zones (formerly separate water systems) would be merged into one, resulting in major changes in normal velocities and pressures and in water supply direction.
- ii) At the time, air entrainment was a serious hydraulic concern which affected pump efficiency and network conveyance.
- iii) Several incidents of pipe bursts had occurred at three major river crossings.
- iv) Sub-atmospheric pressure (or even a fully vacuum condition) could occur within a large portion of the water system.
- v) Rapid and significant pressure surges travelled throughout the system as a result of water taking and stoppage by large industrial water users.
- vi) Extensive field testing and computer simulations were undertaken; including hydrant closing and opening.
- vii) In addition to the transient impacts due to power failures EHG also optimized many "normal" operations such as pump rate changes, reservoir altitude valve and air release valves network-wide.