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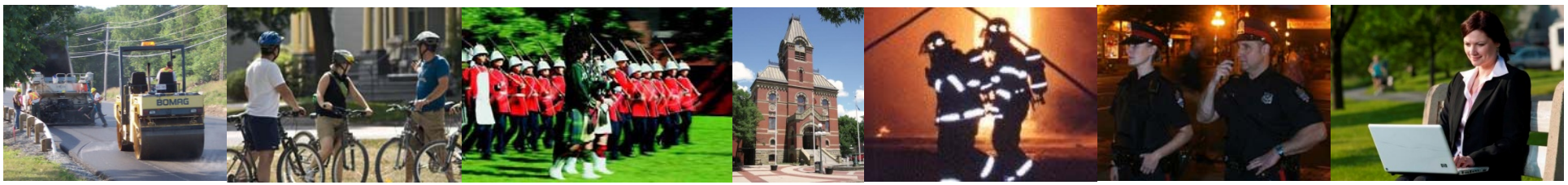
Disinfection of water mains when conducting emergency repairs

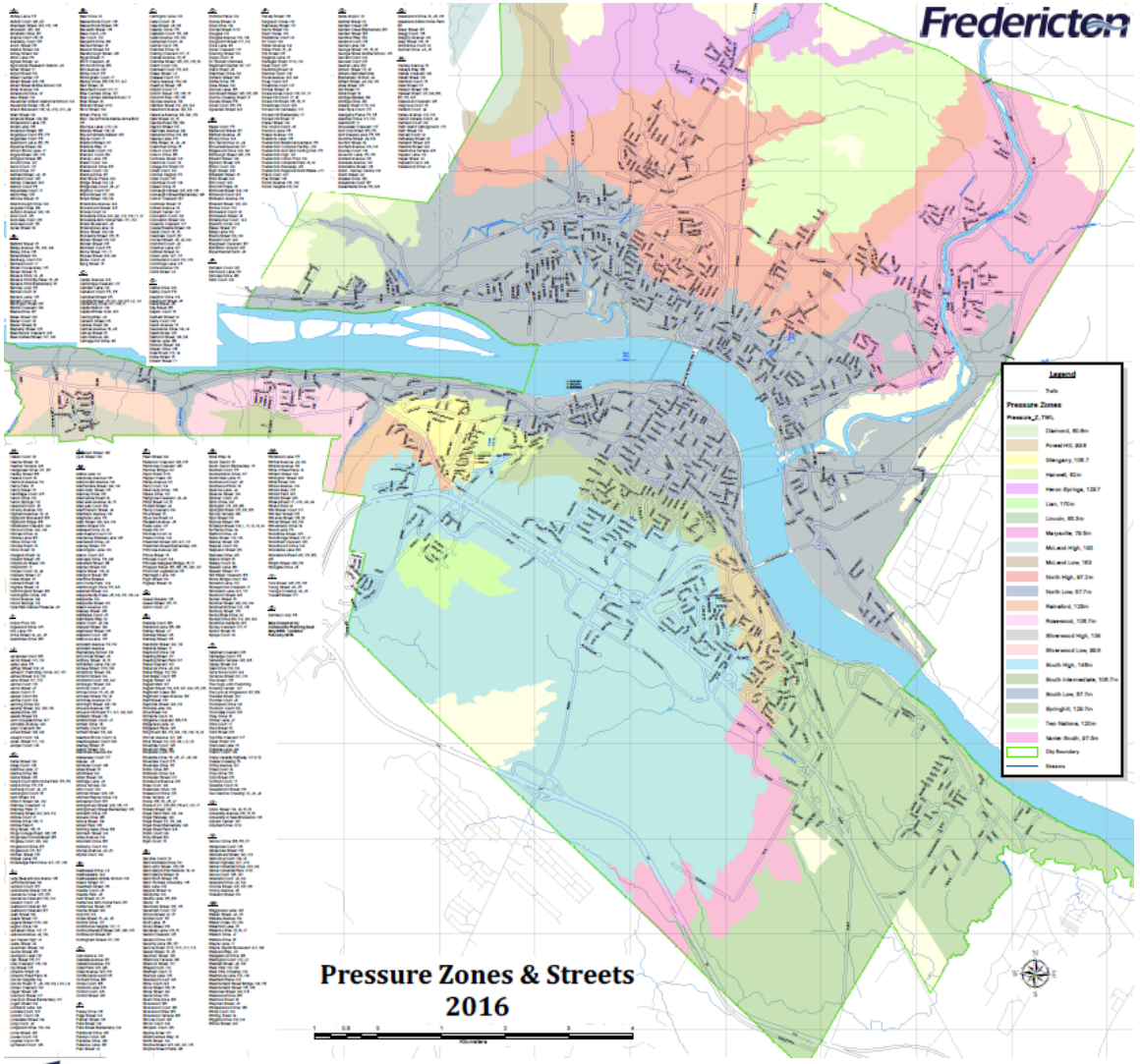
Scott Grasman
City of Fredericton
Engineering & Operations Department
Water & Sewer Division



Agenda

- Fredericton's water system: a brief snapshot
- Water main failure repair considerations:
  - Health and safety of water customers;
  - Regulatory compliance;
  - Risk management: Making the repair;
  - Repair procedures when positive pressure cannot be maintained:
  - Disinfection of materials used in a repair;
  - Flushing and sampling protocols.

Fredericton's water system



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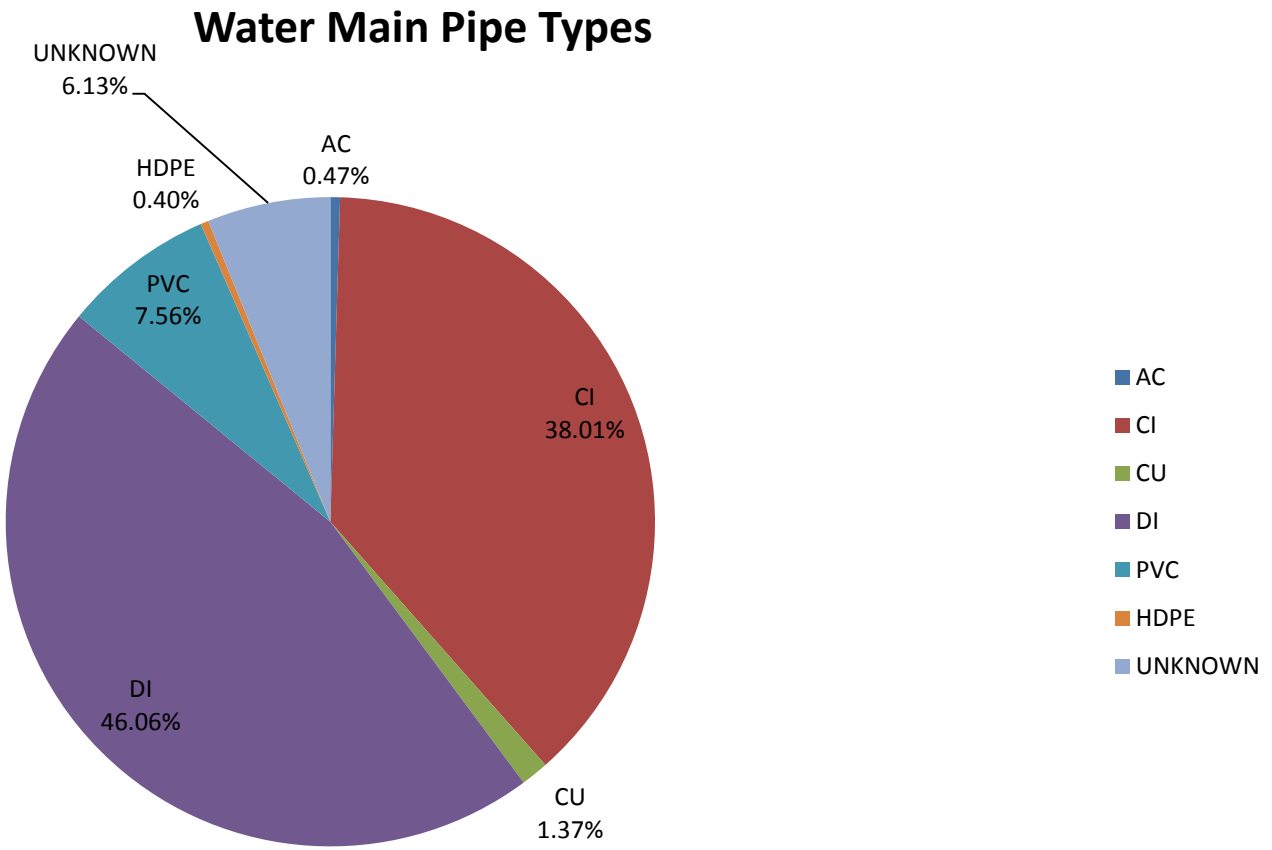
Fredericton's water system:

- Over 17 000 service connections;
- Over 450km of water mains in service;
- Groundwater based supply- 11 productions wells;
- 2 water treatment plants (manganese removal);
- 14 reservoirs, 13 booster stations;
- Over 2400 fire hydrants.

Fredericton's water system



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10 year historical trends

- Total water main failures 2005-15: 399
- 10 year average: 40
- Highest number of repairs in one year: 47 in 2013;
- Lowest number of repairs in one year: 20 in 2006;
- 41 in 2015...

Water main failure repair considerations

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Health and safety of water customers:

- Is the repair site itself safe for the public?
- What is the nature of the area?
  - Residential?
  - Commercial?
  - Institutional?
  - Special customer needs (e.g. Dialysis)
- What is the topography of the area?
  - Flat
  - Elevation differences
  - Risk of backsiphonage?
  - What backflow prevention measures are in place?
- What is the chlorine residual in the area?
- Can positive pressure be maintained at the point of the break?

Regulatory compliance:

- Have impacted customers been notified?
- Has a chlorine residual been measured prior to repair?
- Can we flush through the repair, and flush through a hydrant for water quality purposes?
- Can the impacted area remain isolated from the greater distribution system pending receipt of negative bacteriological samples?
- Does the regulatory agency need to be notified?

Risk management: making the repair

- Can we dig an adequate sump?
- Is the safety of the trench remaining stable?
- Has a sewer main or lateral been broken?
- Has a service been broken?
- Can a clamp be installed while maintaining positive pressure?
- Has an anode been installed?

“Positive pressure....”

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Repair procedures when positive pressure cannot be maintained

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Loss of pressure water main failure repair considerations

- Notification of impacted customers
- Notification of regulatory agency
- Can the trench water be managed?
- Once impacted pipe has been dewatered, cut, and exposed, does it remain above the trench water level at all times?
- Has each exposed end been inspected for debris (e.g. sand, gravel)
- Have new parts to be installed been properly disinfected?
  - Disinfected according to AWWA Standard C651-05
  - Sterile pail, water, adequate sodium hypochlorite mixture?
  - New only mop head used?
- Boil water advisory required?
- Customers notified prior to returning water main to service?

Maintaining positive pressure (initially)

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Managing trench water

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Preparing to cut the pipe

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Making the cut

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Preparing for installation of new pipe

Cutting new pipe to proper length

Disinfection of new parts

Disinfection of new parts

Disinfection of receiving pipe ends

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Installation of new pipe section

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Installation of anode

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Repair complete; anode installed

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Flushing and sampling post-repair

- Required for regulatory compliance
- Want to confirm our repairs have been made safely
- A critical part of the repair process- cannot be an afterthought
- Considerations:
  - Can you flush through the repair to a fire hydrant?
  - What is your alternative flushing plan?
- Flush until turbidity is 1.0NTU or less
- Measure chlorine residual prior to sampling
- Disinfect sampling tap prior to sampling
- Disinfect hands
- Collect sample carefully (bottles are cheap.....)
- Leave impacted area isolated (if possible)....
- False positives unnecessarily complicate the process, can inconvenience customers, and cost money

Summary

- Water main failures are a reality in our business
- We must remain committed to minimizing their impacts to customers, damages to property, and water losses to the distribution system
- Public safety and confidence in our actions is paramount
- We must be aware of our obligations, and take action accordingly
- Pressure loss situations must be managed carefully
- Disinfection process critical
- Manage the repairs by managing the risks....

Disinfection of water mains when conducting emergency repairs

Thank you.

QUESTIONS?

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