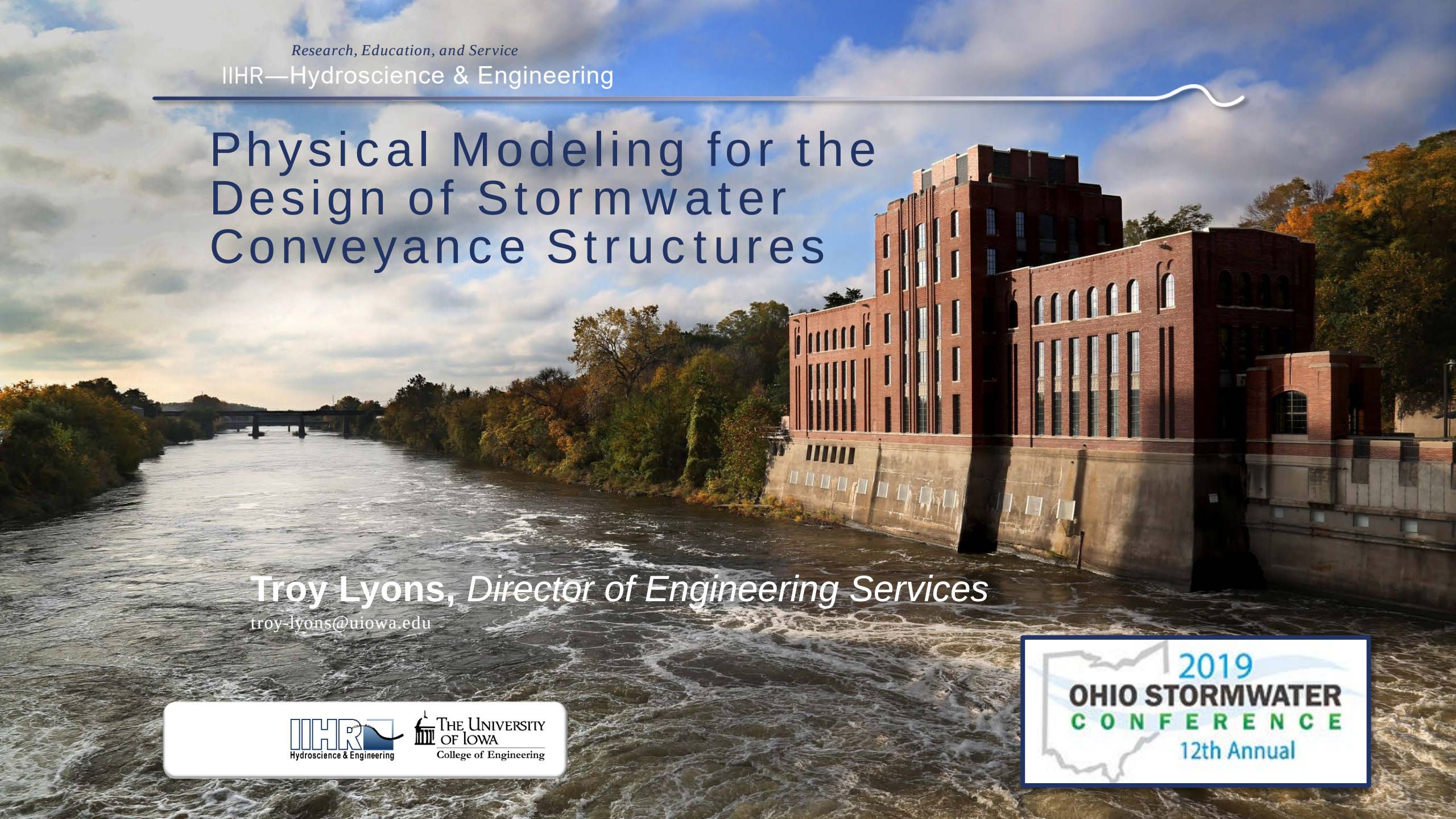
Research, Education, and Service

IIHR—Hydroscience & Engineering

Physical Modeling for the Design of Stormwater Conveyance Structures



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IIHR Hydroscience & Engineering

The University of Iowa College of Engineering

2019 OHIO STORMWATER CONFERENCE 12th Annual

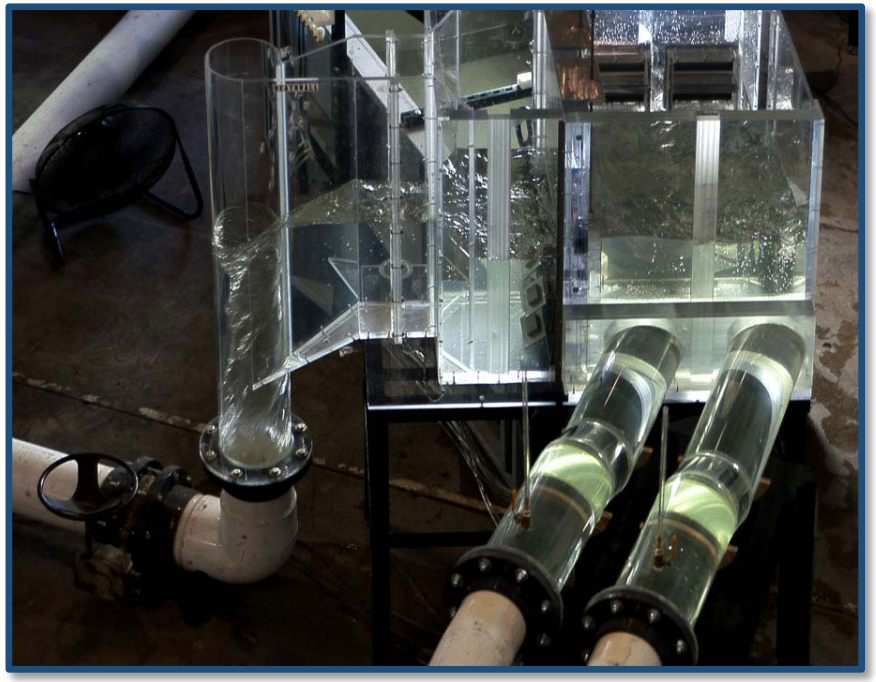
Are physical models necessary?

Common Applications of Physical Models

- Highly complex flows
- Sediment and debris concerns
- Air management
- Flow ratings
- Control structure performance
- High risk scenarios
- Non-standard designs

A new era of fabrication methods

- CNC milling and water jet
- Precision welding
- 3D printing
- Specialty materials

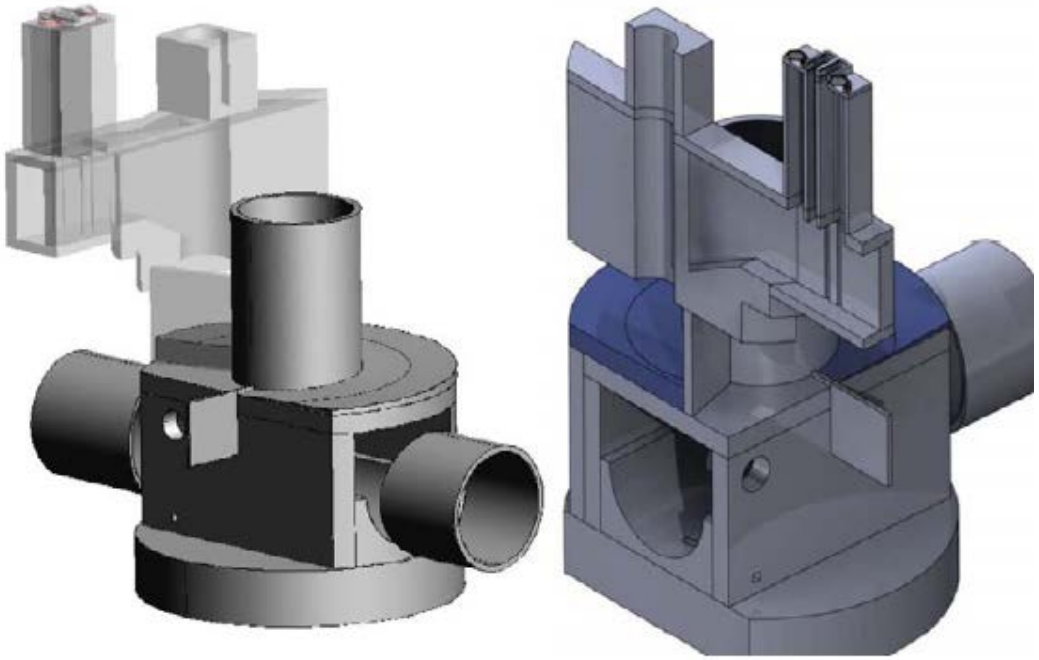


Drop Shafts and Deep Tunnels

IIHR has modeled about 30 systems in the U.S. and around the world, totaling about $5.4M since 2004.

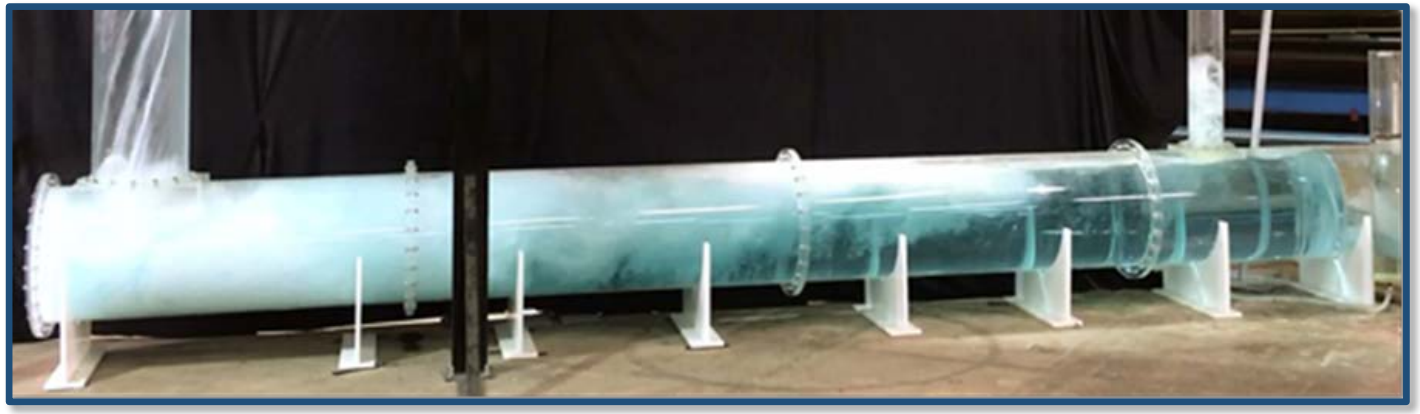
Washington, DC: DC Clean Rivers

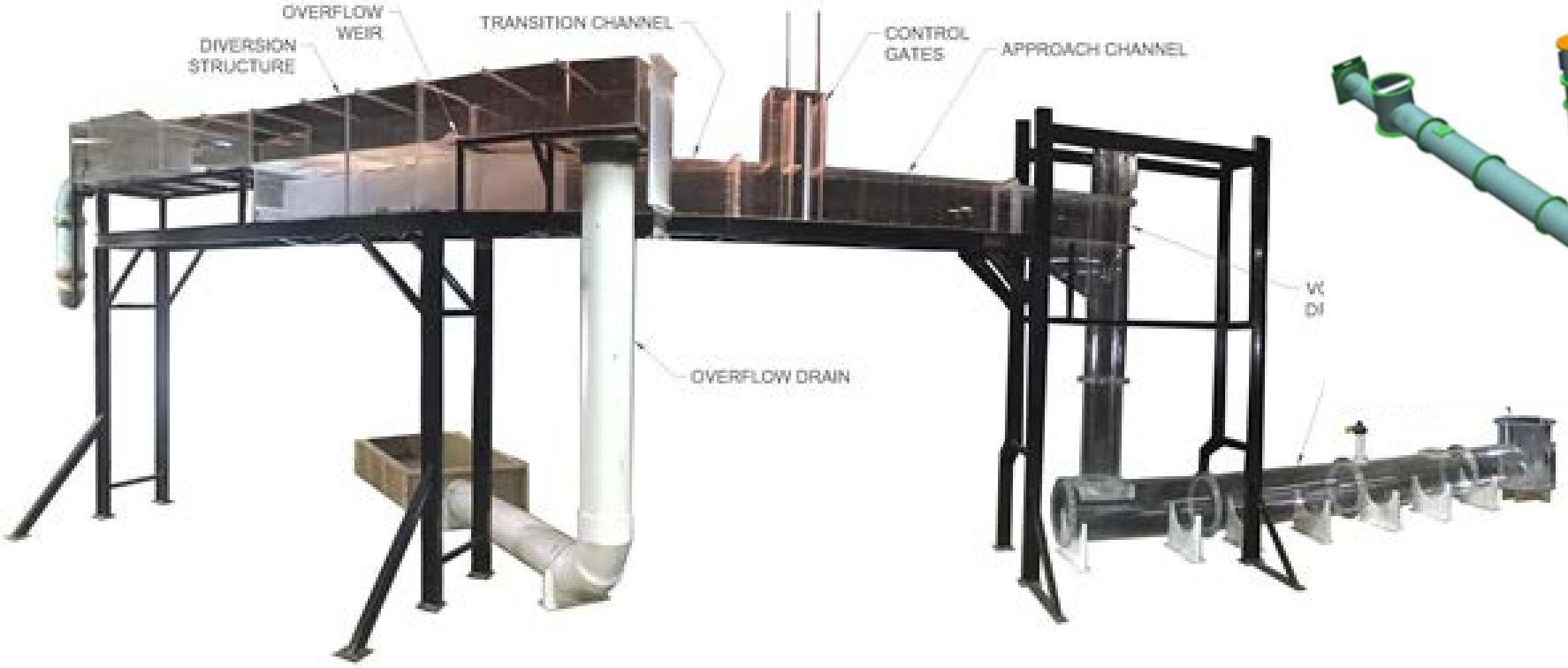
- Soft soils
- On-tunnel deaeration with surge
- In-shaft deaeration

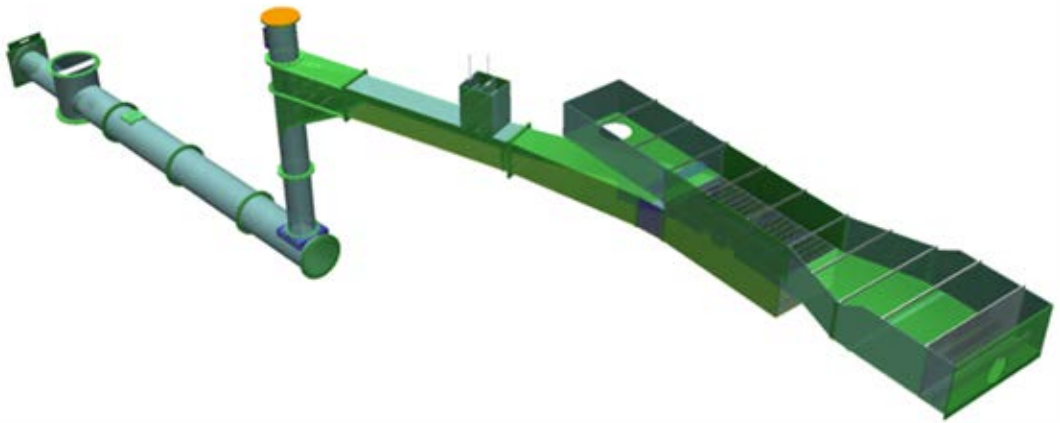


St. Louis: Forest Park Intake

- Large flows
- Deaeration
- Bypass flow control







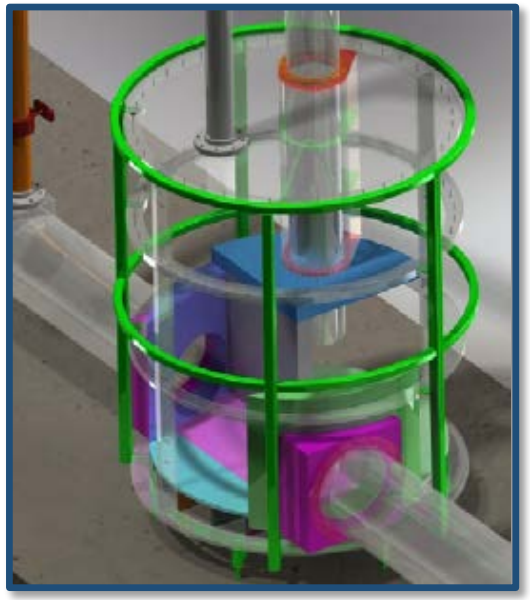
St. Louis

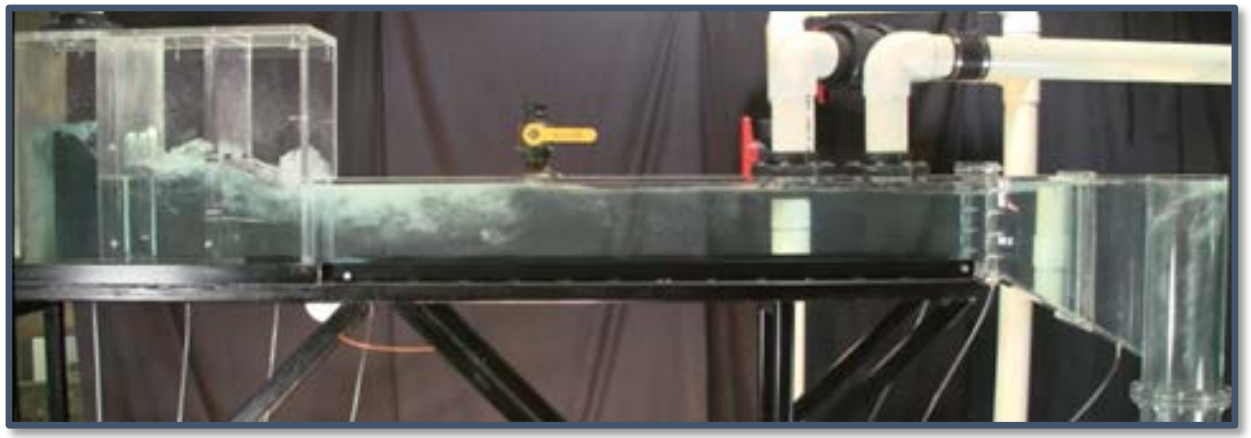
Original Design

Final Design

London: Deptford Storm Relief

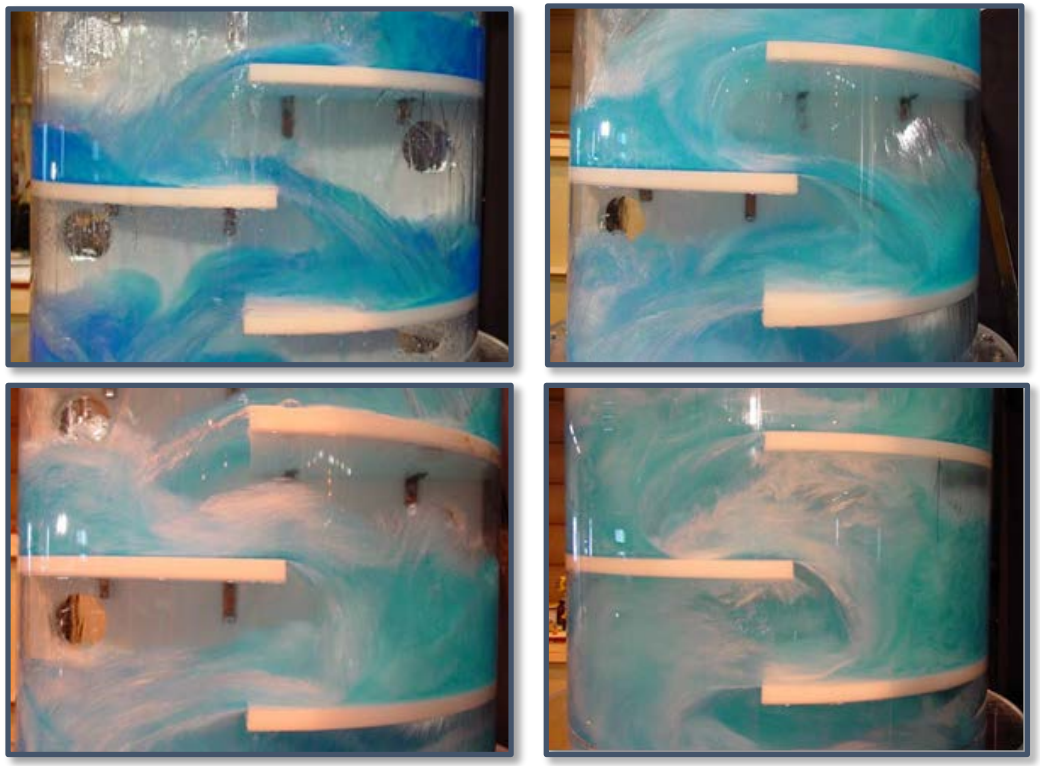
- On-tunnel design
- Air management/deaeration
- Hydraulic performance
- Tunnel crossflow

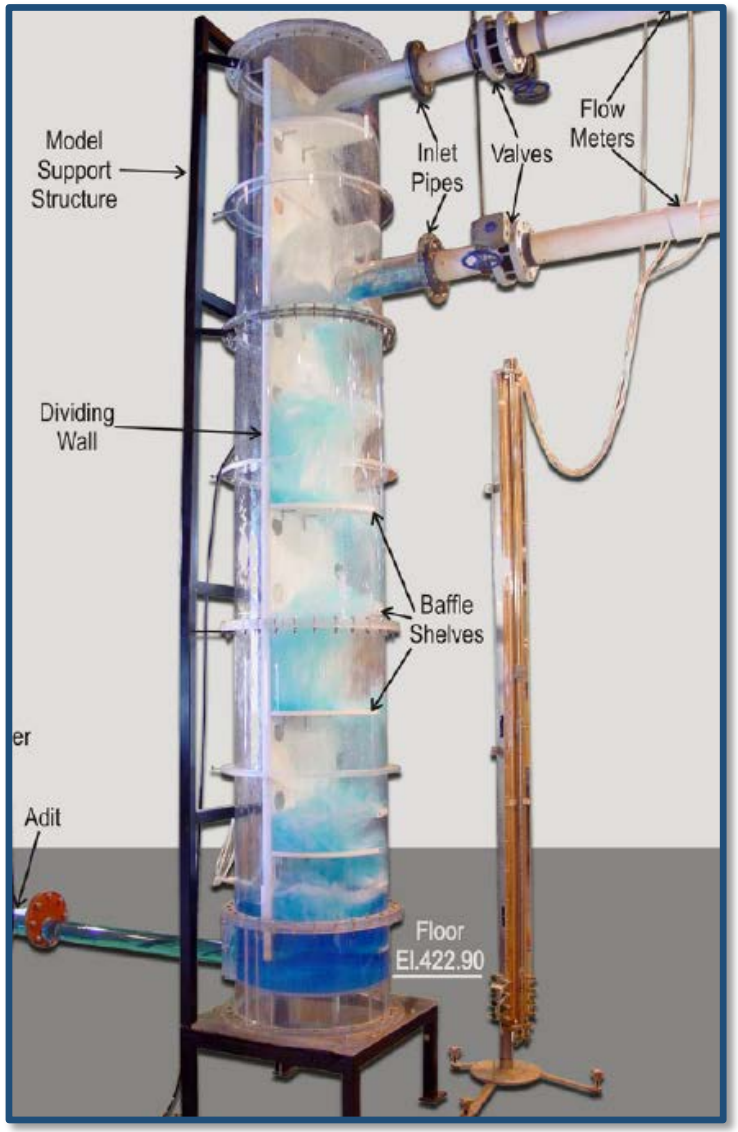


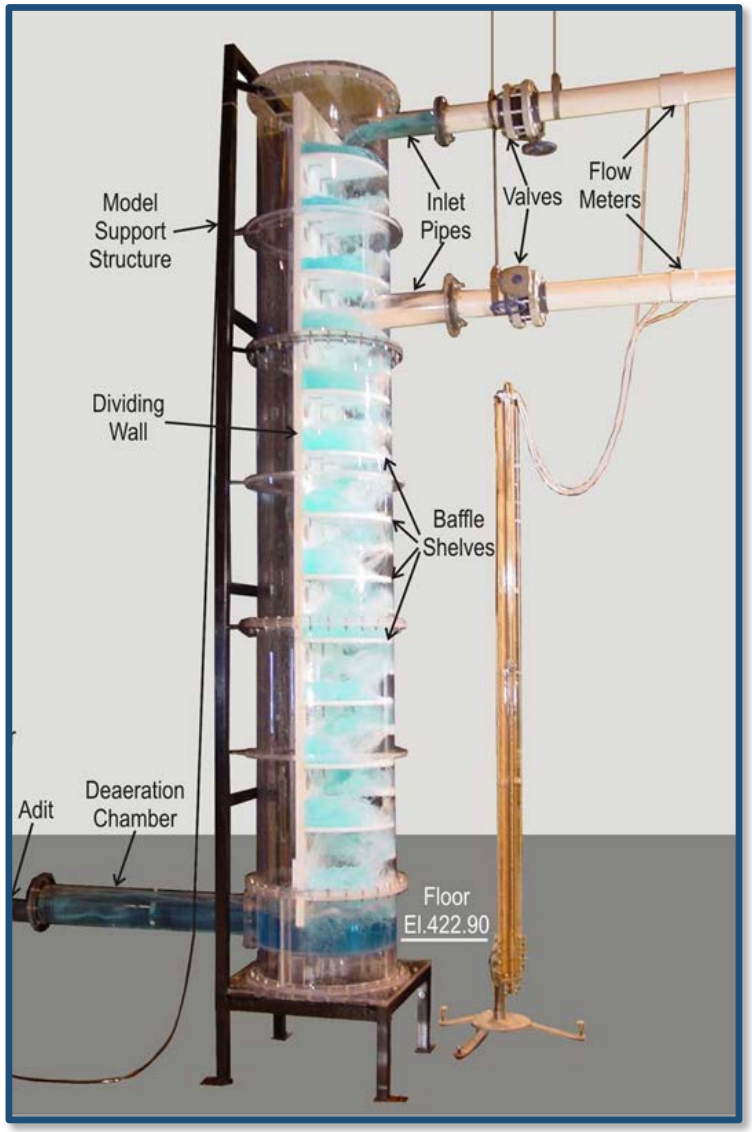


Cleveland: Euclid Creek Tunnel

- First baffle-type drop structure
- Multiple inlets
- Air management

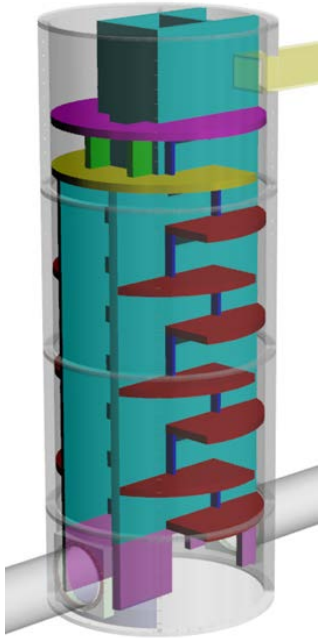


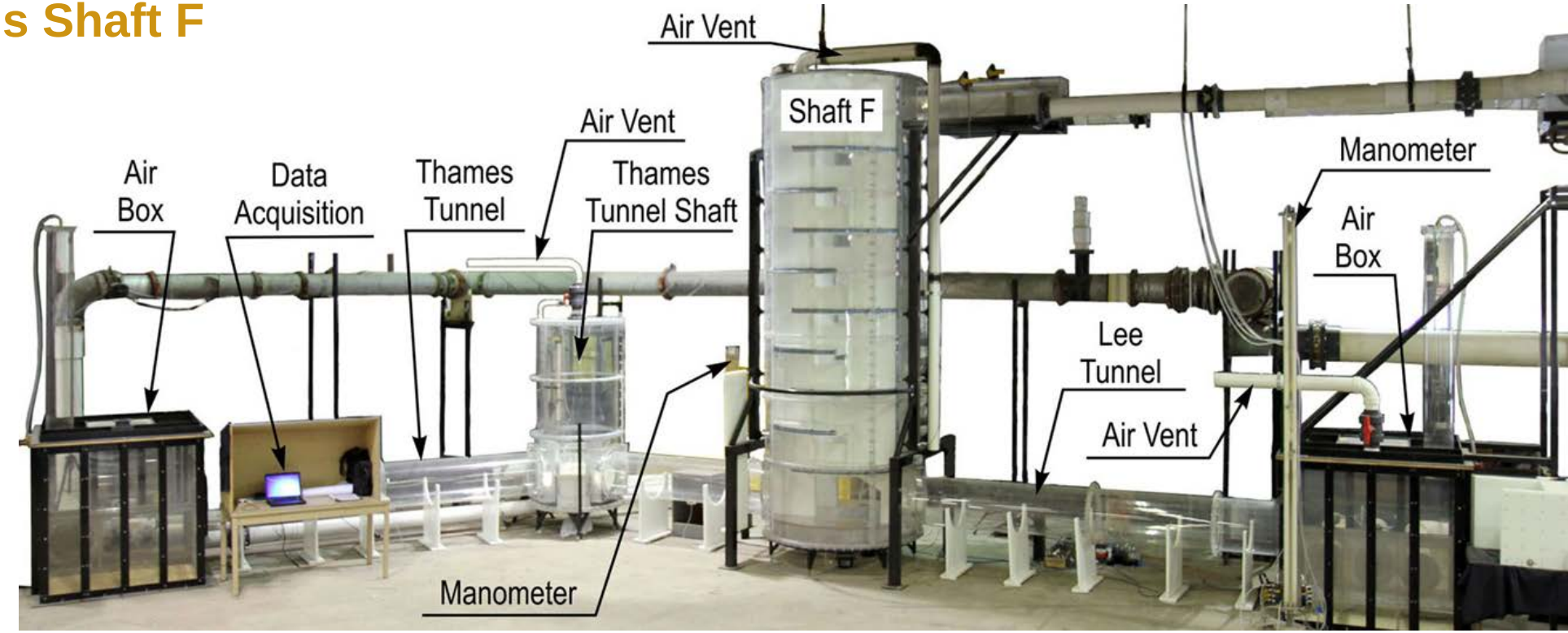


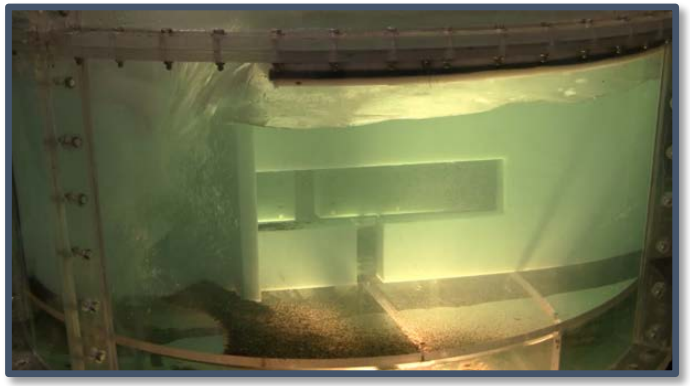


London: Abbey Mills Shaft F

- Dual inlets
- Large flows
- On-tunnel
- Air management

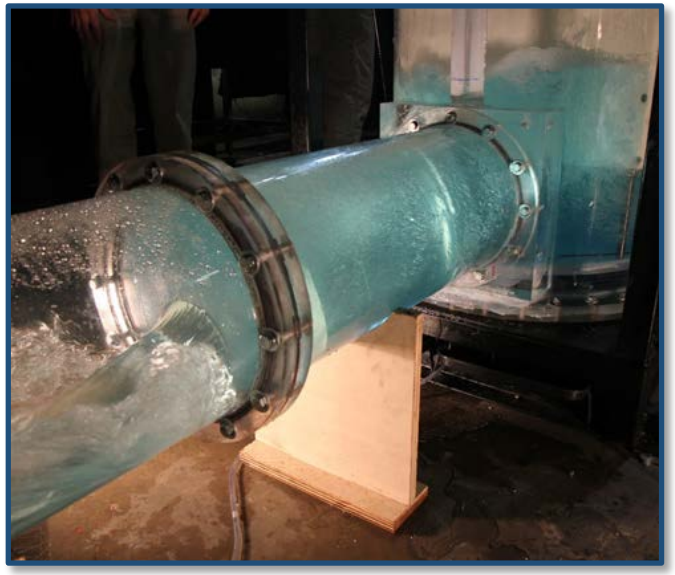


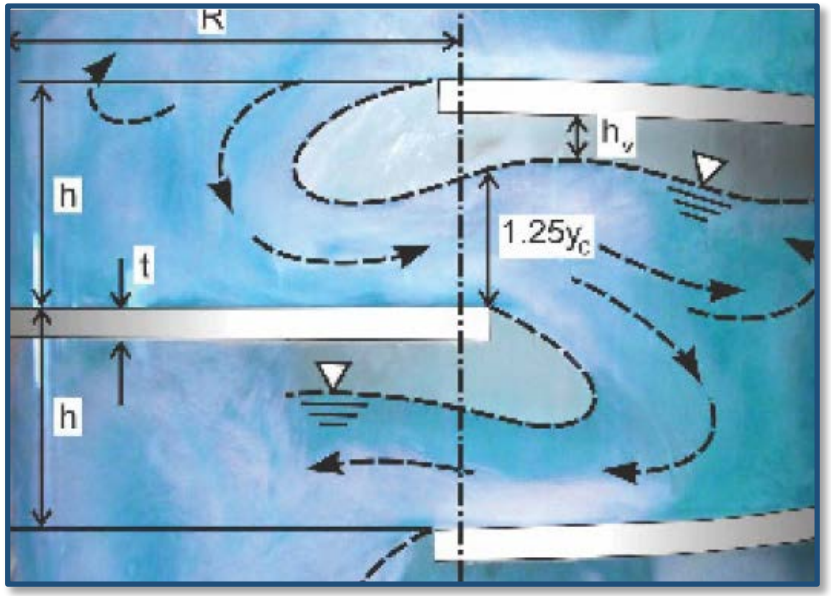


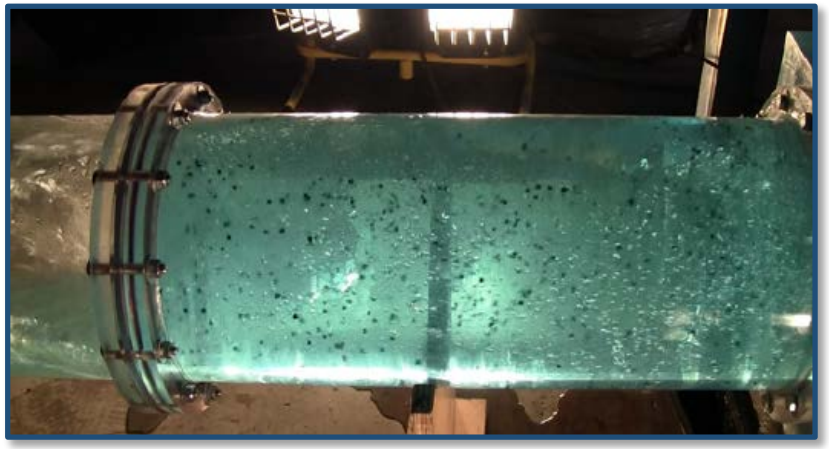


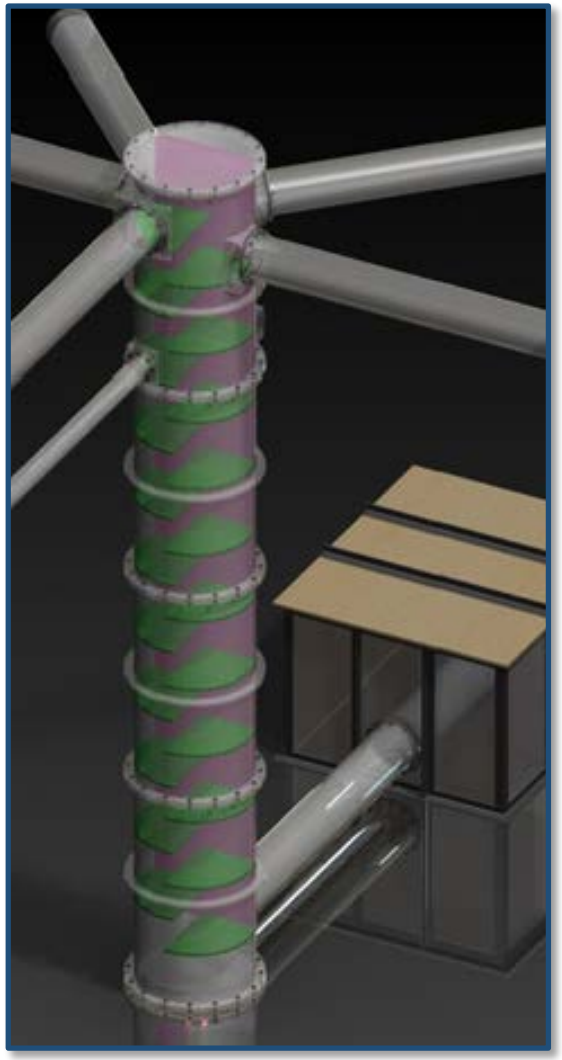
Indianapolis: Fall Creek/Whiter River Tunnel

- Very deep
- Performance validation
- Multi-inlet configurations
- Air management
- Manway access



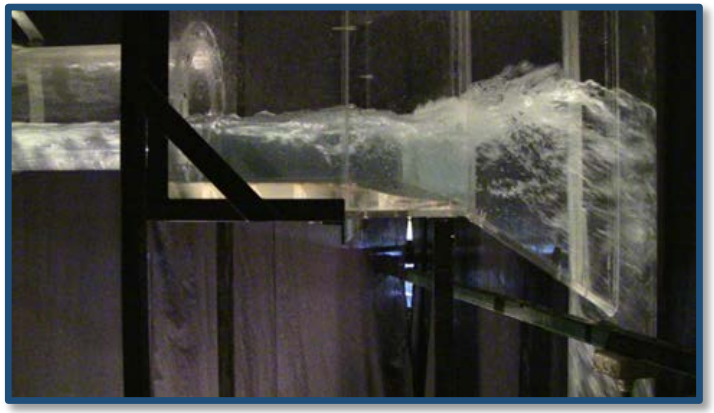


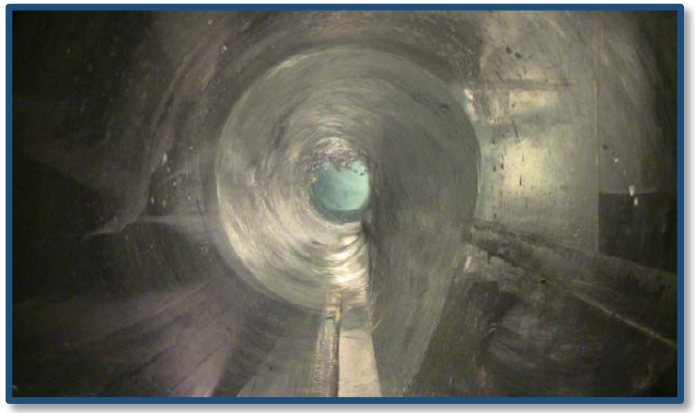


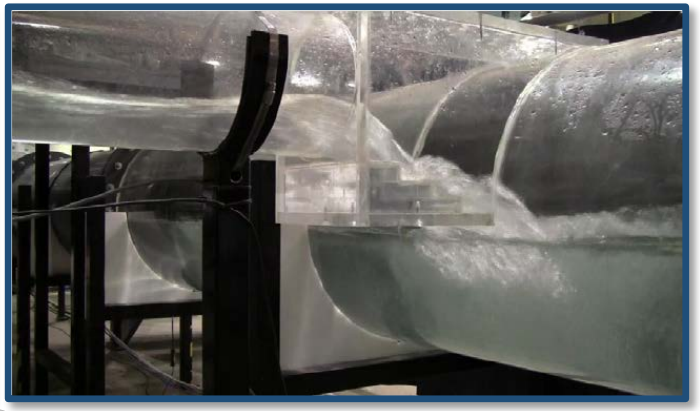


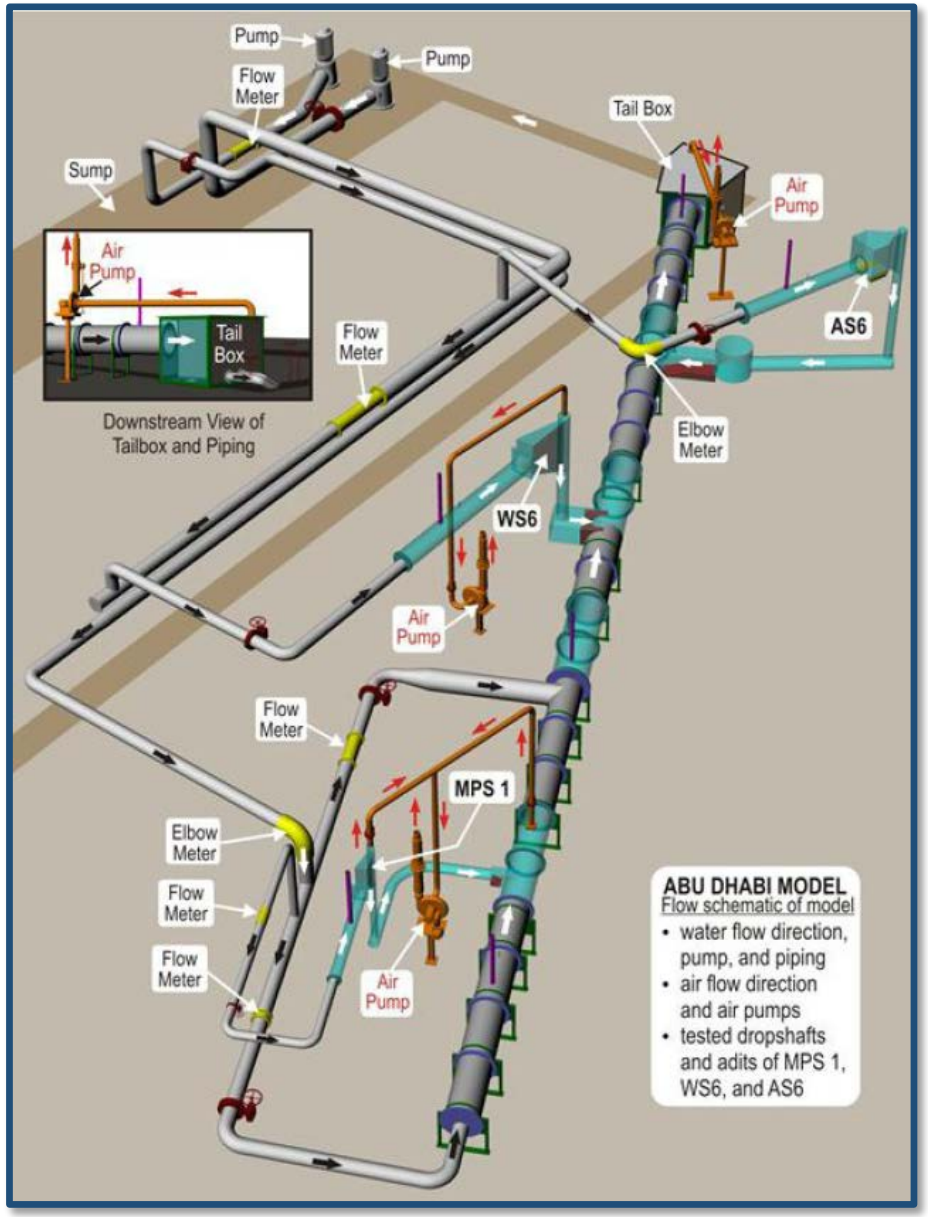
Abu Dhabi: Strategic Tunnel Enhancement Plan

- Regional air management for odors
- Sub-surface interception









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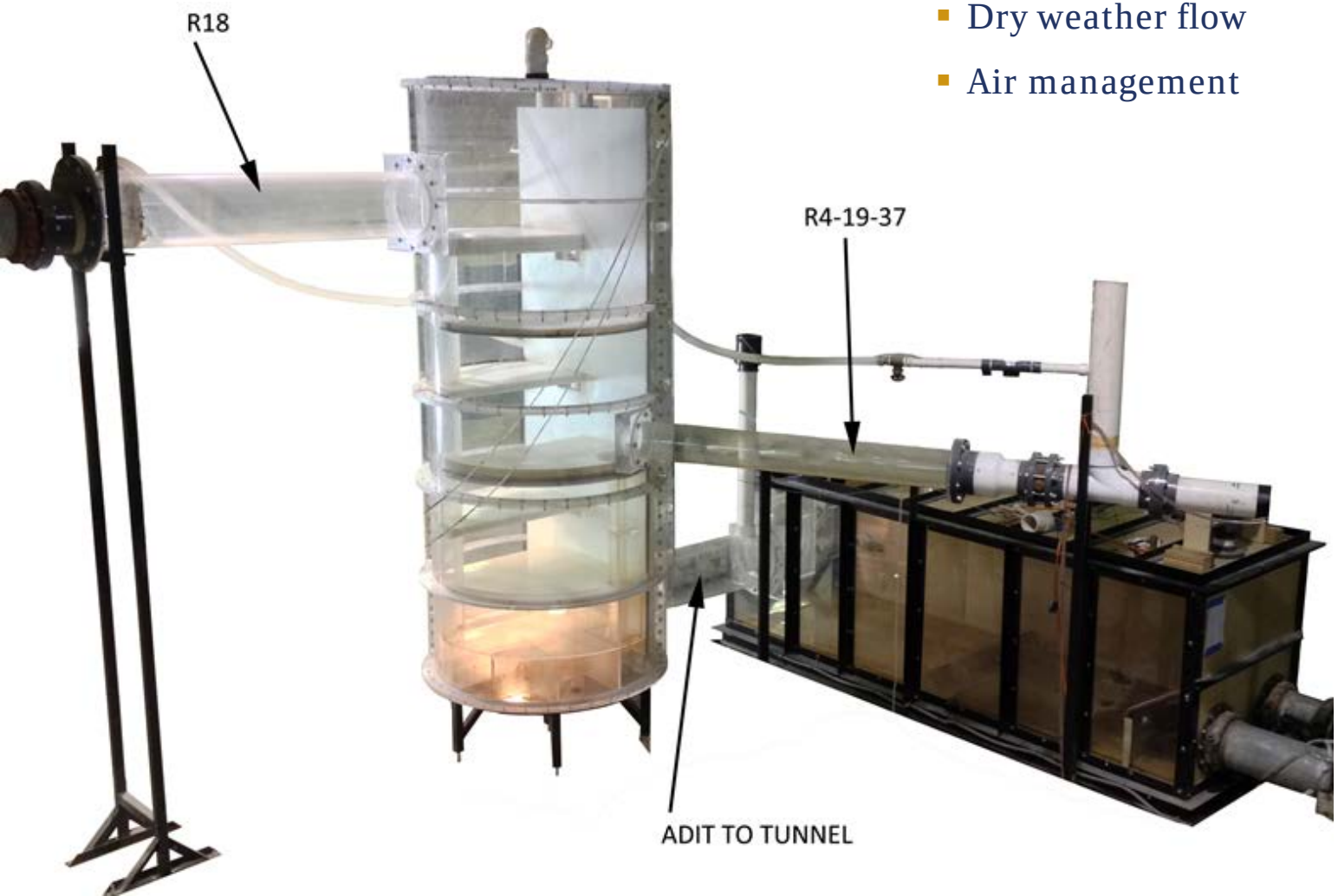
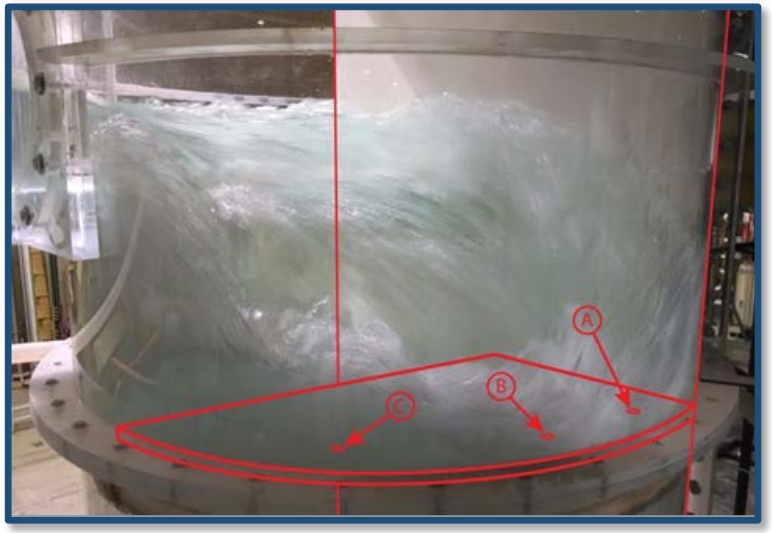
Akron: Ohio Canal Interceptor Tunnel

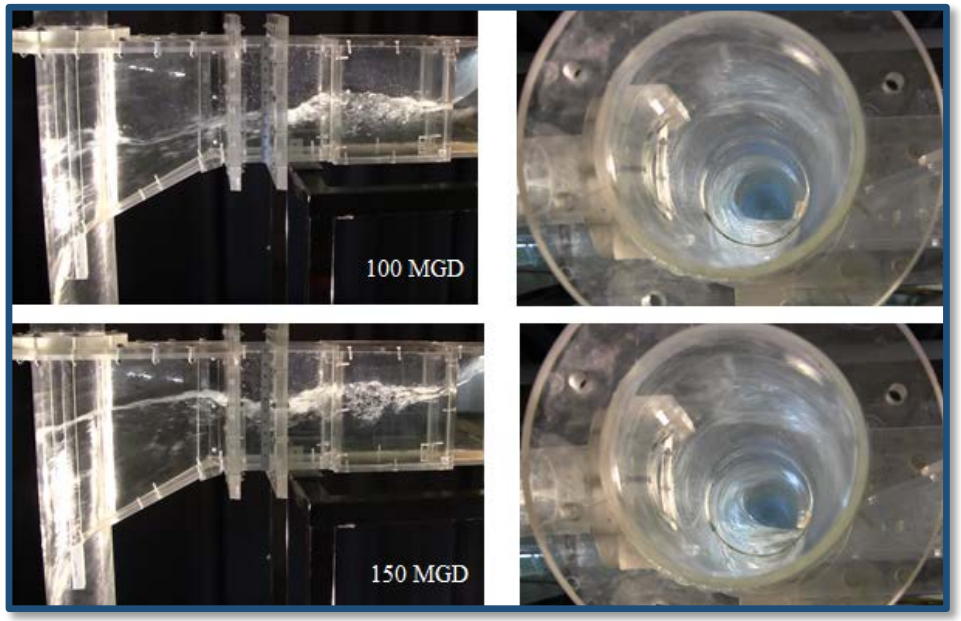
- Baffle drop shafts
- Dry weather flow
- Air management

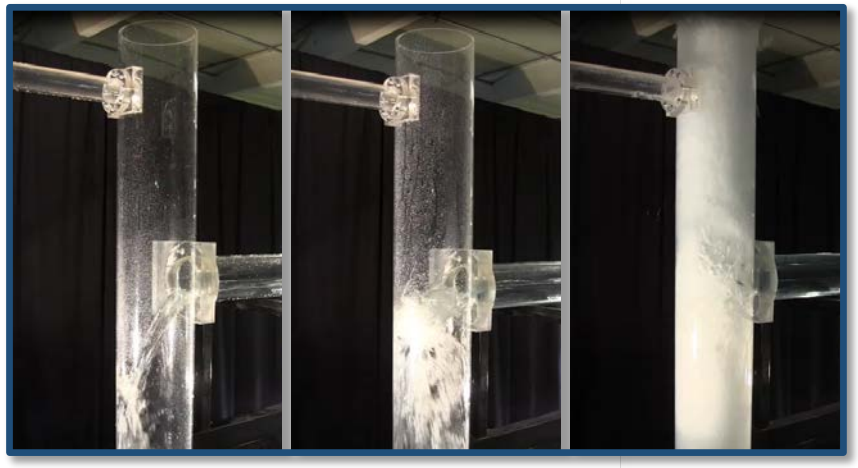


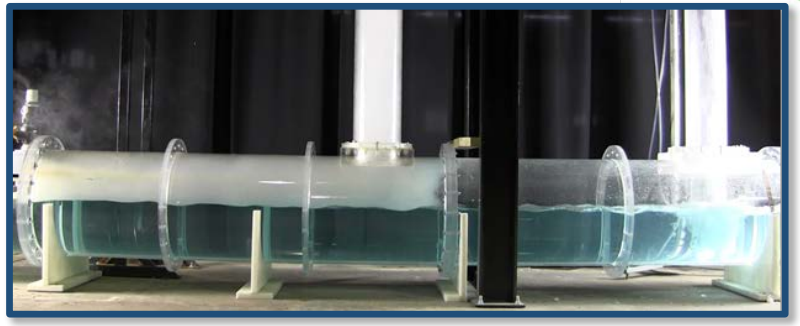


Indianapolis: Deep Rock Tunnel System

- Air vent capacities
- Plunge vs. vortex
- On-tunnel drop shafts

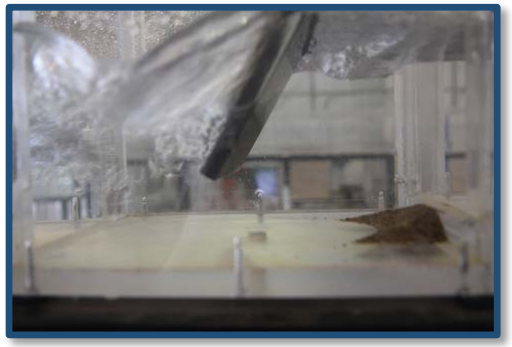


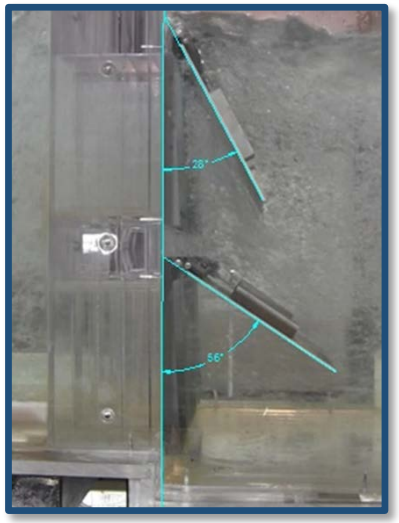


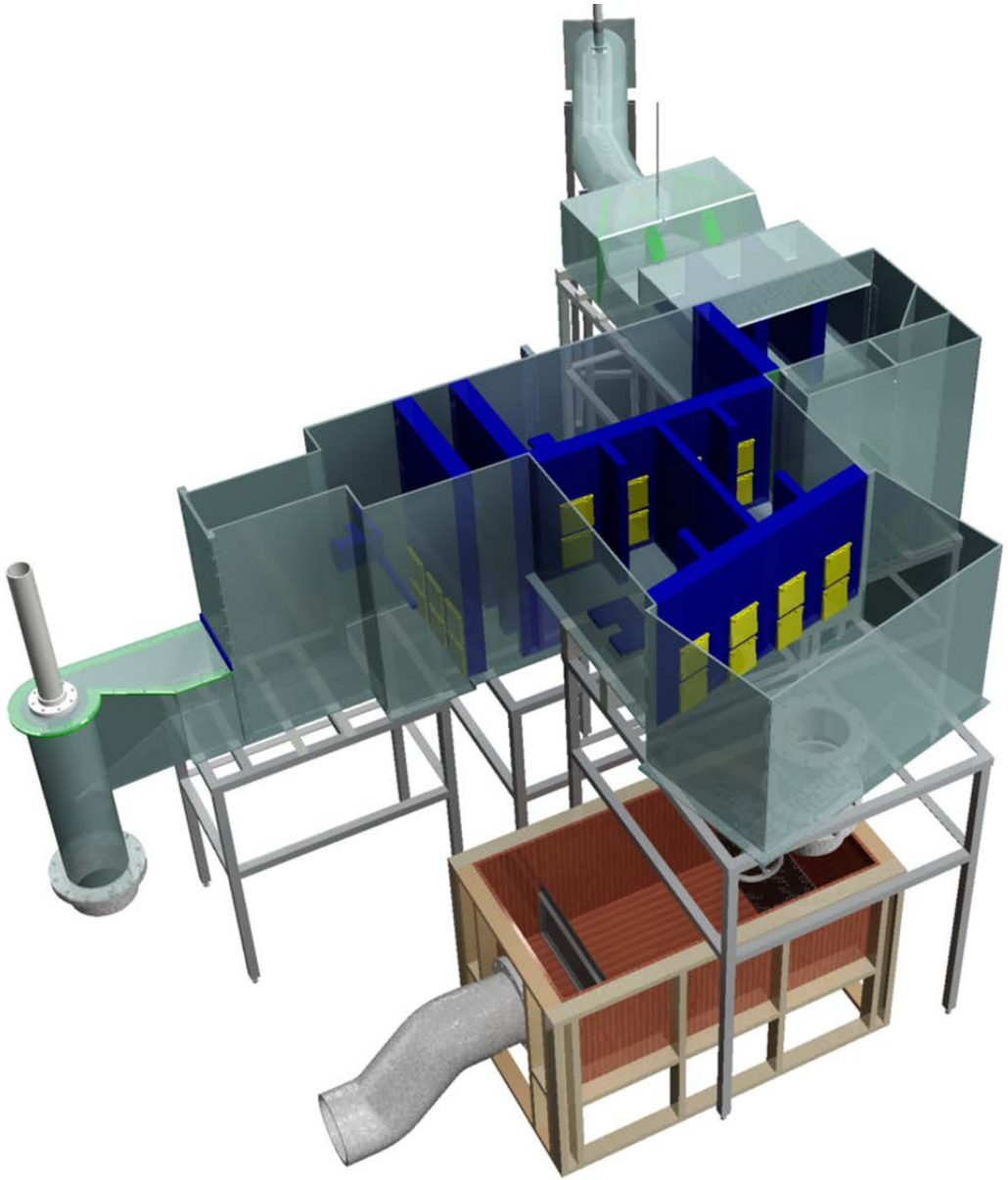


London: Interception Chambers

- Site constraints
- Solids/floatables
- Tide gates
- Complex geometry







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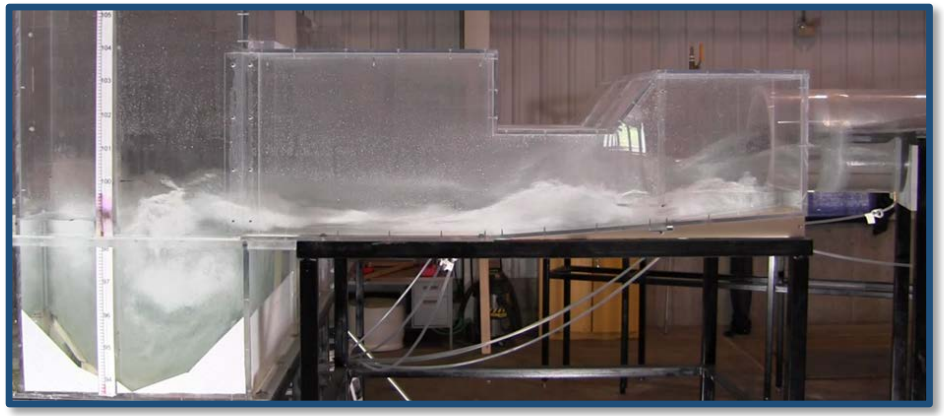
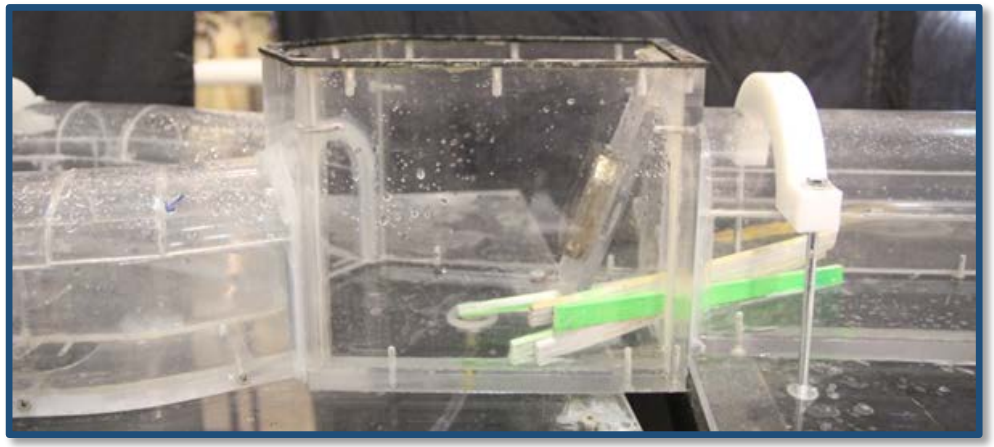
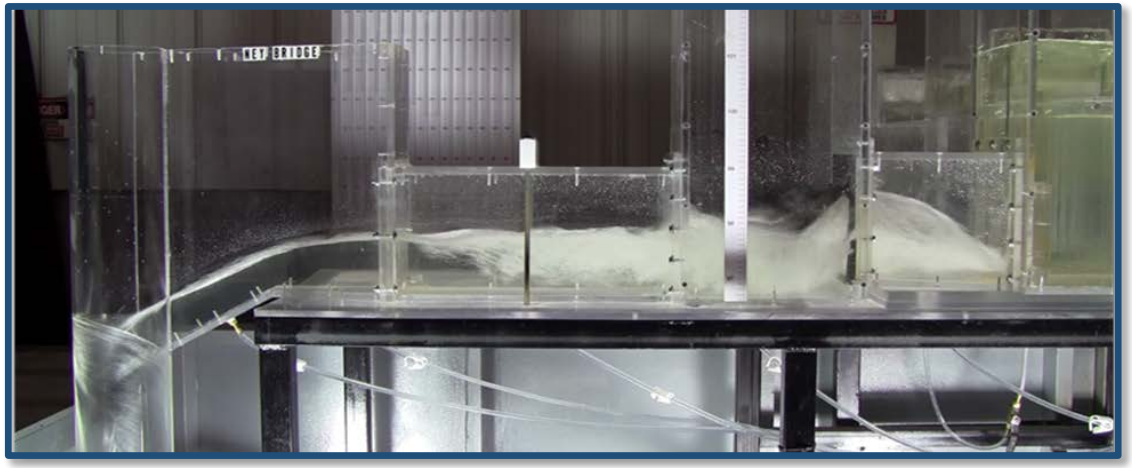
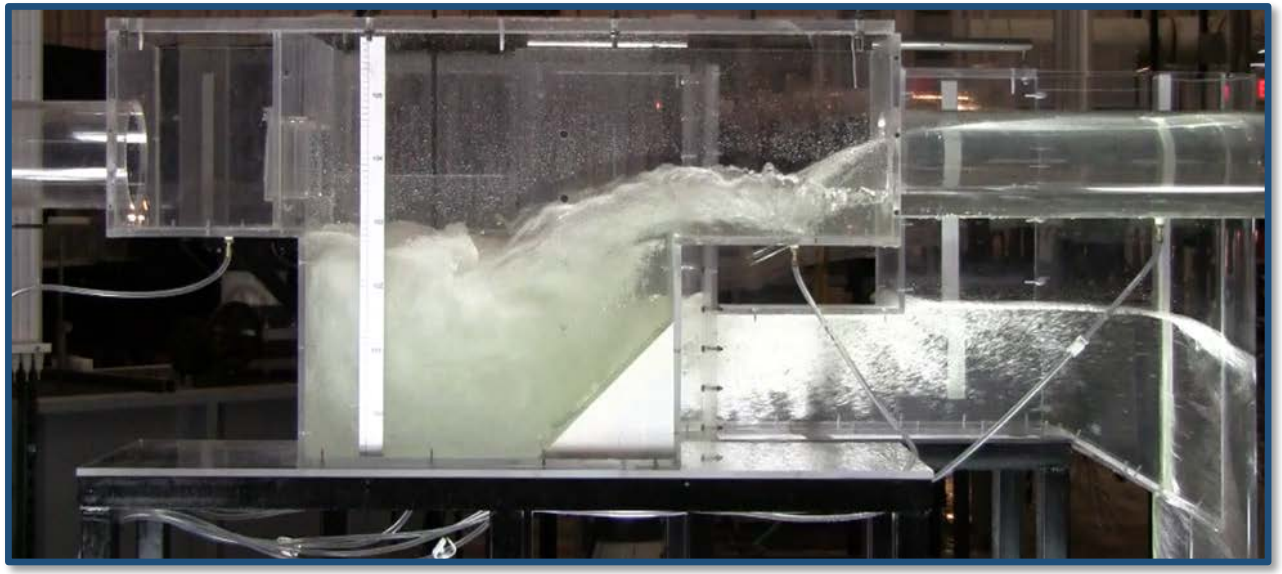


London: Interception Chambers

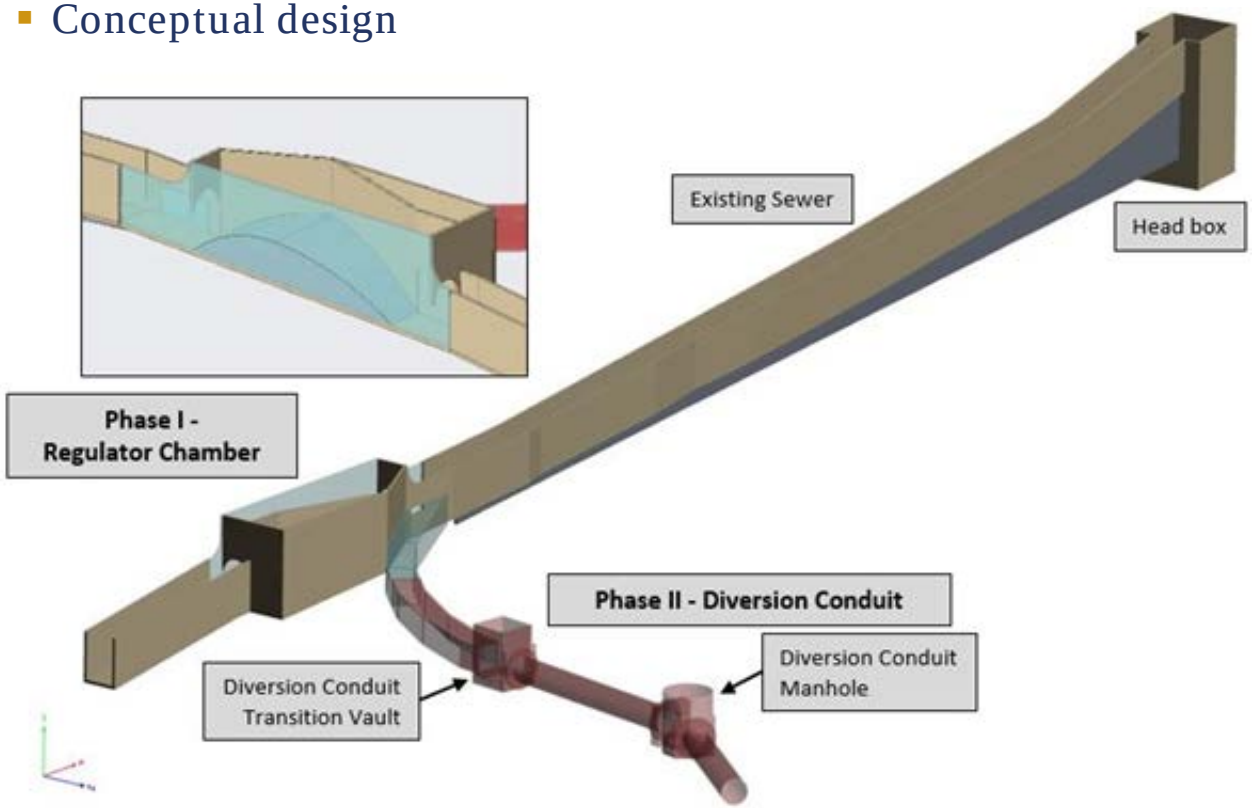






Lynchburg: CSO 56 Regulator

- Supercritical flow
- Passive interception flow control
- Conceptual design



60 MGD

212 MGD

Thank you!

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