Urban Water Management – 40 years of Innovation

November 30th 2022

Hydro International

Introduction

Kwabena Osei
Director, Group Product Development

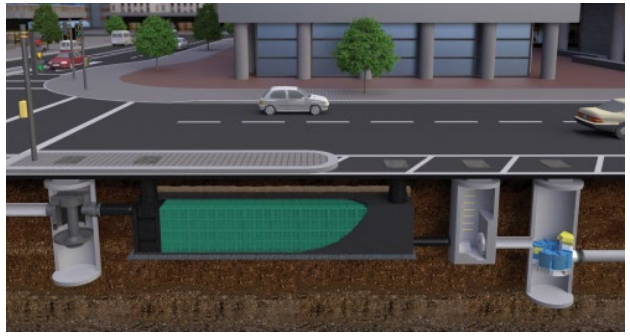
Email: kosei@hydro-int.com

Overview

- About Hydro International
- The Urban Environment
- How do we Innovate
- Innovations in
  - Flow Management
  - Quality Management
  - Future Trends
- Summary

Our Capabilities

- Stormwater management
- Water and wastewater treatment
- Flood protection
- Waste Water CSO screening and treatment
- Industrial stormwater treatment
- Hydrometry, monitoring and data analysis
- Water engineering and resource management



Solve Complex Water Management Challenges with Simple Solutions

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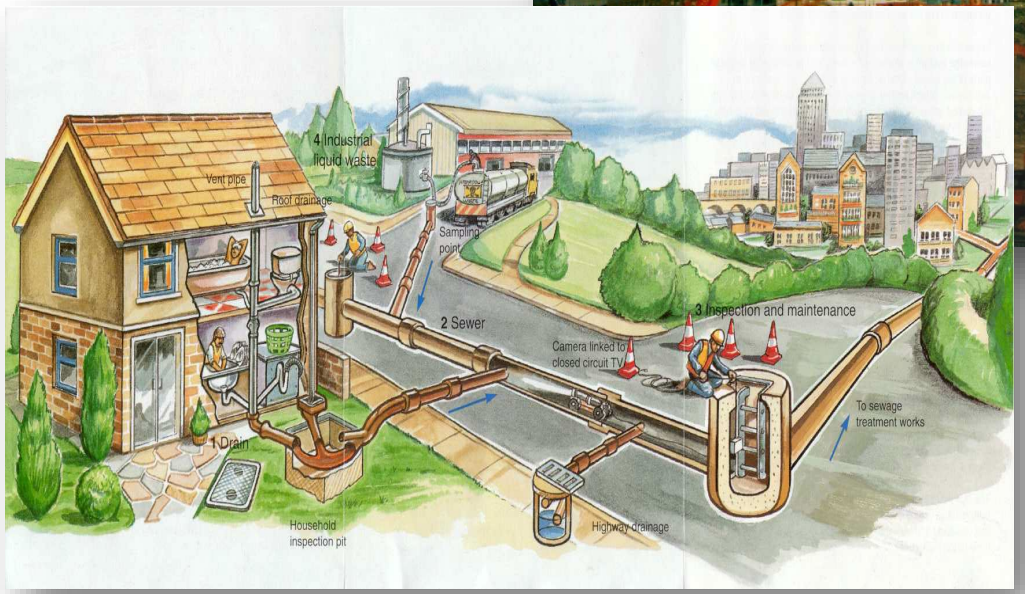
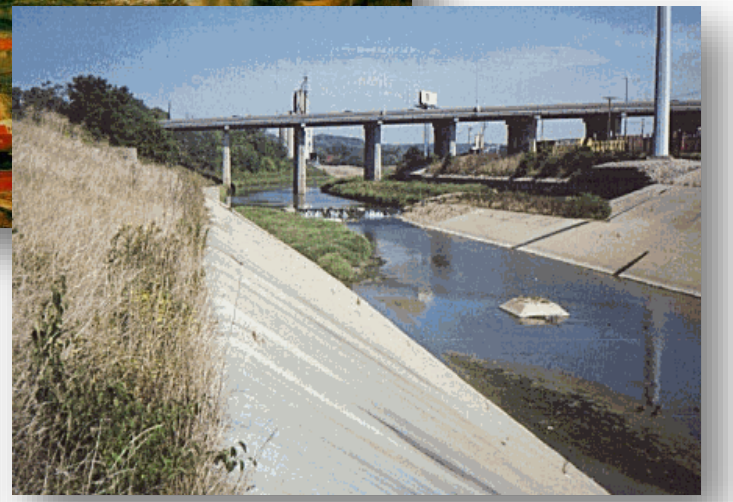
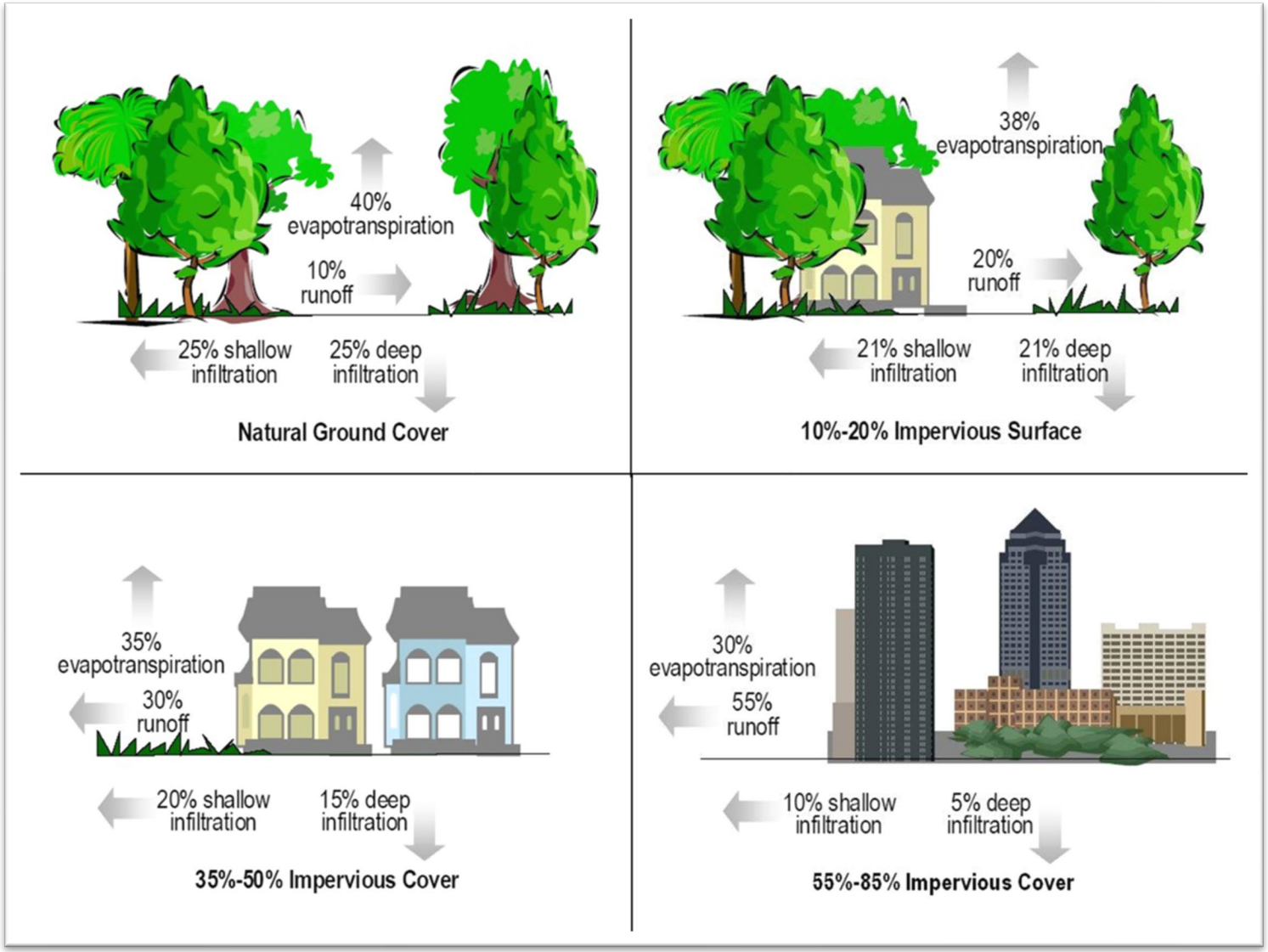
Urbanization Process

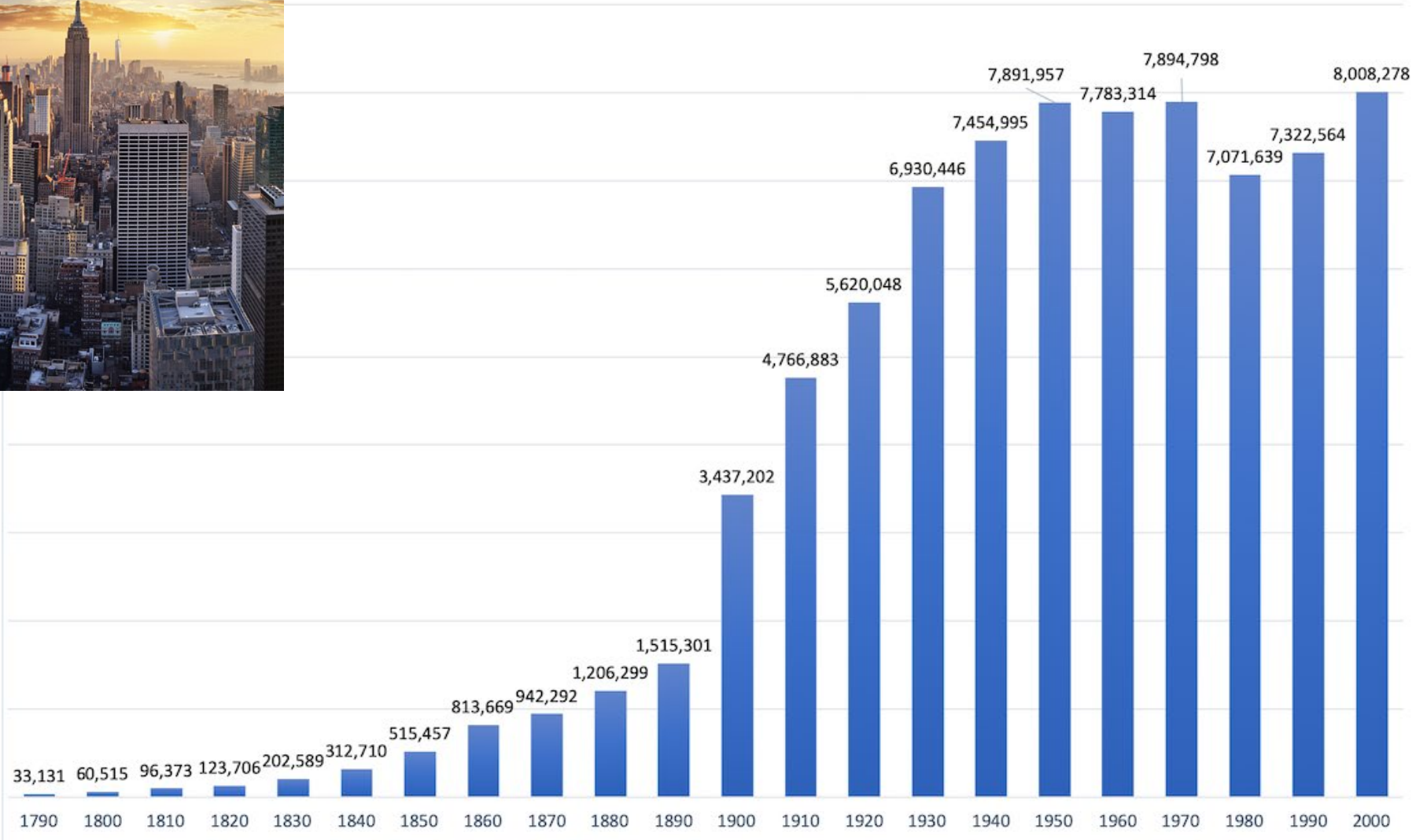




Hydrologic Cycle and Development

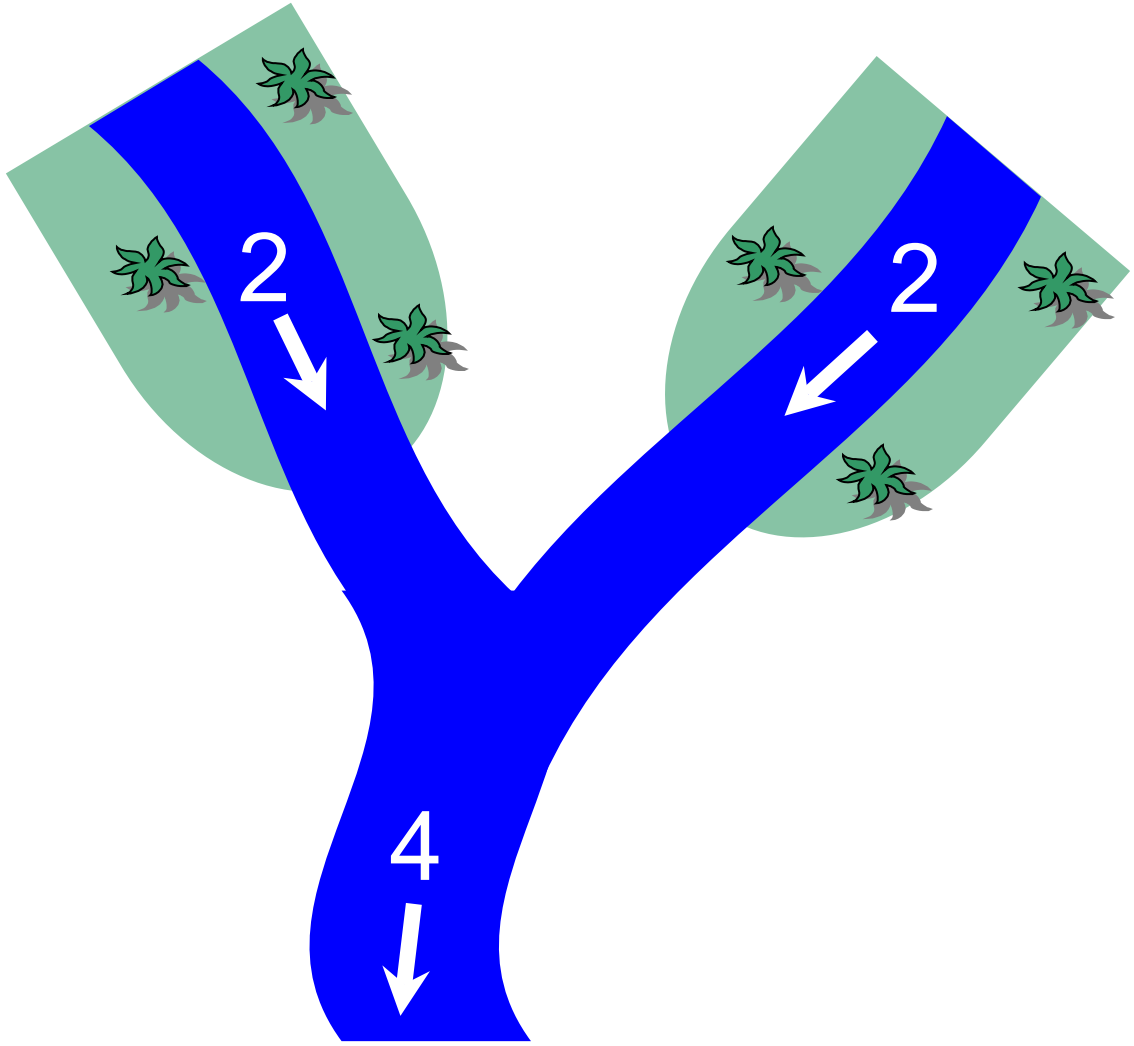


New York City Population Growth – 200 Years

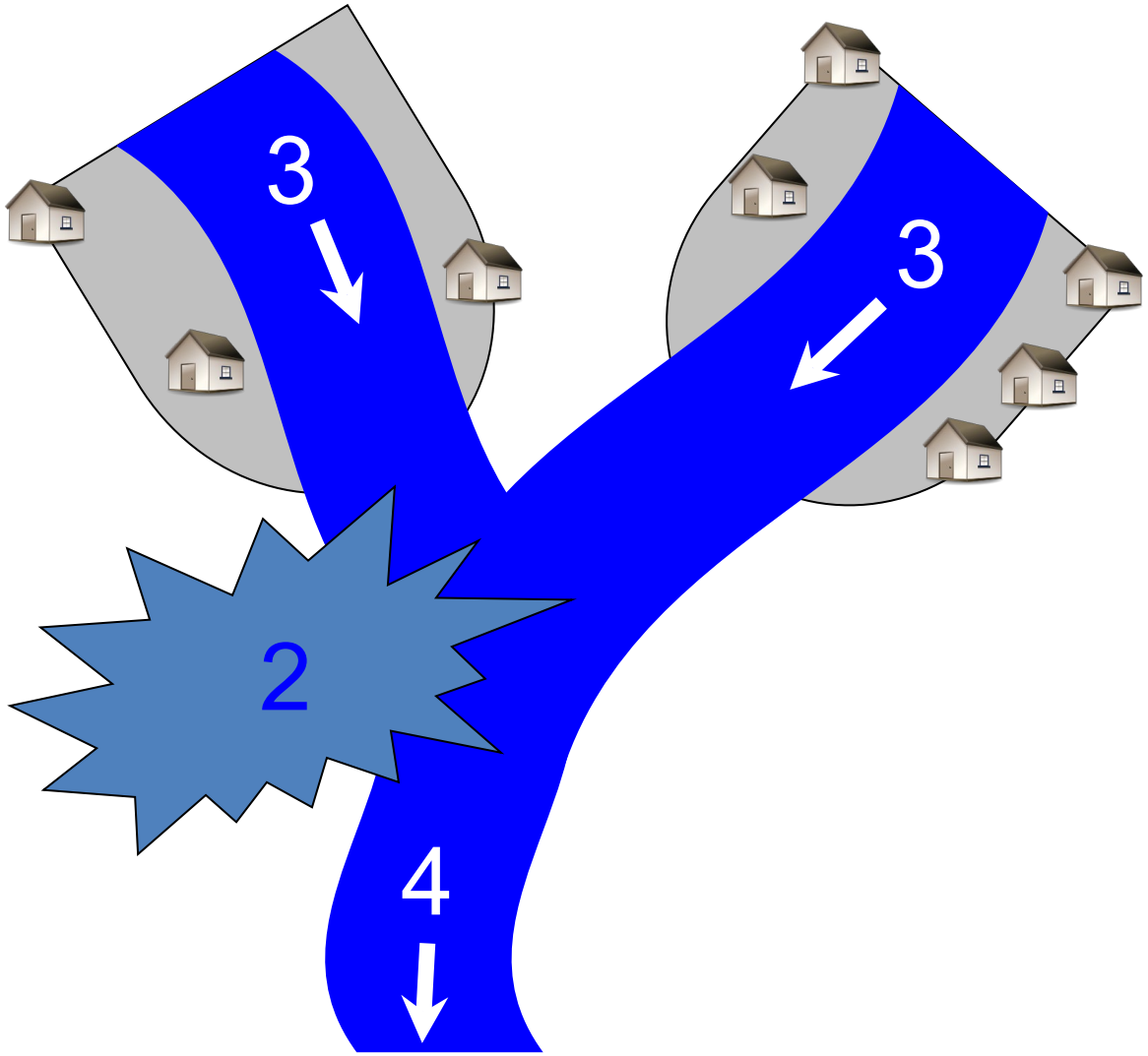


Source: Street Easy

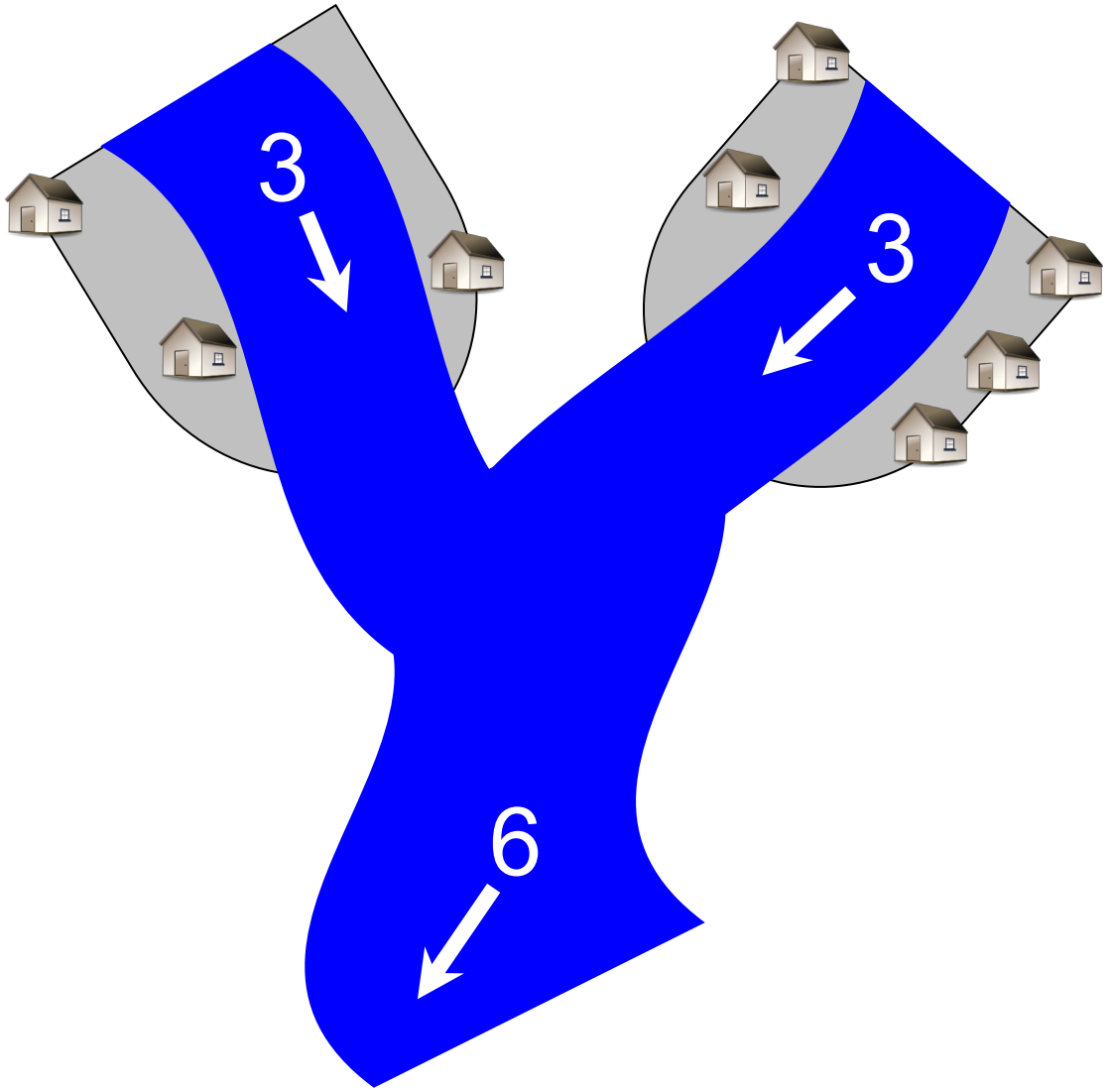
Balanced Drainage



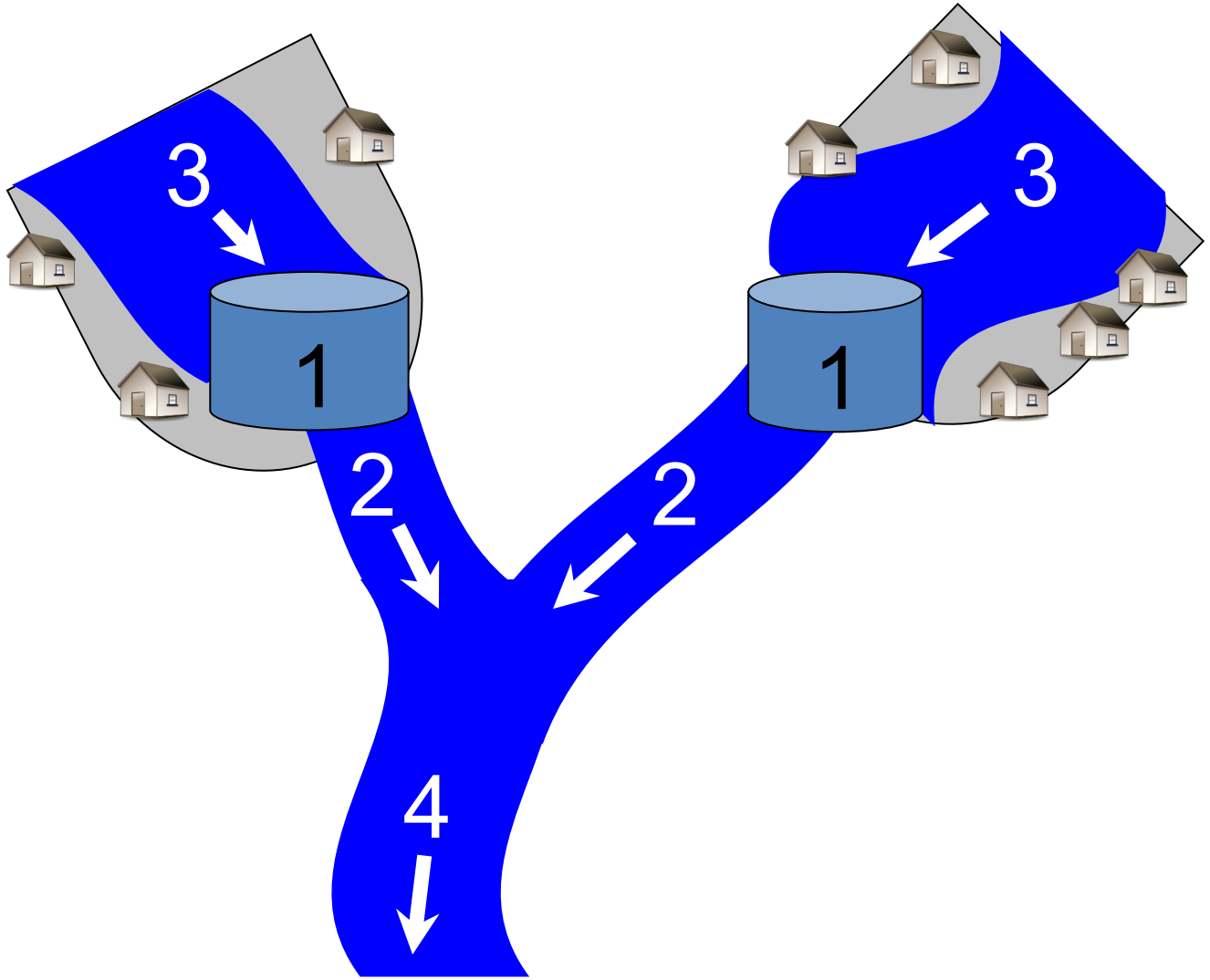
Upstream Development



Downstream Expansion



Upstream Control



How we Innovate

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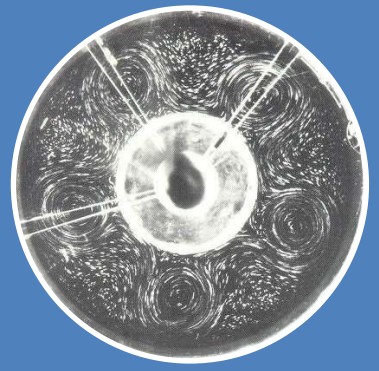
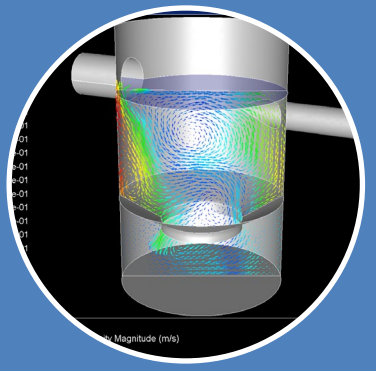


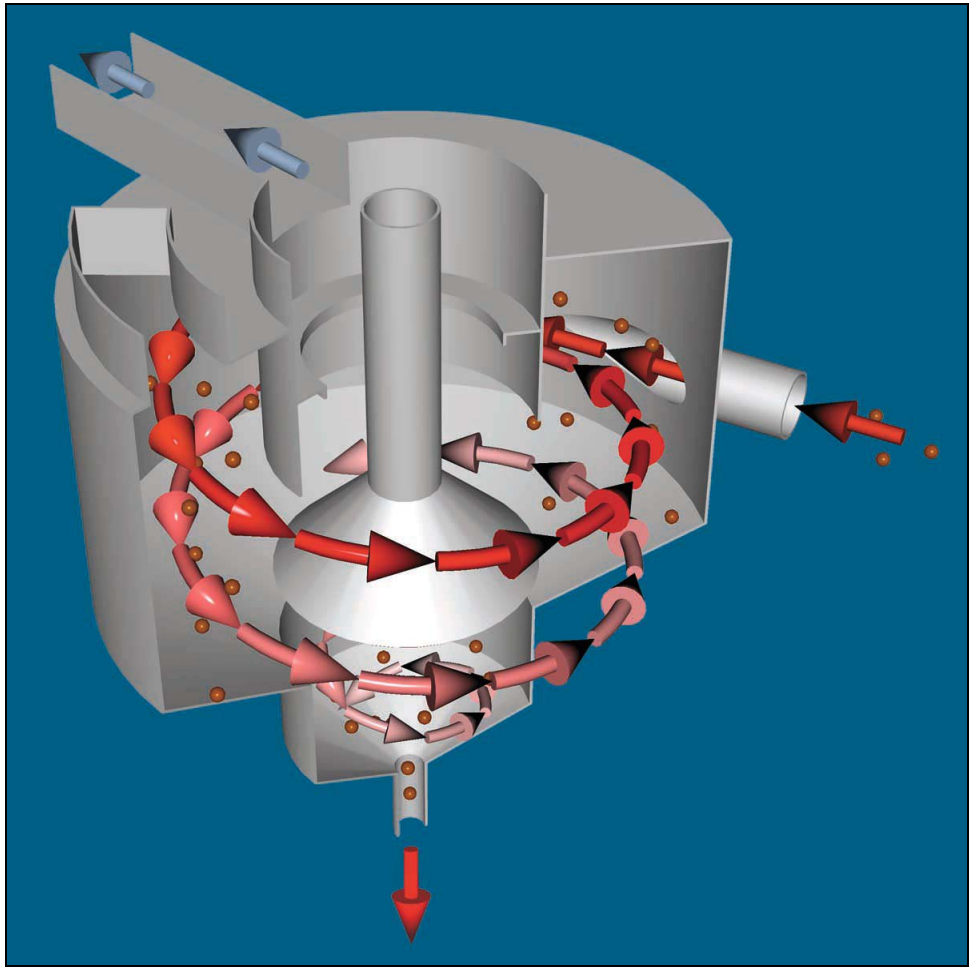
Science

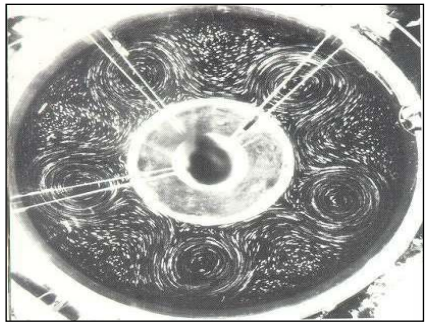
Physical Testing



Computational Modeling

Vortex Motion





Hydraulics Lab

Physical Testing

Lab Testing

Field Testing

Analytics

Computational Fluid Dynamics

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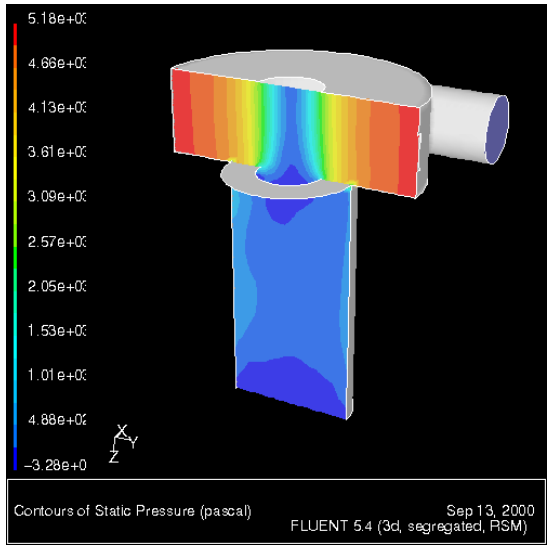
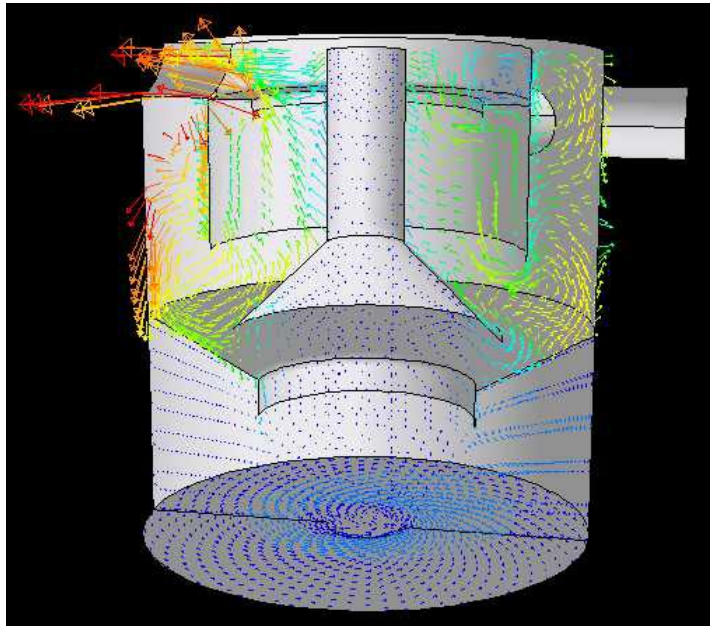
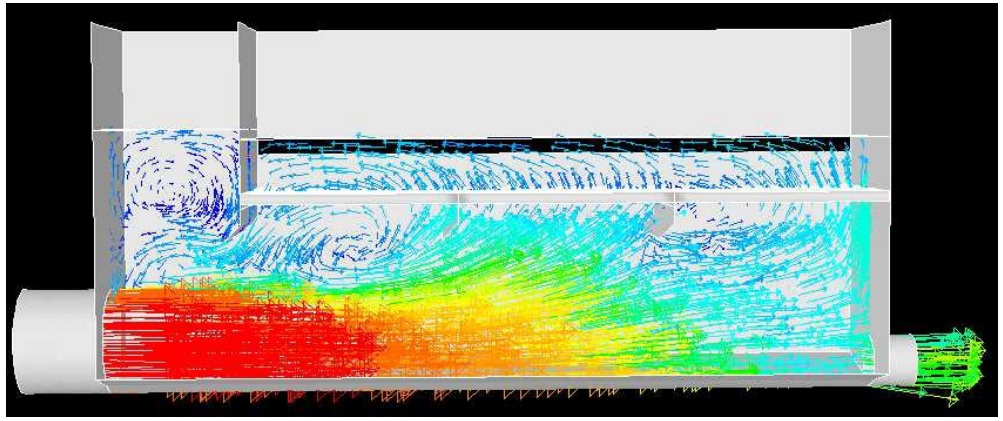
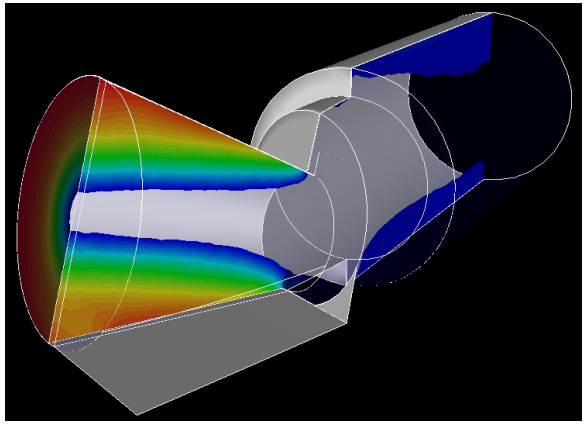
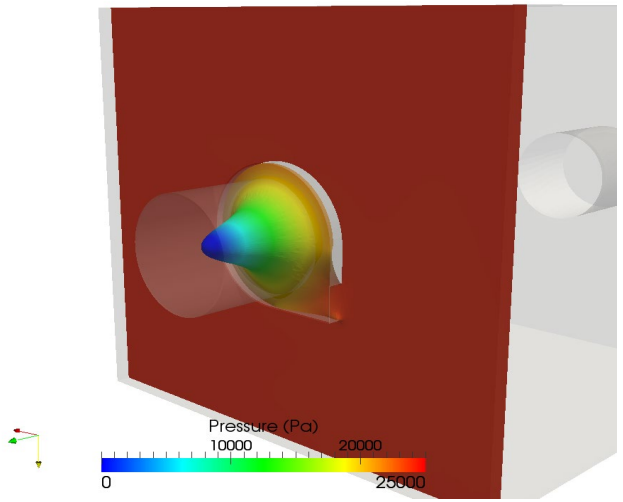


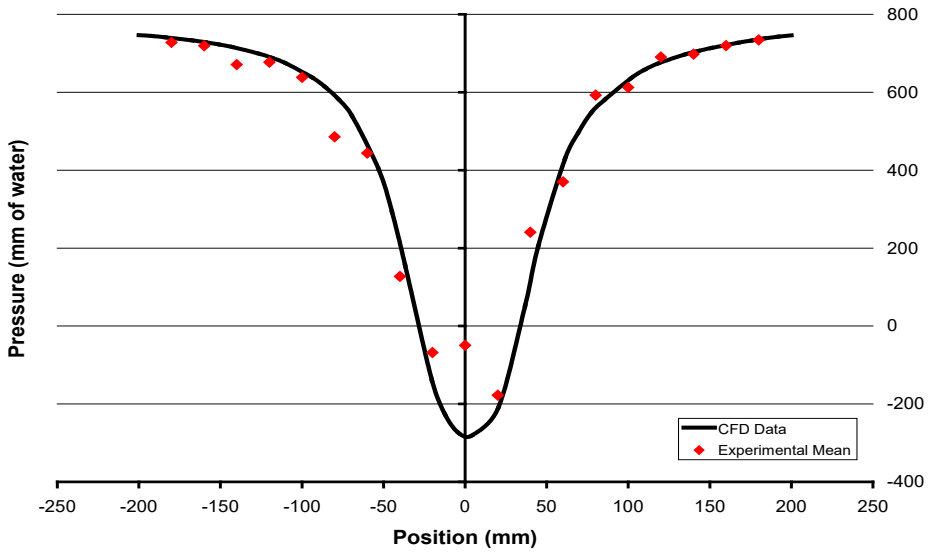


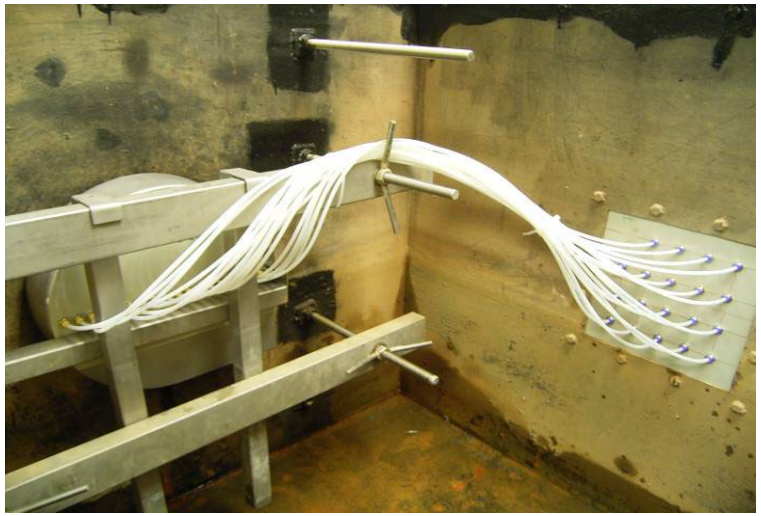


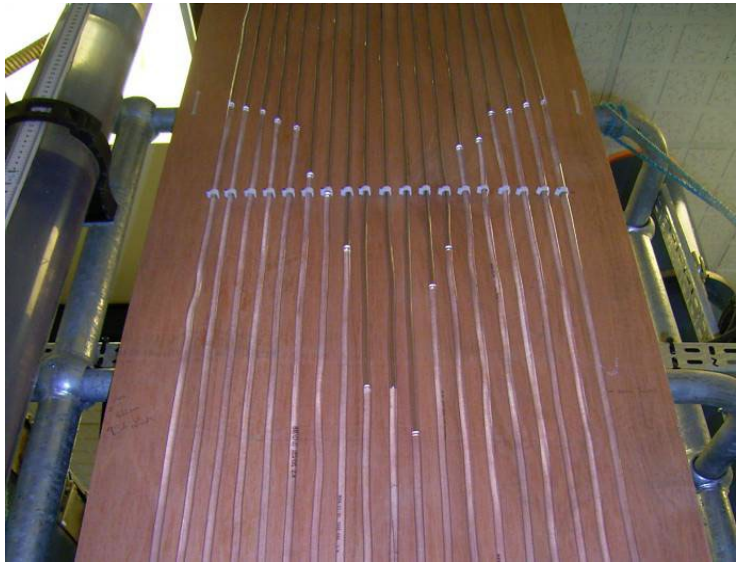


Combining Development Tools









Advanced Vortex Separation

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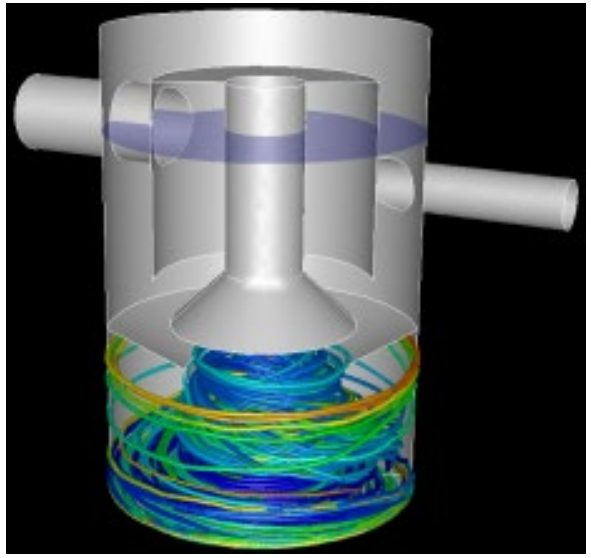

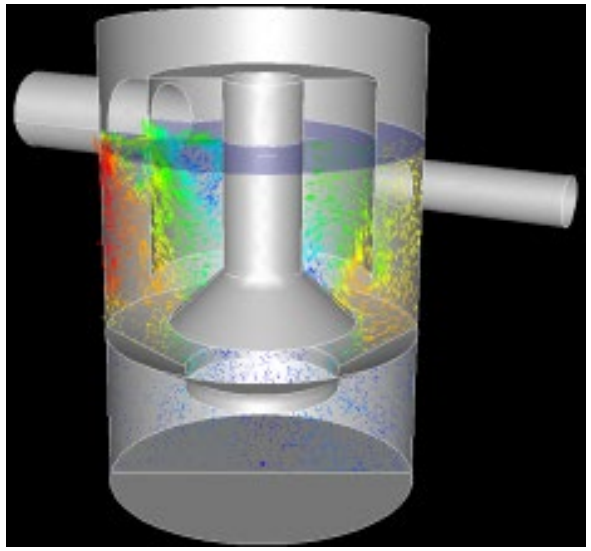

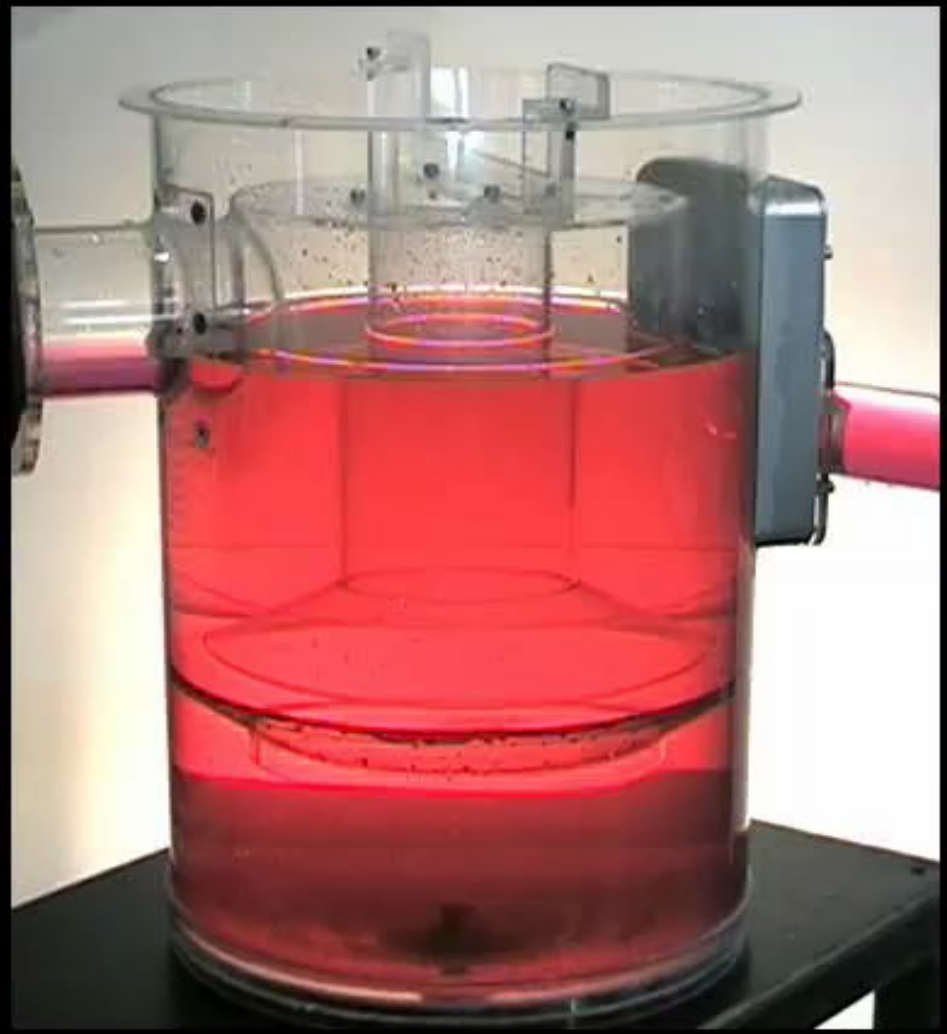

Case Study: Managing Flows

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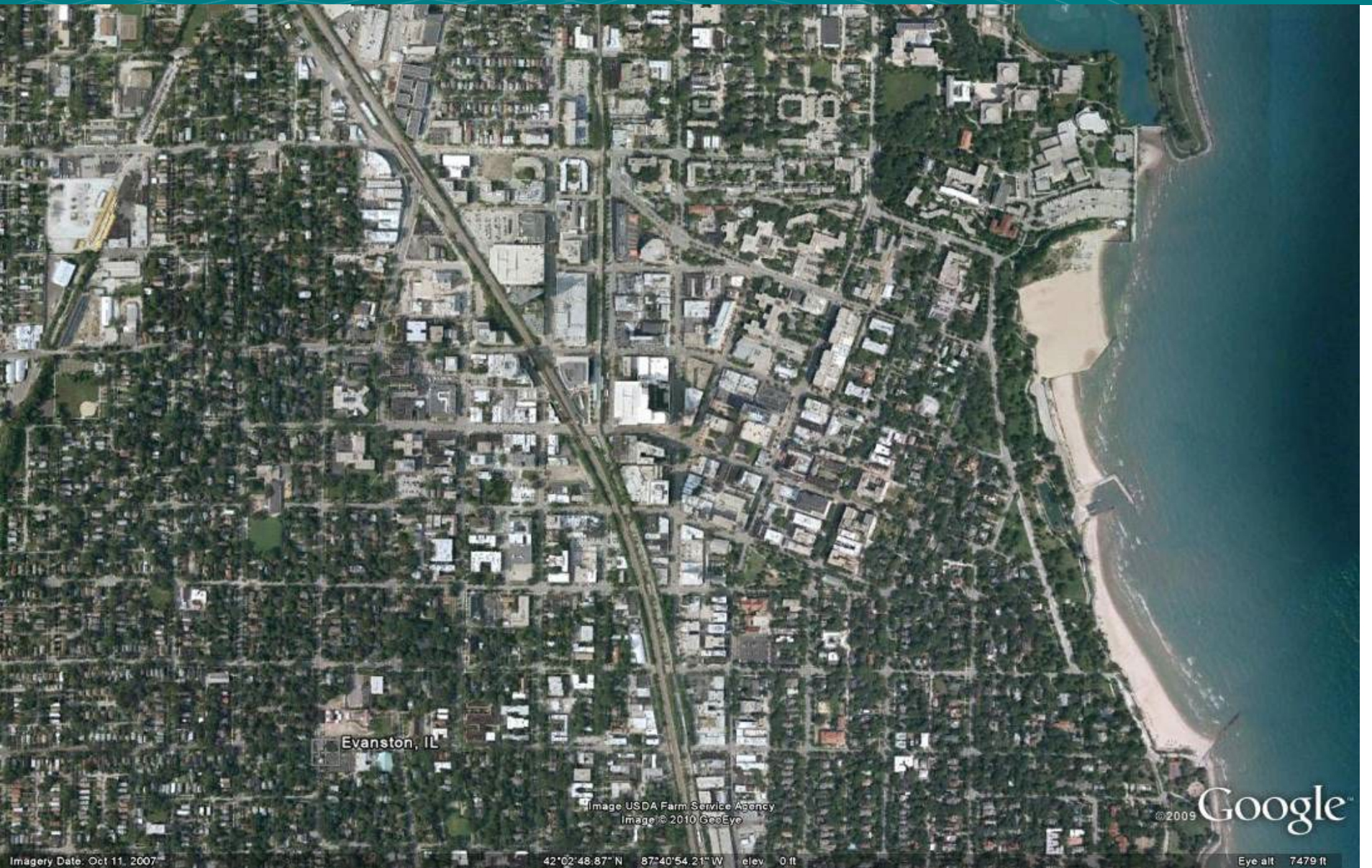
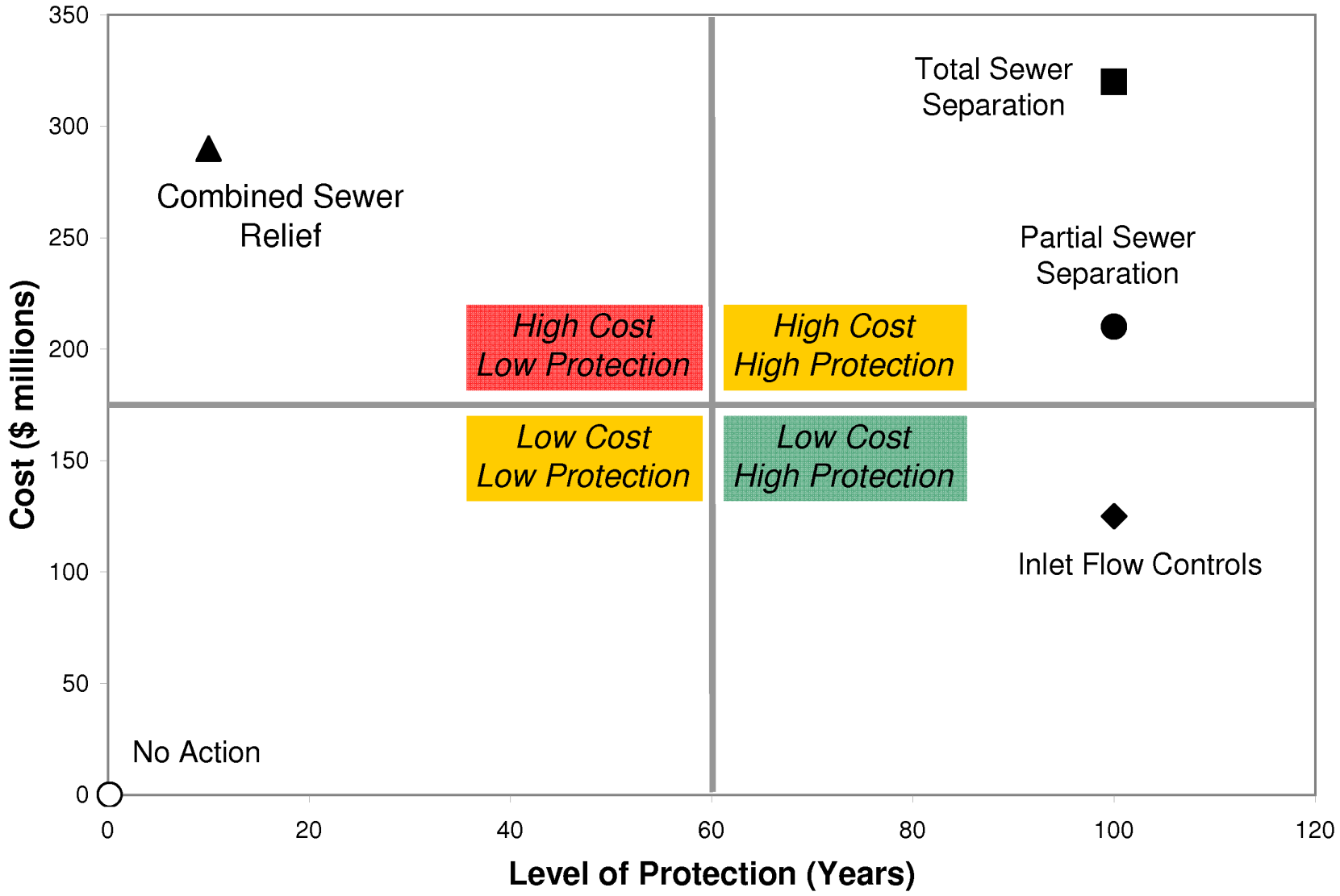
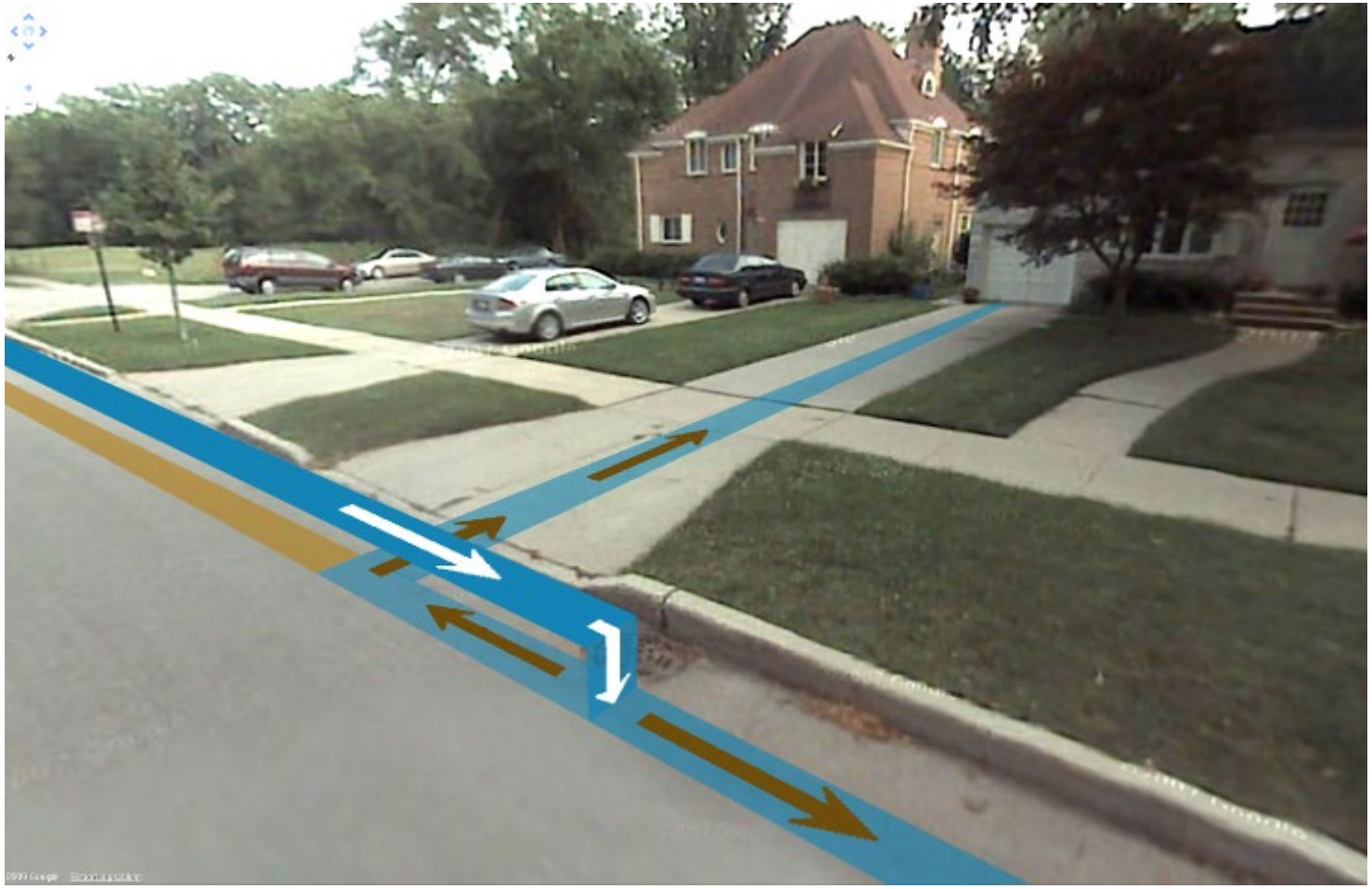
Evanston, Illinois



Basement Flooding - 6X per year



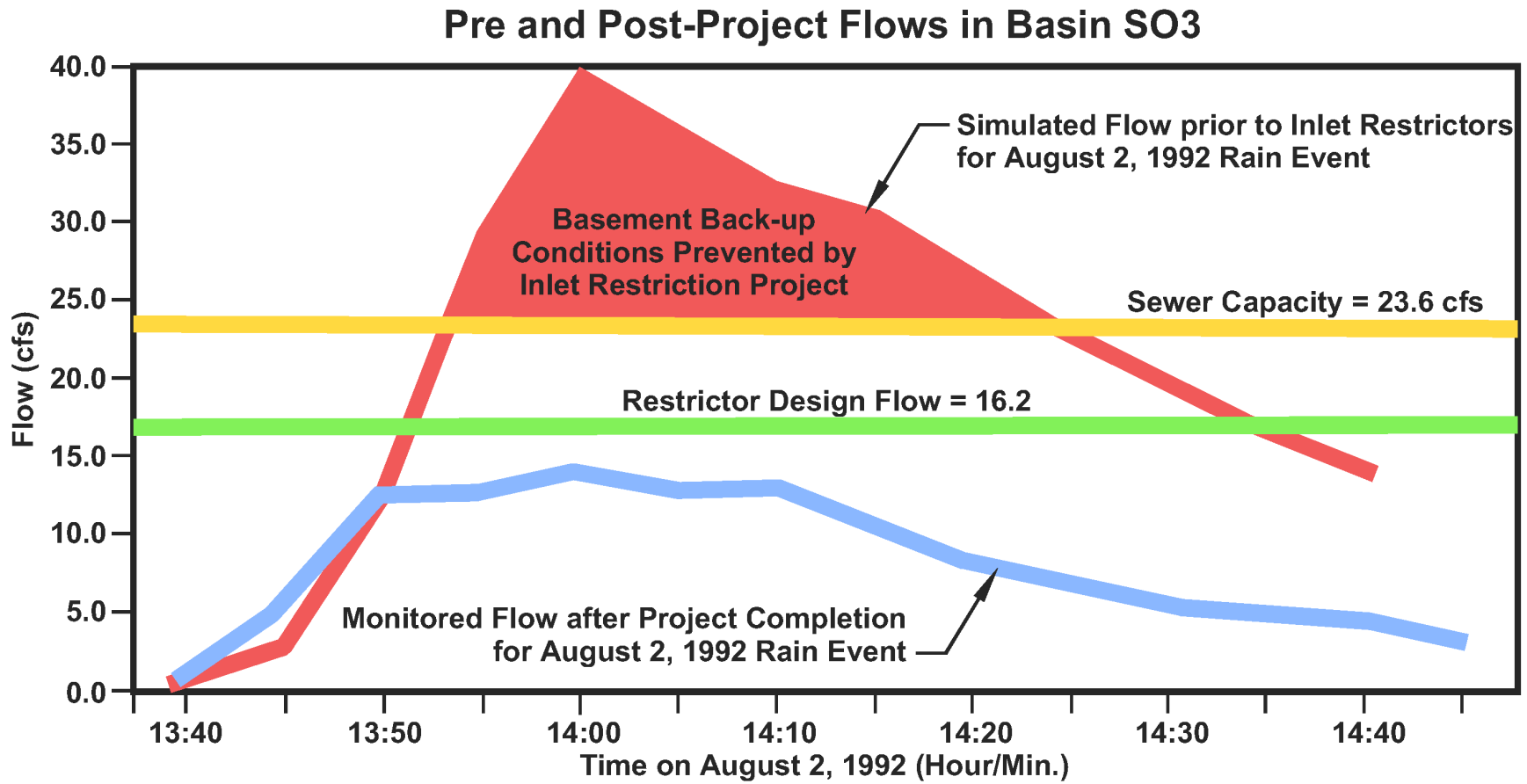
Before Flow Controls



After Flow Controls

2300 Vortex Flow Controls

Measured Results



Case Study: Improving Water Quality

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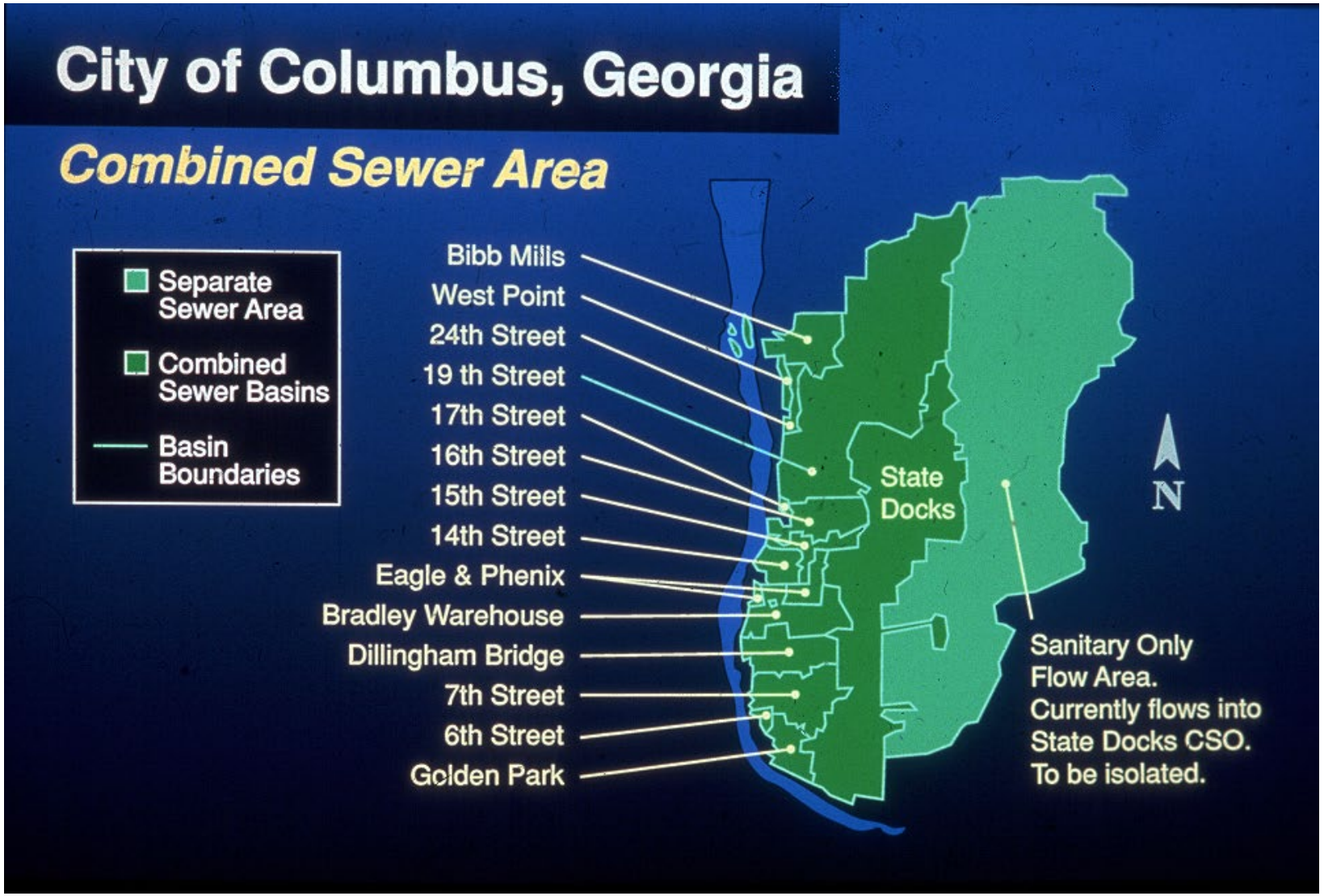
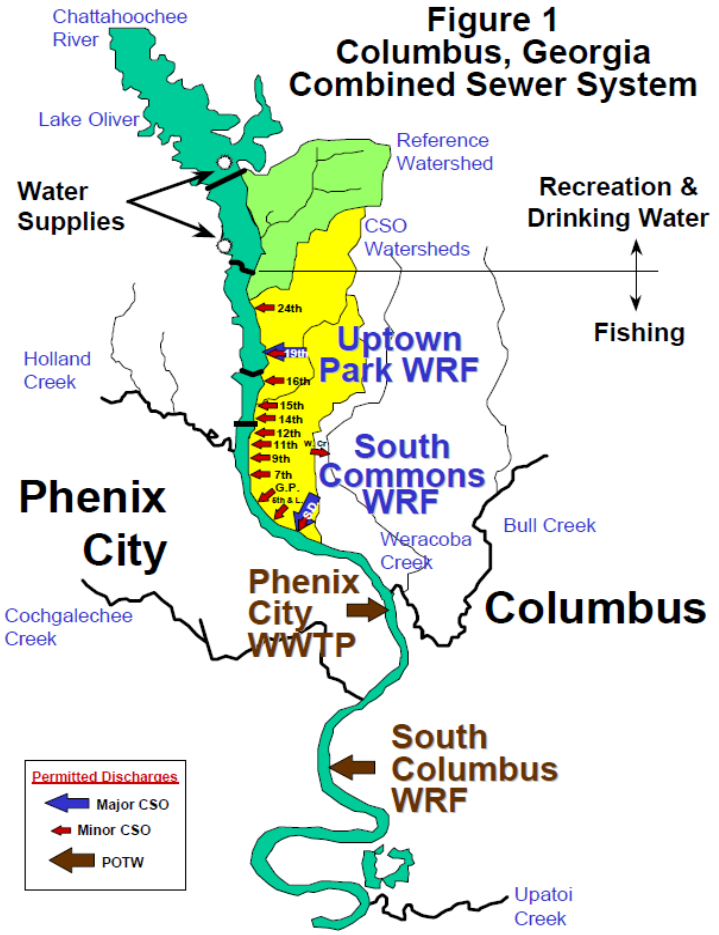
Columbus, Georgia



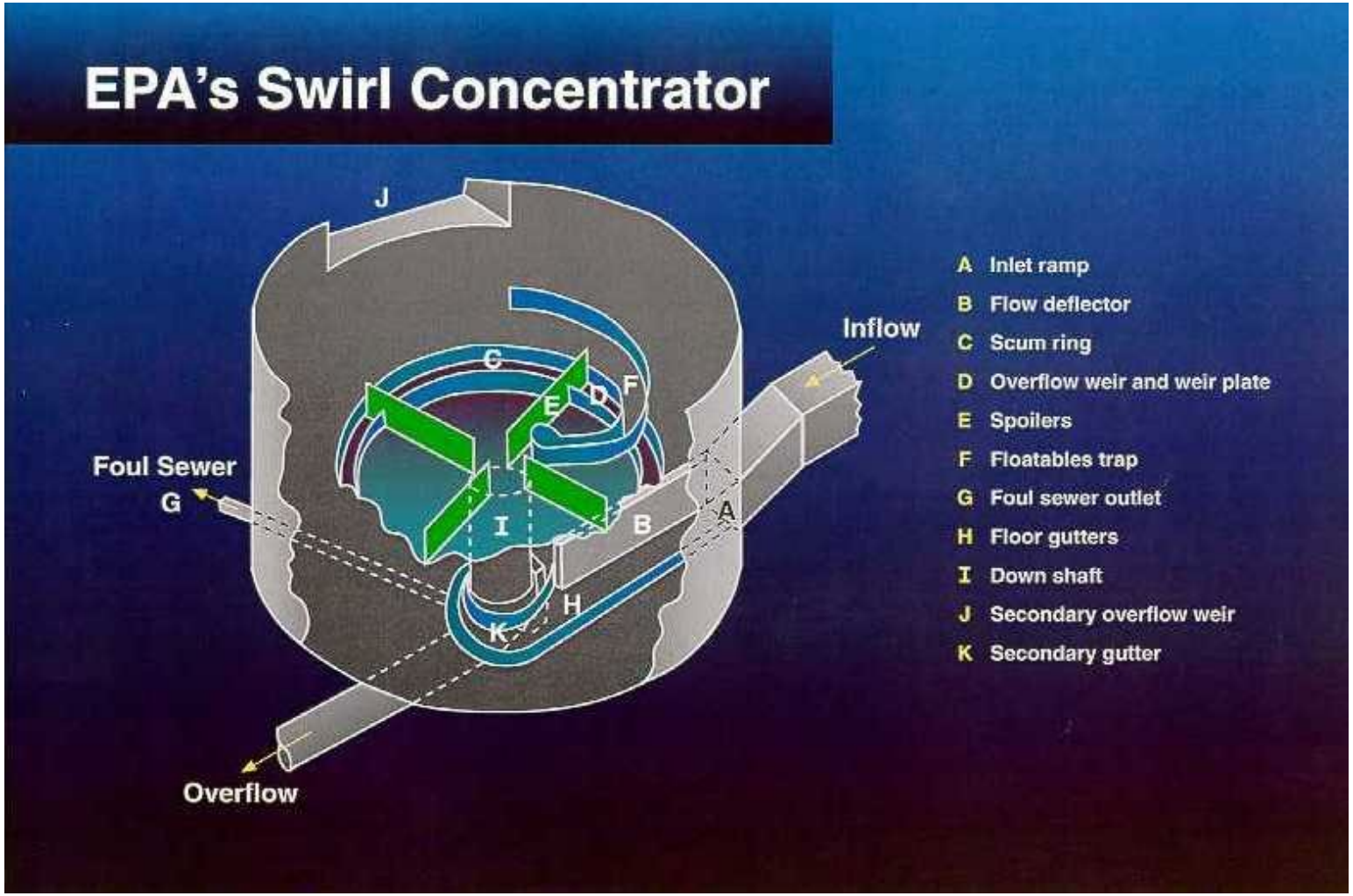
Columbus, GA

- City of Columbus
  - Population – 186,000
  - Contributing area – 60,800 acres
  - Combined sewers – 8.1 miles
- Design
  - Consolidation of 15 active outfalls
  - Number of units: 12
  - Combined flow: 5,600 l/s
  - Unit sizes: 32ft. & 35 ft.
- Treatment target:
  - Gross solids removal
  - Primary treatment equivalency
  - In vessel disinfection

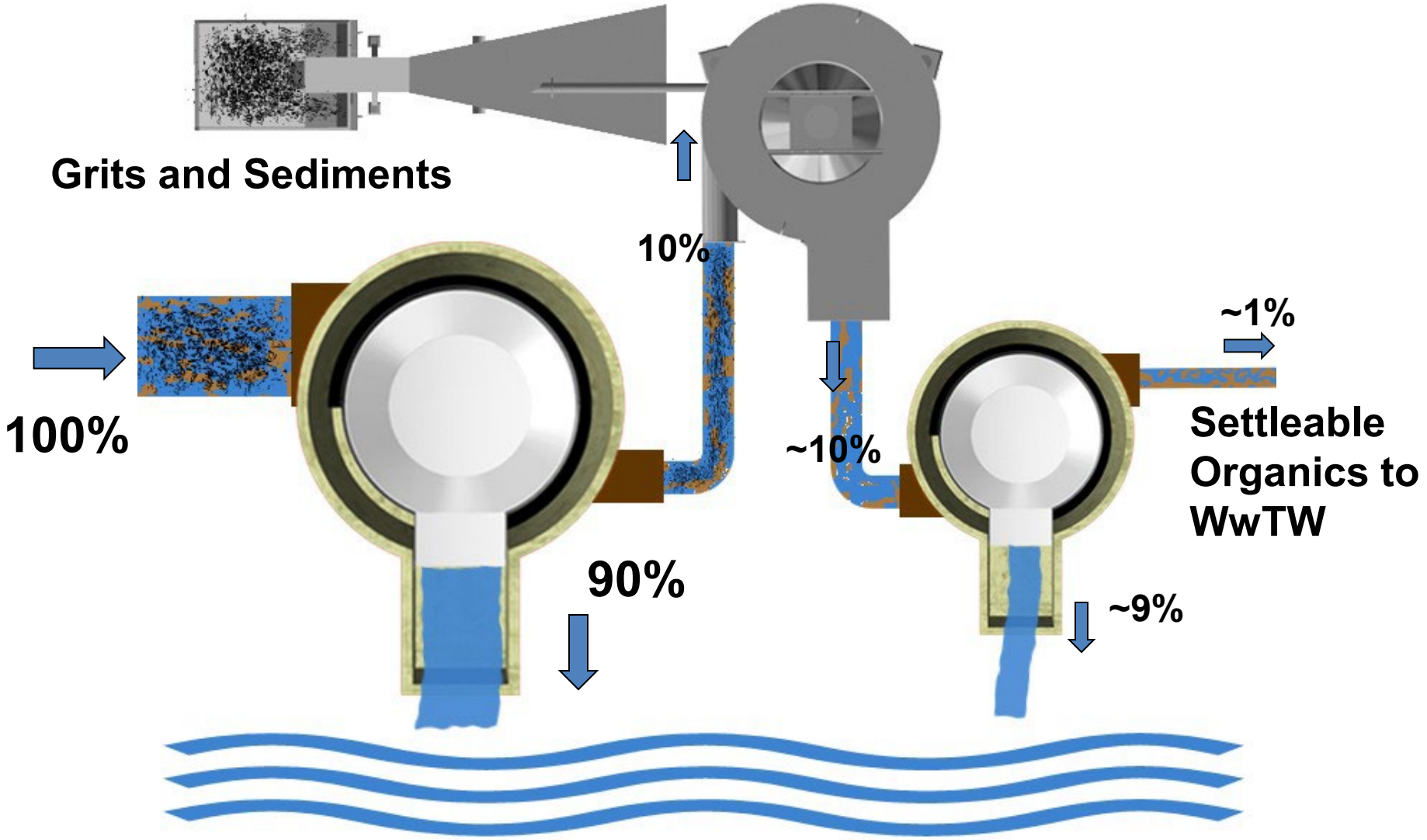


Multi-process Vortex Separators

- Attenuation + Separation + Floatables



Process Flow - Source Control of CSOs

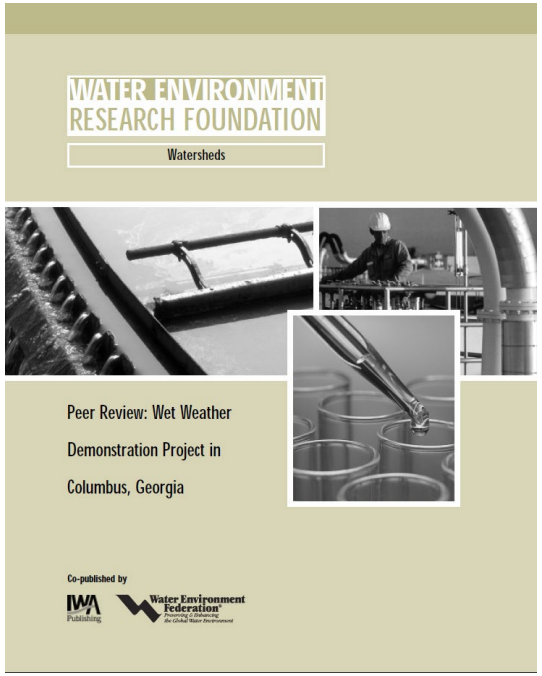


Uptown Park ADF - Findings

- Outcomes
  - 66% of CSO flows treated
  - 63% reduction in annual TSS discharge
  - Storm King vessels
    - Primary treatment at low flows
    - Pre-treatment and disinfection at high flows

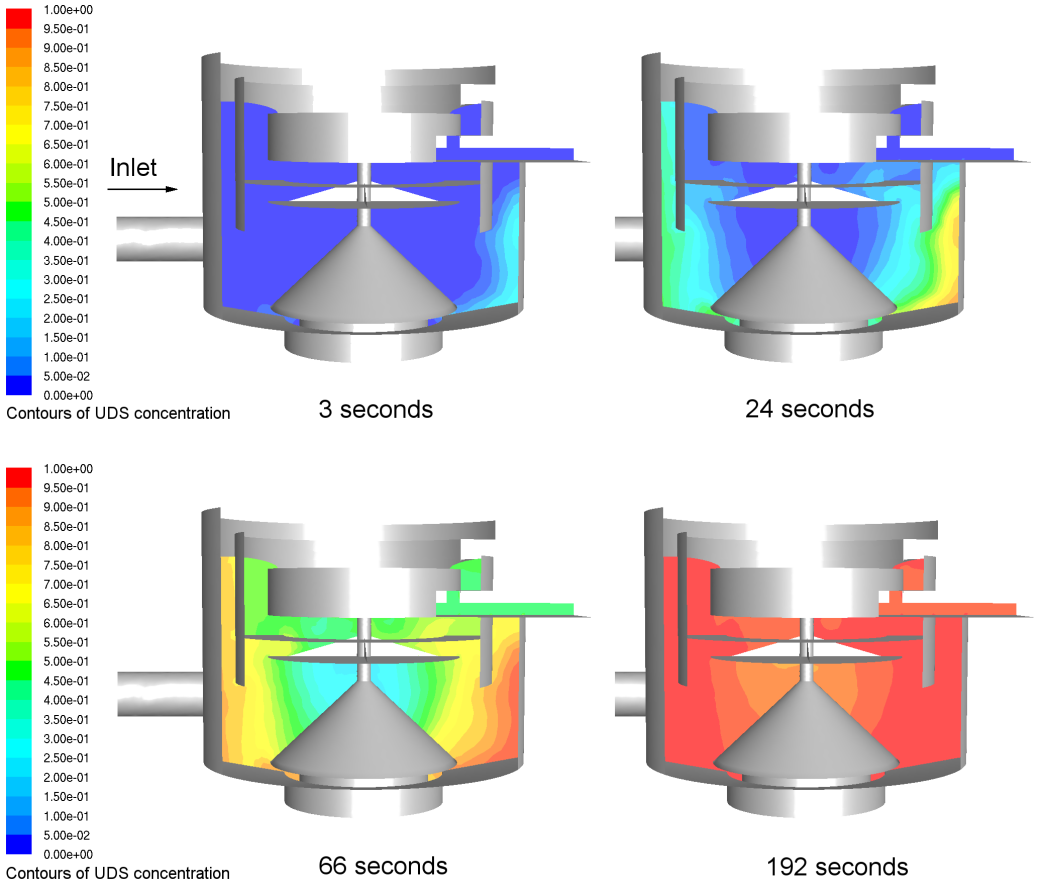
- Optimised process costs **half** the value anticipated by the USEPA for primary disinfection and clarification.

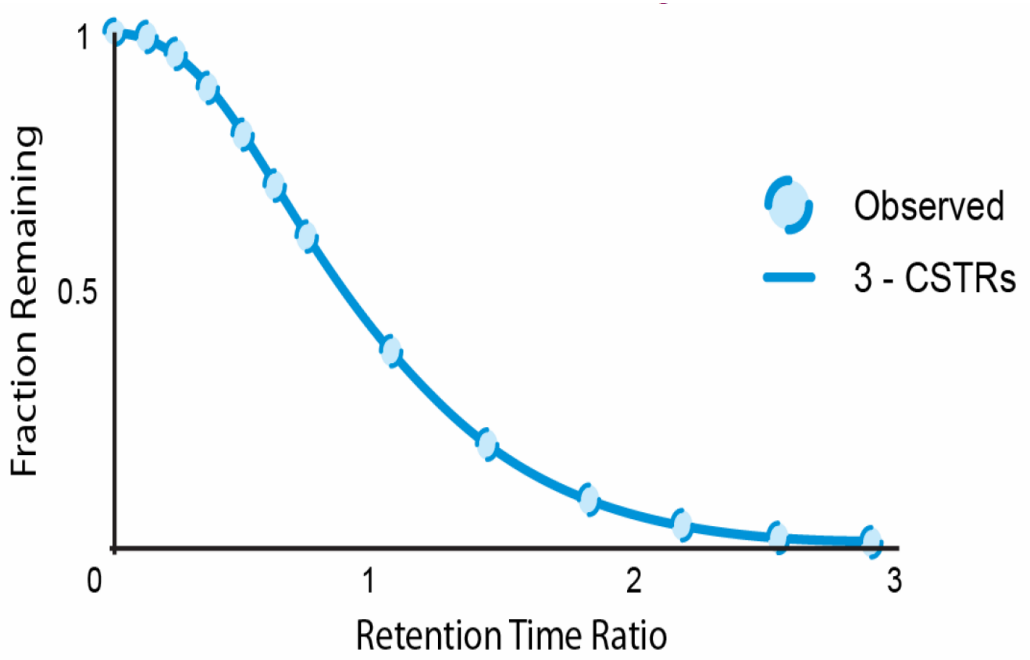
- Total solution cost = $85m
  - Conveyance = $58m
  - Treatment = $27m
  - 35% saving on traditional solution



Boner, M.C. (2003) Wet Weather Demonstration Project in Columbus, Georgia, WERF & IWA Publishing

Computational Model of Disinfection





Urban Stormwater Treatment

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Nutrients | Trash & floatables | Oils & hydrocarbons | Metals | Very fine particles | Industrial materials

Gross Pollutant Removal ◄·····► **Finest Pollutant Removal**

Baffle Box

Oil Grit Separator

Oil Grit Separator

Filtration System

Bioretention

What does the future look like?

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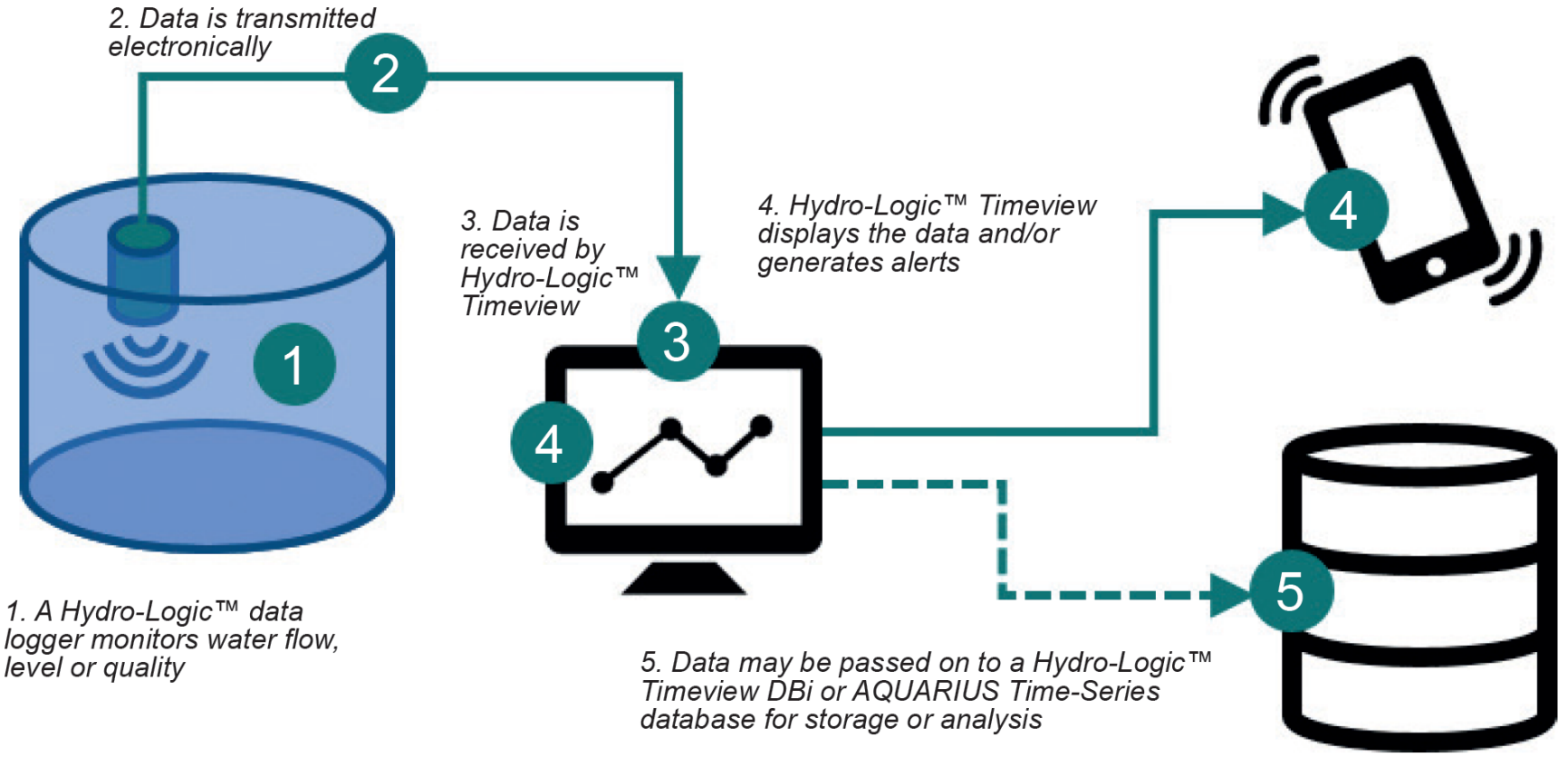
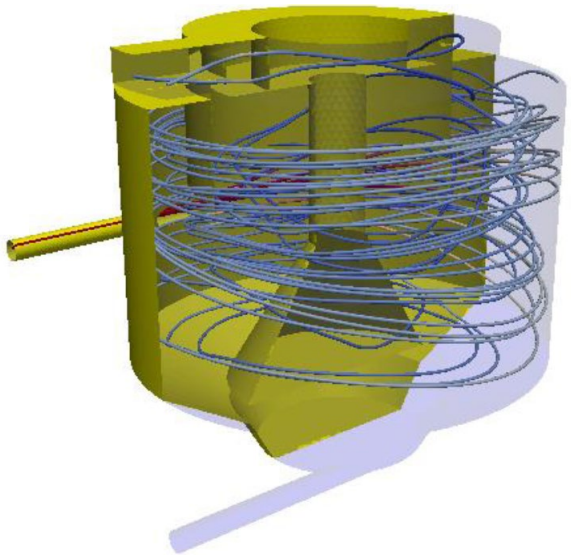
Applying Telemetry to Enhance Performance

The Hydro-Logic™ Smart Monitoring concept



Optimization Techniques

- Continuous adjoint formulations
- Refinement of existing geometries



Flow solution

Surface sensitivity
(iterative improvements)

Volume sensitivity
(new features)

Summary

- The Urban Environment creates challenges to water management
- Understanding and utilizing natures principles
  - Results in more sustainable designs
  - Creates opportunities to utilize existing infrastructure
- The tools available for development continue to evolve and improve
- New regulations drive continuous innovation

Questions

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