



# Distribution System Flushing:

Conventional, Unidirectional,  
and No Discharge Methods

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# Why Have a Distribution System Flushing Program?

- Water Quality
  - Scour pipe surfaces
    - Remove sediment, biofilm, scale, etc.
  - Remove stagnant water
    - Reduce water age, increase disinfectant residual, etc.
  - Address aesthetic issues

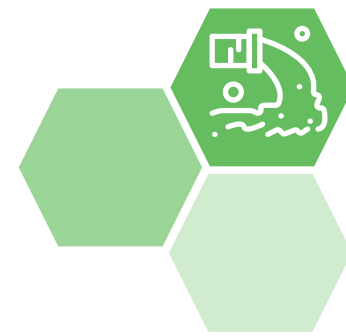


*Large debris (rock)*



*Hydrant flushing example*

# Why Have a Distribution System Flushing Program?



- System maintenance
  - Exercise valves/hydrants
  - Improves the carrying capacity of pipes
  - Allows operators to assess available water pressure and available flow



*Master meter vault*



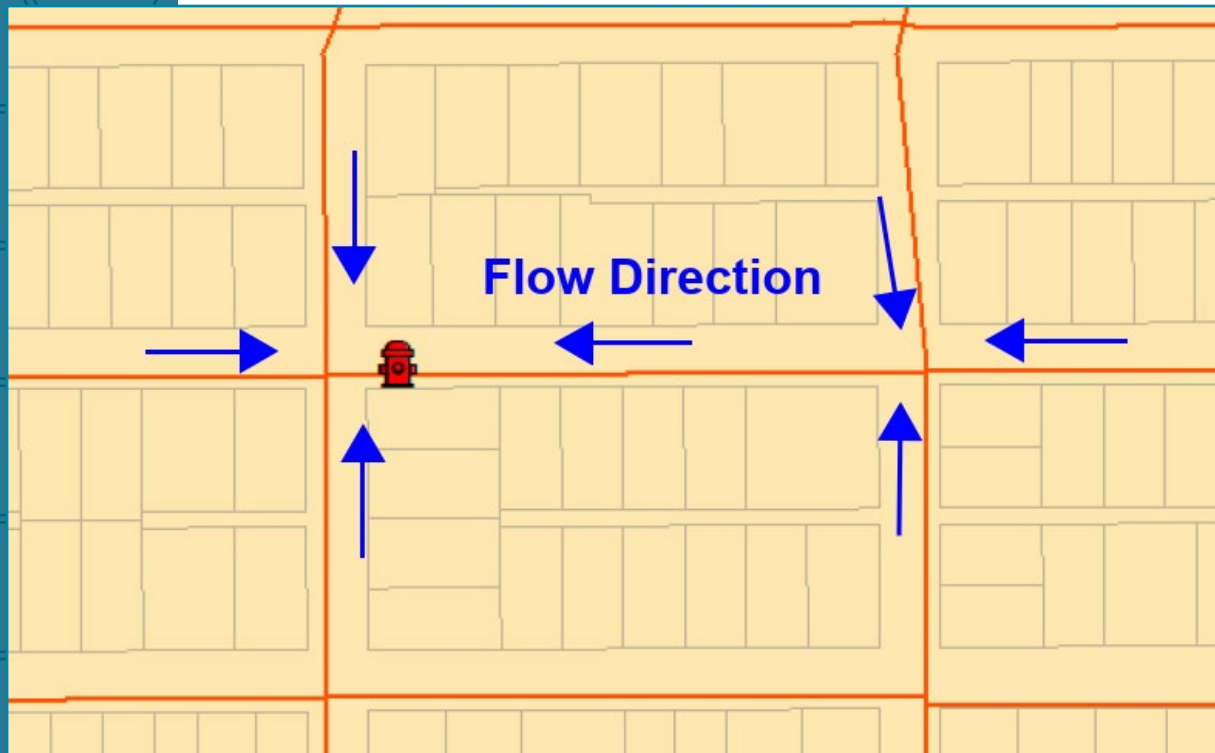
*Hydrant pressure transducer*





# Conventional Flushing

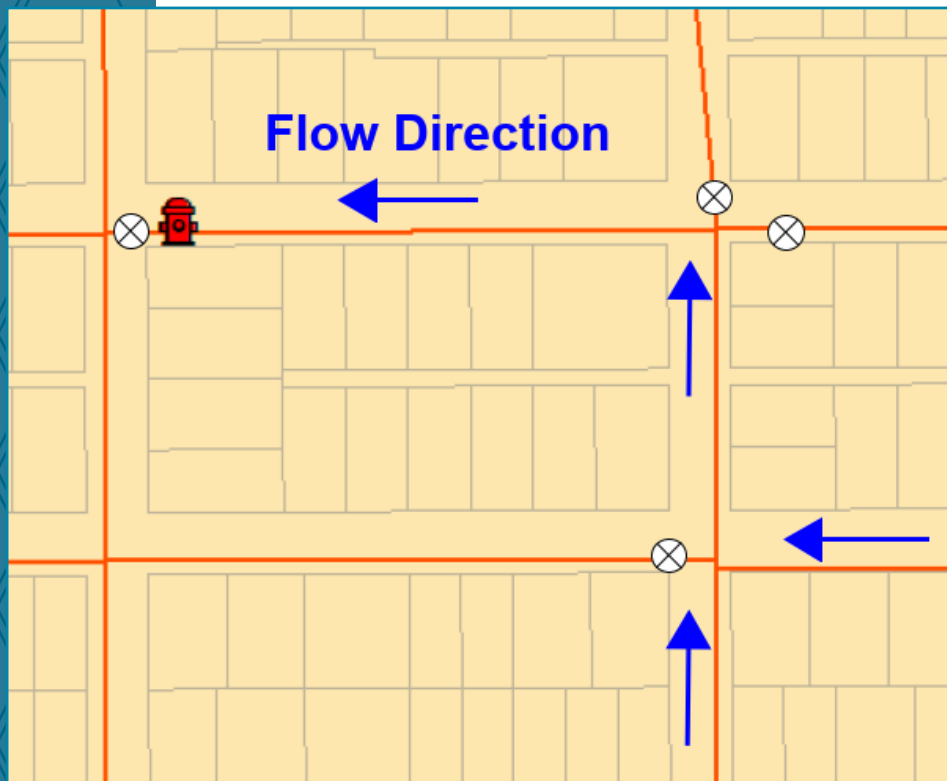
- Conventional flushing – opening hydrants and using the available flow rate without manipulating system valves



- Open hydrants in targeted areas, generally, one hydrant at a time
- Water comes from all directions in the distribution system to the open hydrant

# Unidirectional Flushing

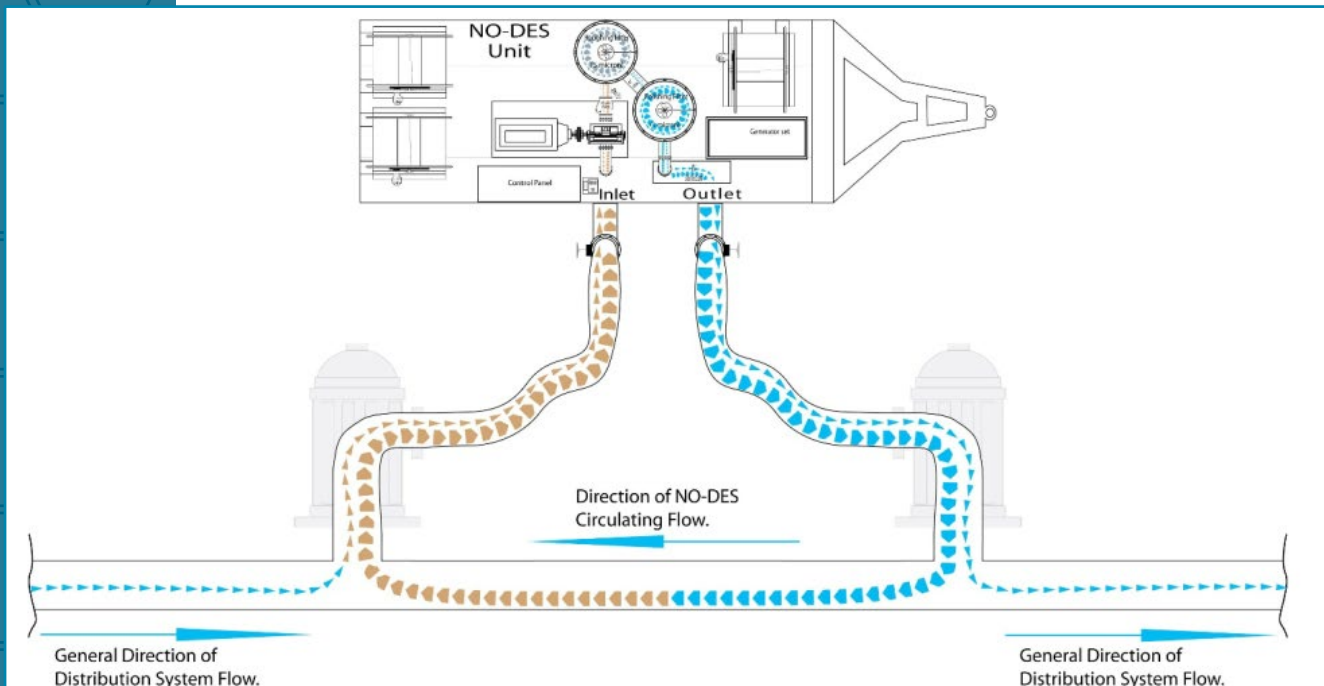
- Flushing systematically from water sources to the edges of the distribution system
- Strategically opening and closing valves to force flow from targeted directions



- Isolating an alignment to achieve the velocity criteria for pipe scouring

# No-Discharge Flushing

- Distribution system flushing is crucial to the maintenance of a distribution system but has its challenges
- Specialized equipment allows flushing without discharging water from the distribution system



*NO-DES Flushing System (2020)*

# Why use a Hydraulic Model to Develop a Flushing Program?

- Where can velocity criteria be achieved with conventional flushing?
- Where is unidirectional flushing needed to achieve flushing velocity?
- Improve efficiency – flush longer alignments from one hydrant.



# Unidirectional flushing alters the system configuration which can lead to unusual system conditions

## Distribution System Pressure

- Under 30 psi
- 30 to 40 psi
- 40 to 80 psi
- 80 to 100 psi
- Over 100 psi

## Flushing Velocity Achieved

- Pipes Not Targeted for Flushing
- Less than 3 ft/s
- 3 ft/s to 8 ft/s
- Greater than 8 ft/s







# Flushing Parameters/Criteria

- Velocity criteria
- Minimum acceptable system pressures during flushing
  - 20 psi? Or maintain a higher level of service as system flushing is a non-emergency event
- Hydrant emitter coefficient
  - Diffuser(s) to be used
  - Establish a realistic flow rate from individual hydrants

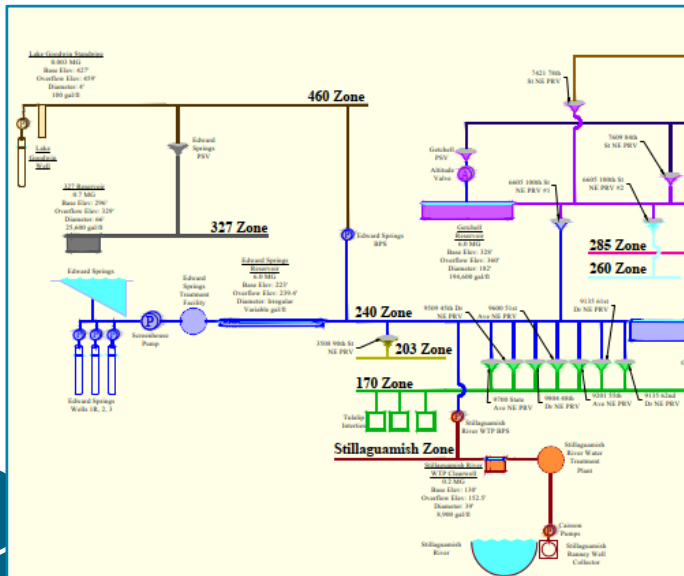
# Flushing Program Development

- A well-calibrated hydraulic model that accurately represents the water system is required
  - Distribution system mains
  - Hydrant locations
  - System valves



# Flushing Program Development

- Begin in the pressure zone nearest to the utility's water sources
- Identify potential flushing locations
- Vet the location using digital tools and utility operator input





# Flushing Program Development

Determine subsequent flushing events efficiently, targeting the most distribution main possible

Determine flushing locations that can target multiple areas

Identify and eliminate redundant flushing events that target the same areas





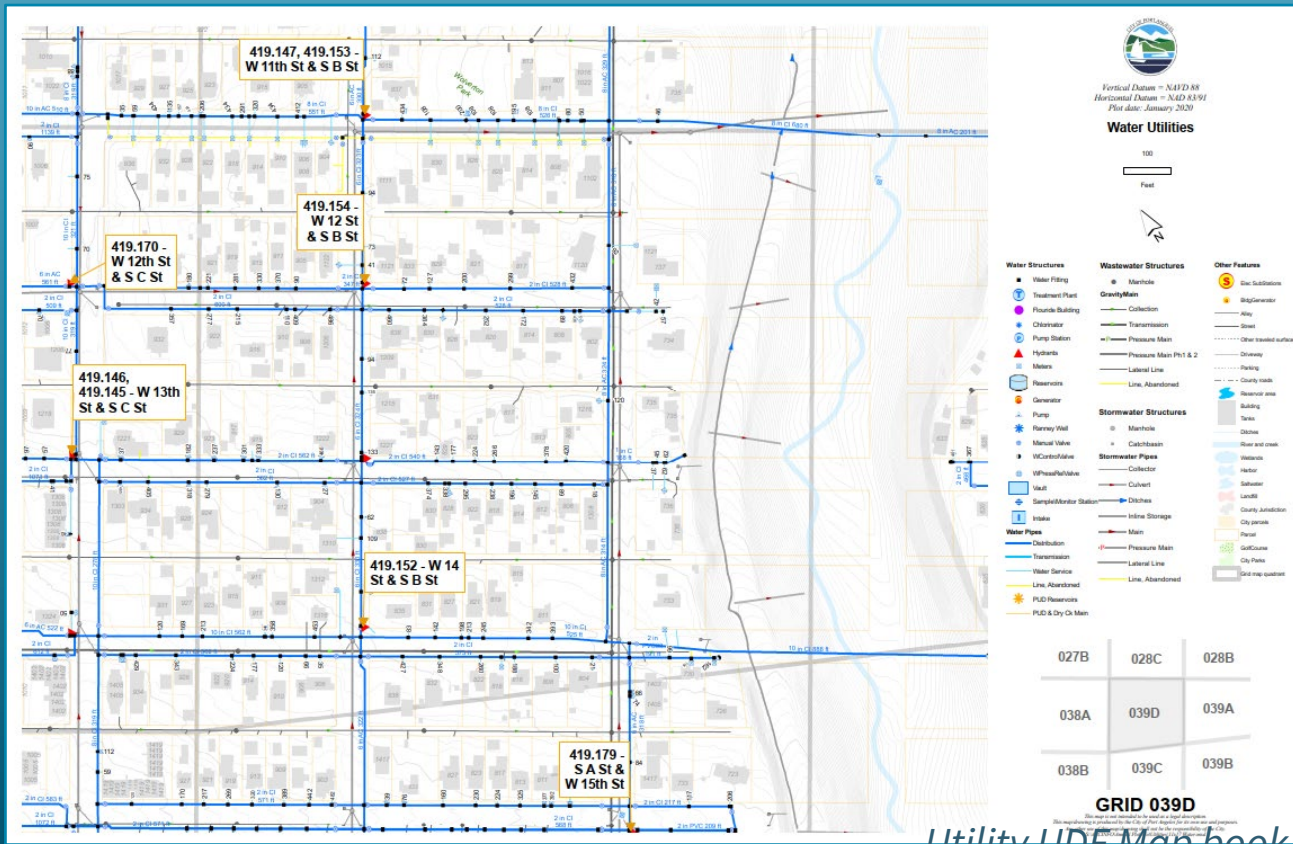


# Developing Functional Deliverables



Using GIS software field-flushing reports can be incorporated into utility map books

- Utility symbology and asset IDs can be used





# Troubleshooting/Concerns

Large diameter mains are difficult to flush

Small diameter mains that exceed the utility's velocity constraint

Low-pressure areas

Areas that rely on sensitive facilities

Drainage issues



# Questions?



**RH2**