

The Whole Story in Woods Hole

Or How Sometimes You Need to Dig a Little Deeper Than a Traditional I/I Project to Really Fix a Collection System

NEWEA Wastewater Collection Systems
Specialty Conference & Workshop Series
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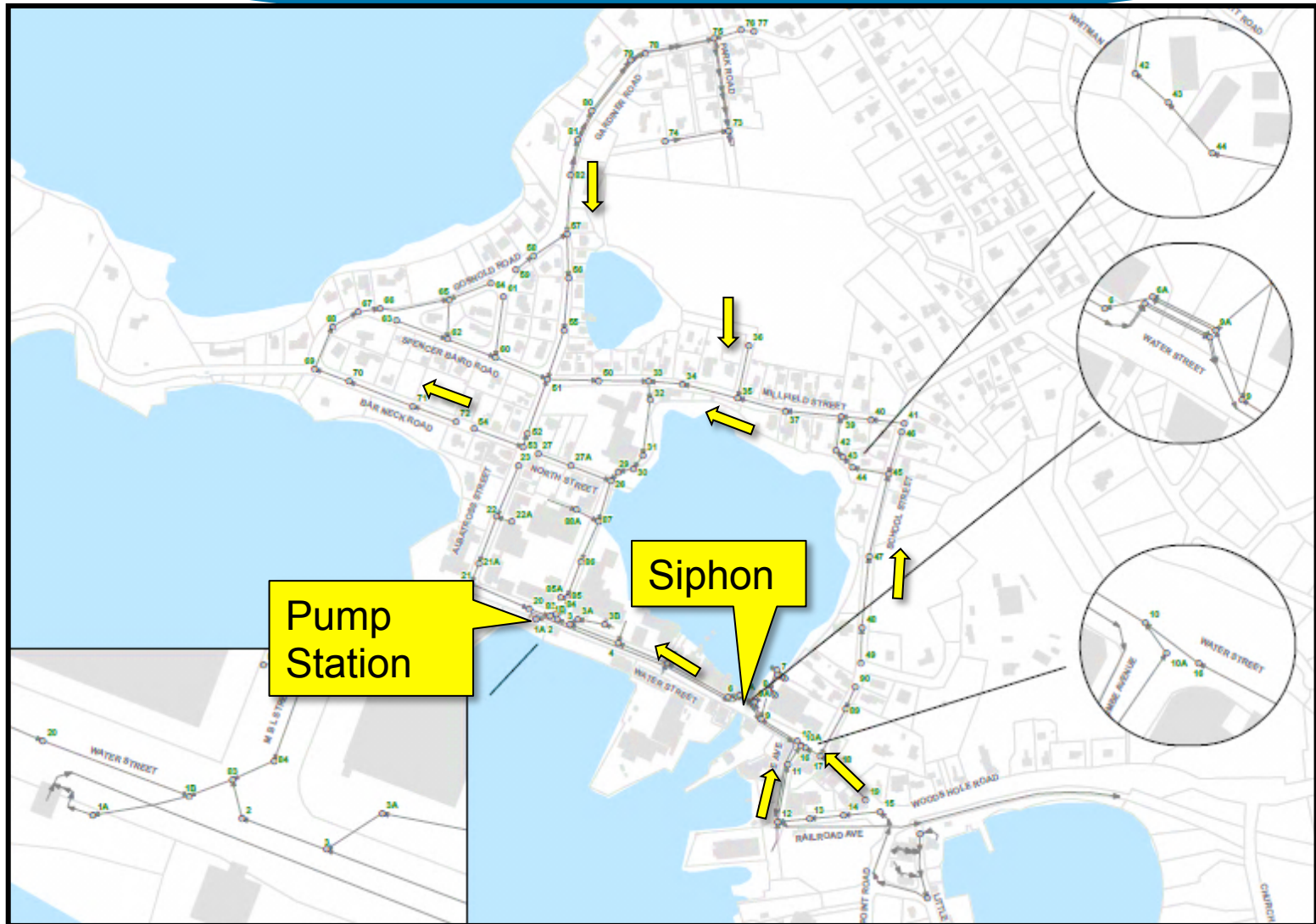
The Purpose of the Project

- Town required to remove at least 30,000 gallons of I/I from the wastewater collection system by December 2, 2016.
- The purpose of this project is to quantifying discrete sources of I/I and recommending means of I/I removal

Woods Hole



Woods Hole Sewer System



Scope

- **Flow metering, Evaluation of LS flow records**
- **CCTV inspection**
- **MH inspection**
- **Integrate results into VueWorks**
- **Develop recommendations**

Continuous Flow Metering

■ 3 Continuous Flow Meters

- 1 Area Velocity
- 2 Parshall Flumes

■ Woods Hole Lift Station Flow Totalizer

Tighe & Bond
METER SITE INFORMATION FIELD LOG

PROJECT: Falmouth, MA
LOCATION: Water Street at MSL Street
COMMENTS: GPS: 41.52537, -70.67274

DATE: April 2, 2013
TIME: 11:00
METER SITE: 2





Size (")	Material	Flow Depth (")	Ultrasonic	Shape	MH Depth
8	PVC	2	0	Circular	11' 00"
12	PVC	2	0	Circular	12' 00"





SURCHARGE INFORMATION

IS SURCHARGE NONE EVIDENT: ☒

IS SURCHARGE MARKS TO: _____

IS SURCHARGE CURRENTLY TO: _____

WEIR INFORMATION

LENGTH: _____

BREADTH: _____

LEVEL: _____

HEIGHT ABOVE WEIR: _____

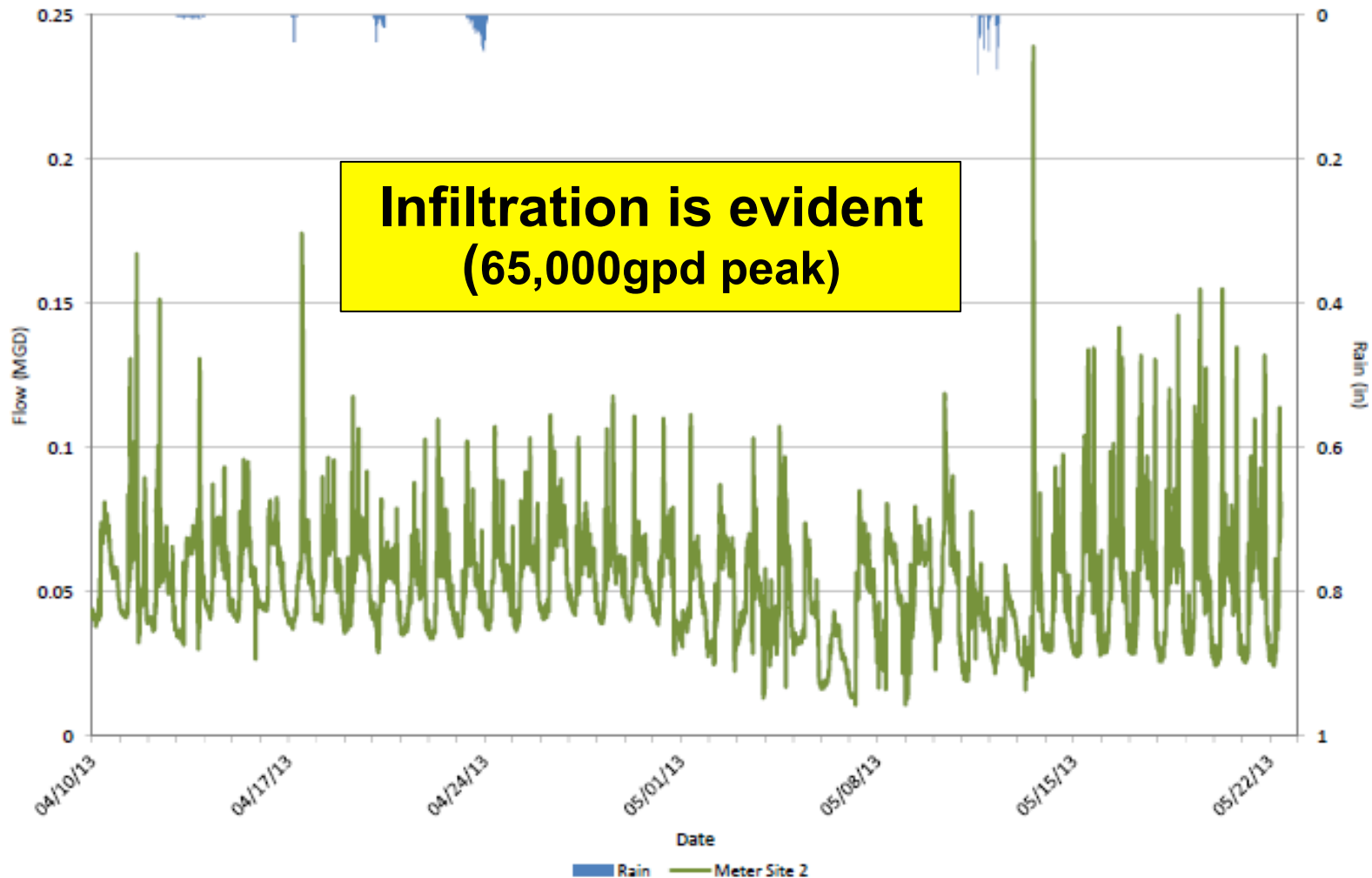
OVERFLOW OCCURS AT: _____



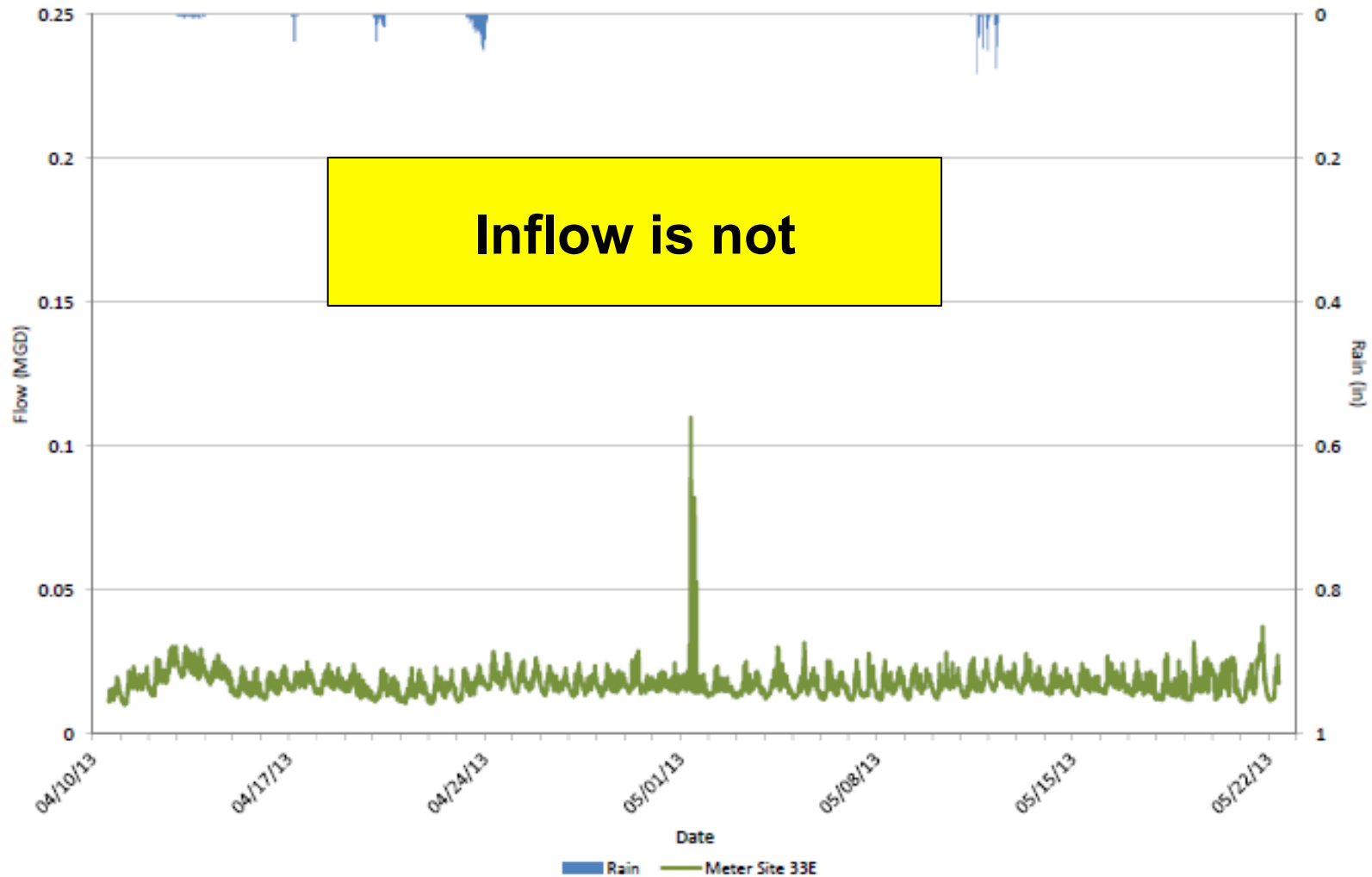


Tighe & Bond

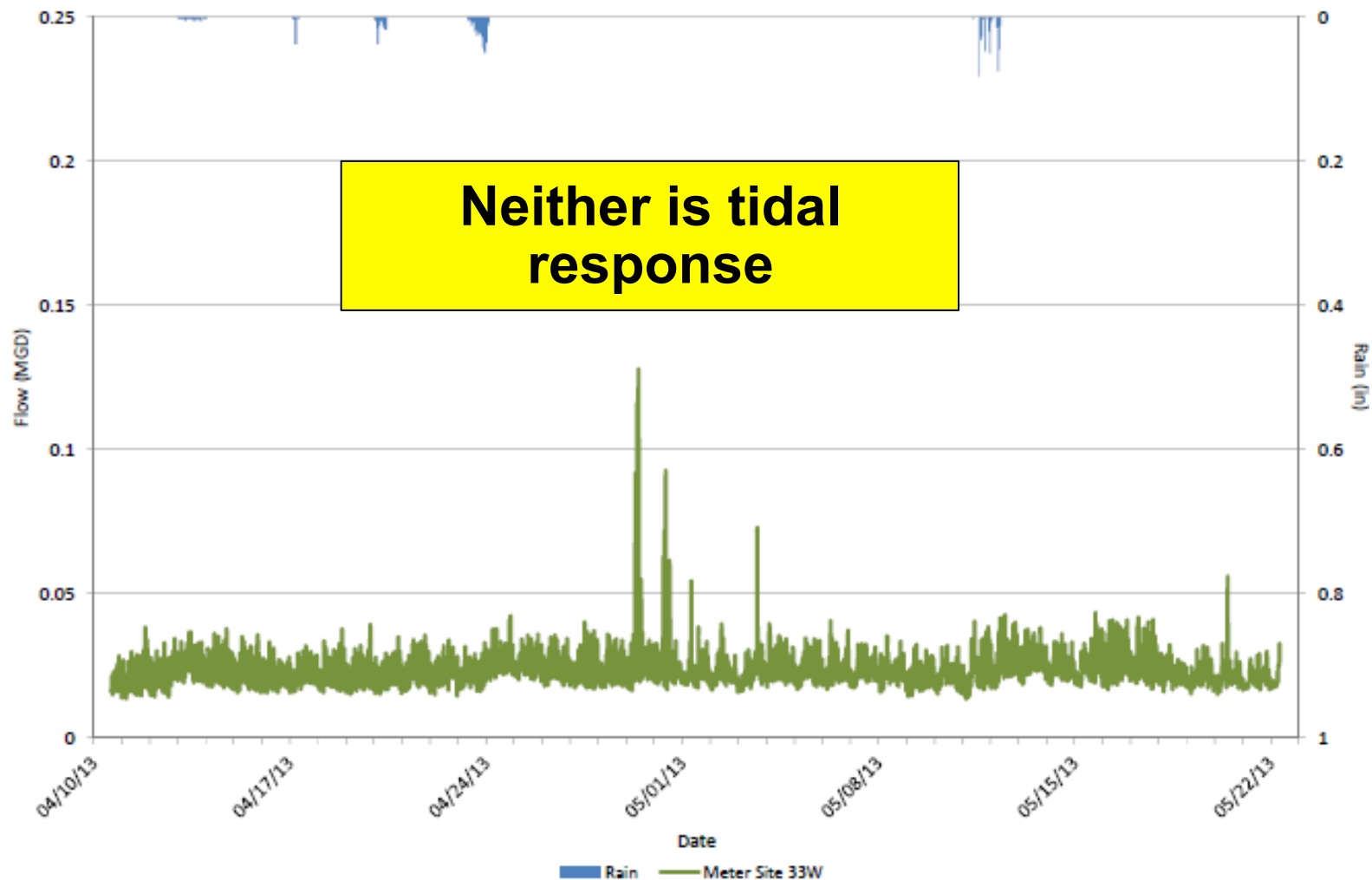
CFM Results



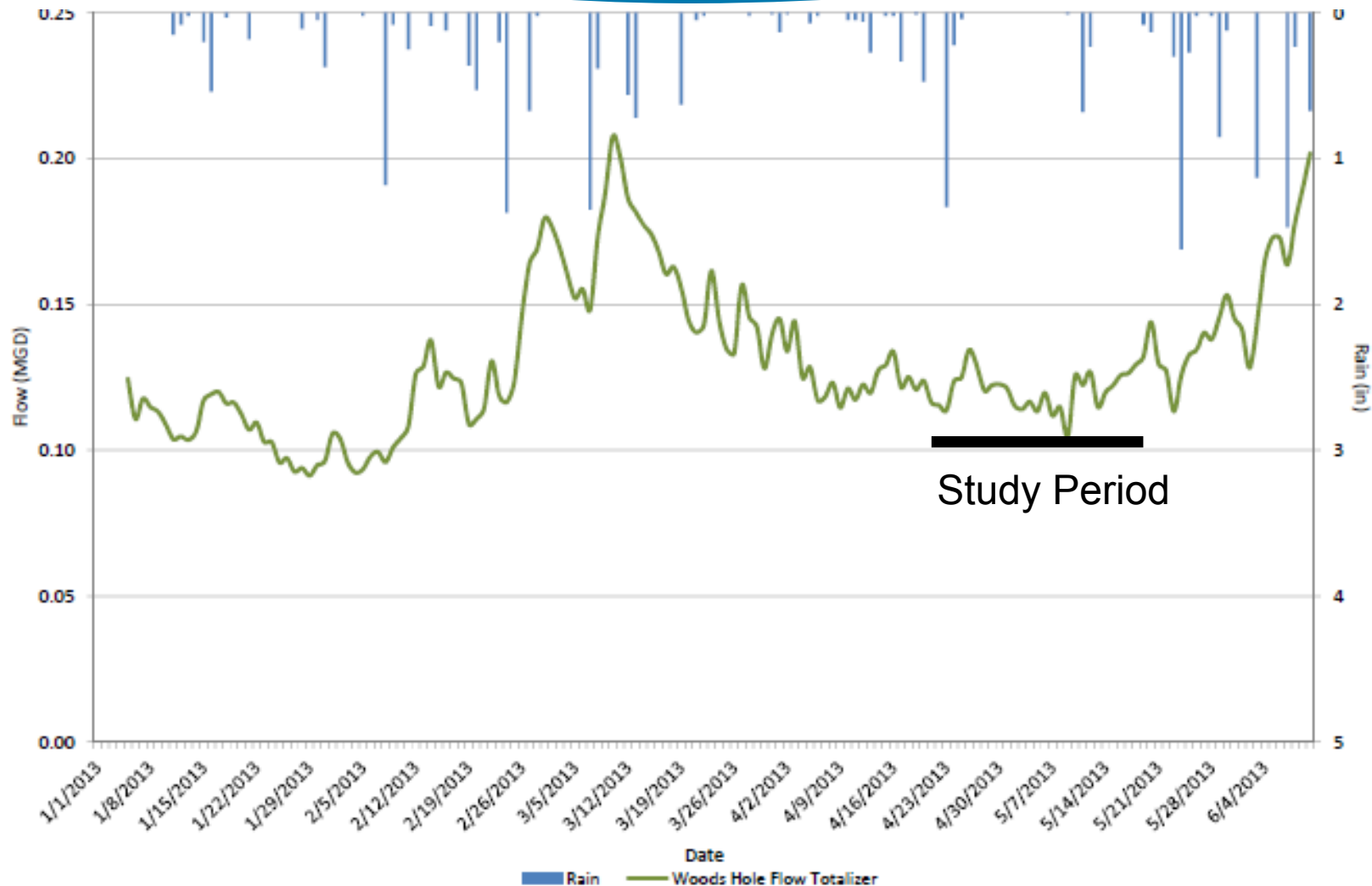
CFM Results



CFM Results



And Then The Rain Came



MH Inspections

- **82 MH's**
 - 62 brick
 - 20 conc
- **Brick MH's in fair to poor condition**

Manhole: 3

Sub Area: River St Weather: Cloudy, Warm
 Date: 2009-06-12 Time: 10:46:11 Inspector: PL

Grade: At Grade Runoff: Pavement

Steps: 5 Steps Condition: Good

Cover Diameter: 24 Pick Holes: 2 Cover Holes: 0

☐ Surcharge ☐ From Invert ☐ Flood -> Submerge

Comments:
 Recommendations:
 Defects:
 Deposits:
 Frame:
 Corbel:
 Walls:
 Bench:
 Invert:

Material	Condition	Leak (gal/min)
Cast Iron	Good	0.00
Brick	Good	0.00
Brick	Poor	2.00
Brick	Fair	0.00
Brick	Good	0.00

Connections - Downstream	Position (clock)	Invert Depth (")	Pipe Diameter (")	Pipe Material	Flow (")	Debris (")	Leak (gal/min)
2	6	8-9	8	Vitrified Clay	5.00	0.00	0.00

Connections - Upstream	Position (clock)	Invert Depth (")	Pipe Diameter (")	Pipe Material	Flow (")	Debris (")	Leak (gal/min)
4	12	8-8	8	Vitrified Clay	4.00	0.00	0.00
SVC	11	8-1		Vitrified Clay	1.00	0.00	0.00

National Water Main Cleaning Company

Manhole

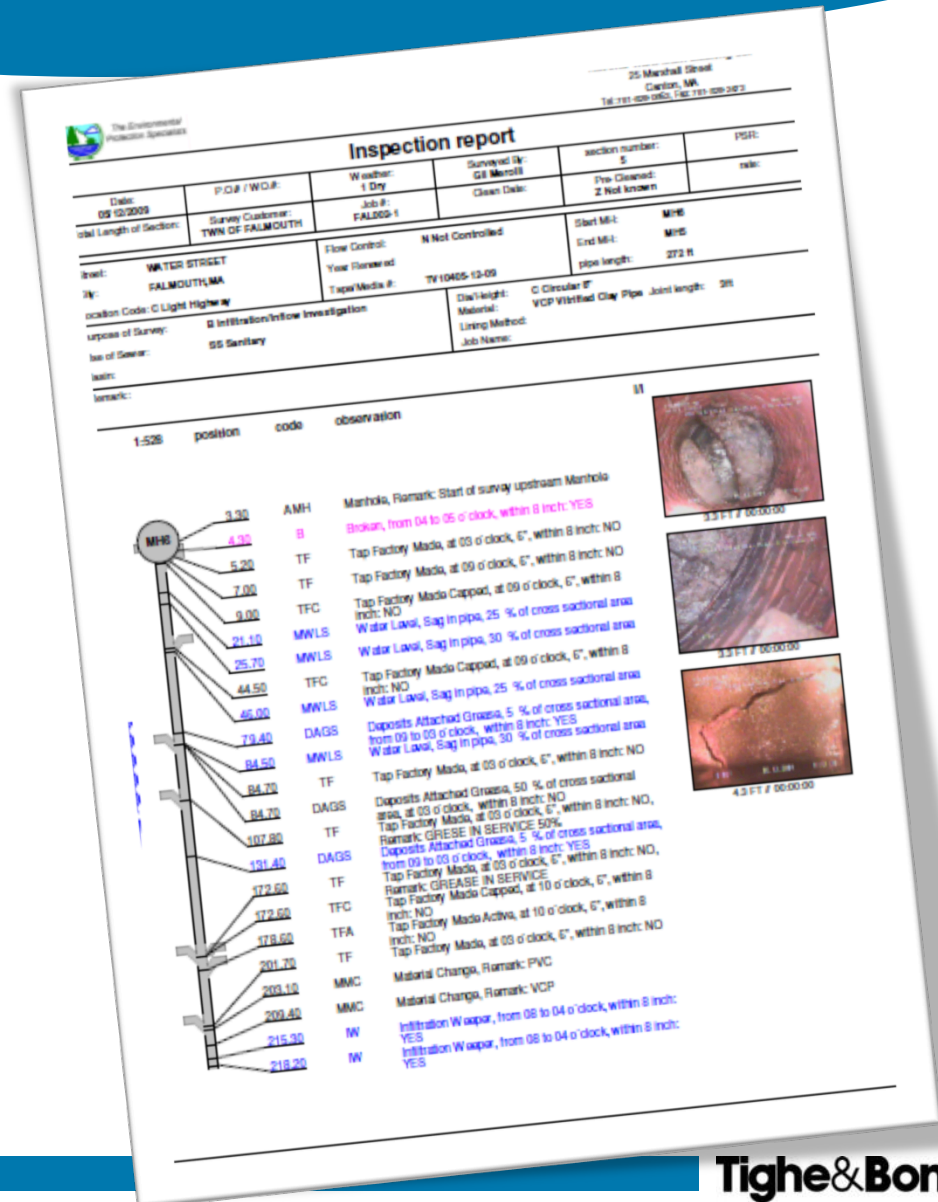
CCTV inspection results

■ 13,600 feet inspected

- Open joints
- Cracks/Fractures
- Infiltration
- Mineral Deposits
- Roots

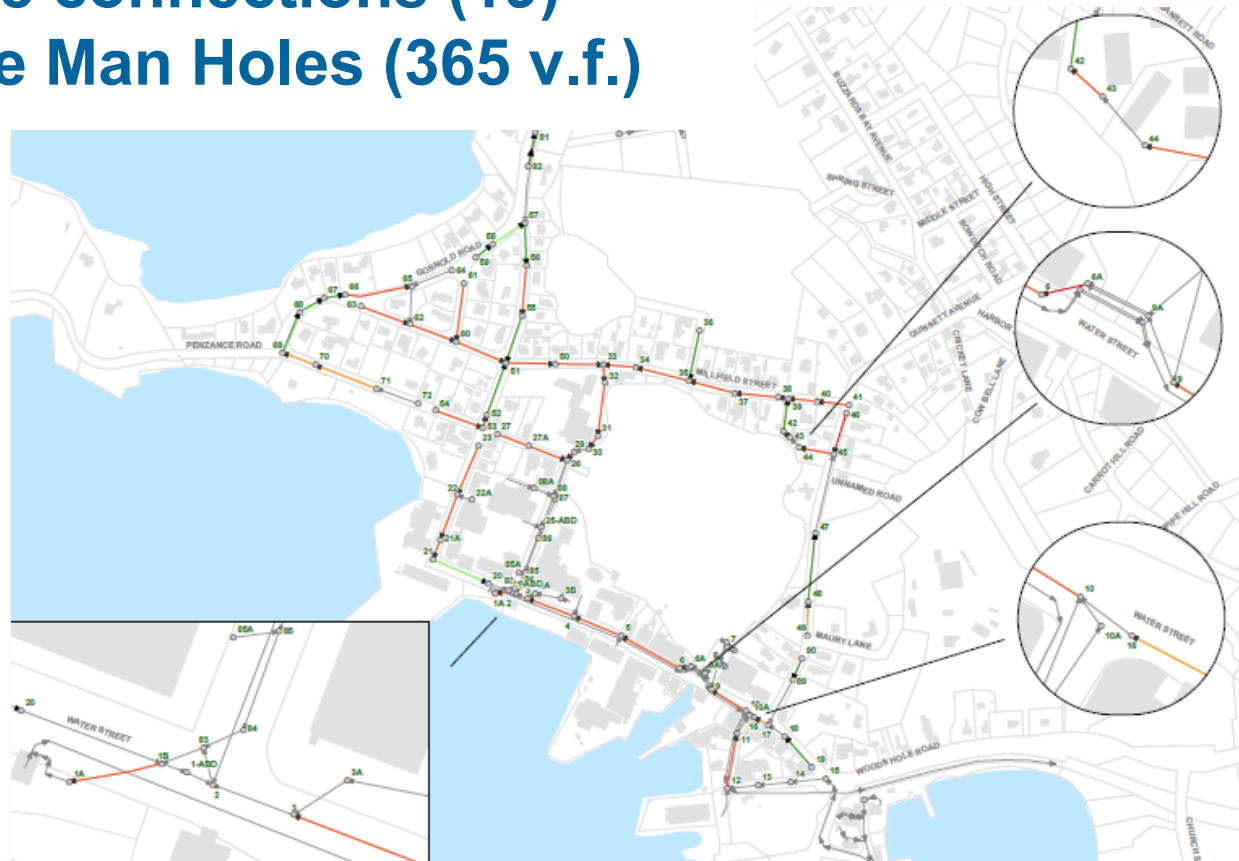
■ Localized Grease

■ Sag, sags, sags



Recommendations

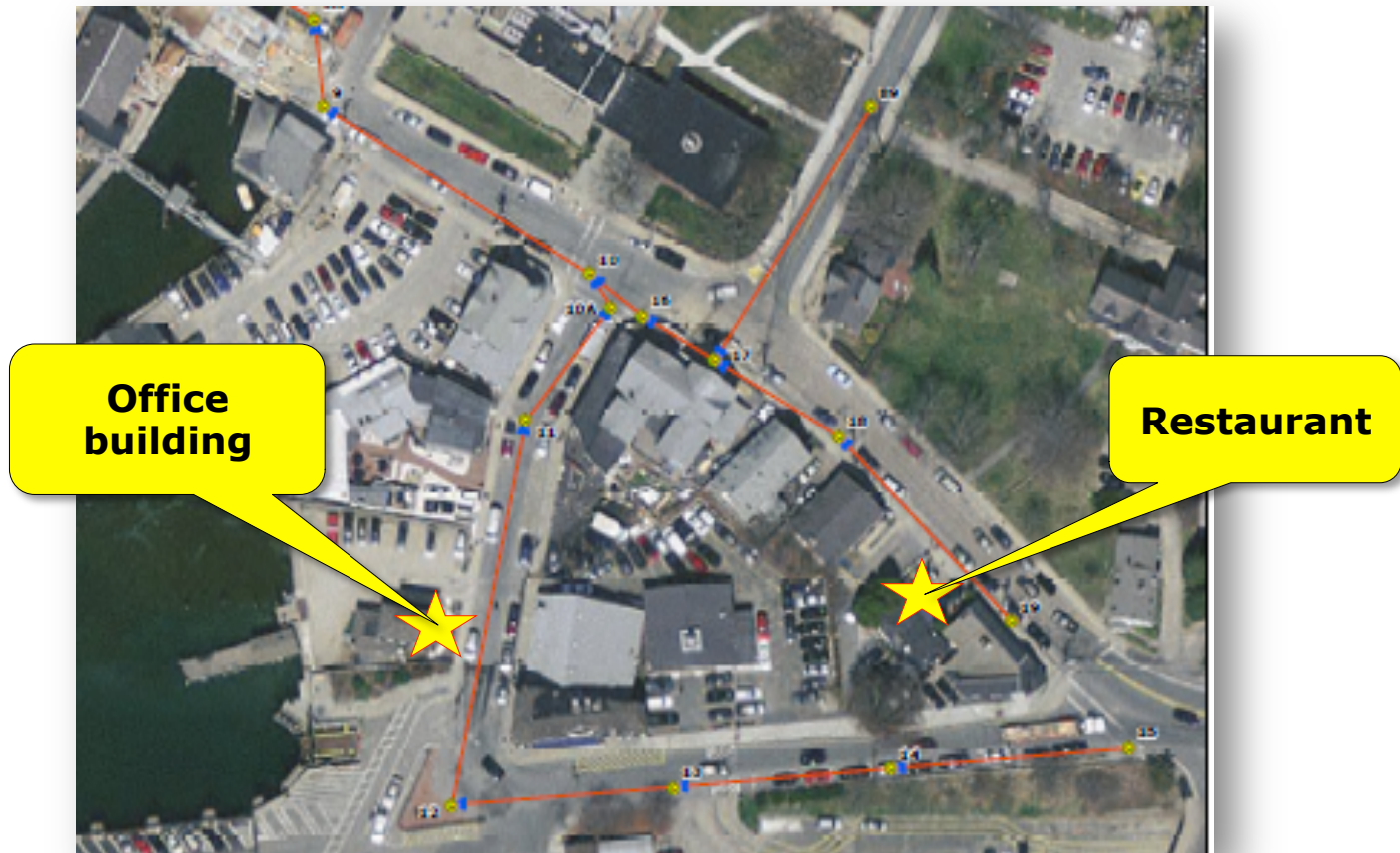
- Cured in place lining (5,900')
- Tee-liners (100)
- Seal service connections (19)
- Rehabilitate Man Holes (365 v.f.)



That'll do it, right?

- **Sewer rehab' will meet the needs of the Modified Groundwater Discharge Permit**
- **BUT it does not address**
 - Sags
 - Grease
 - Surcharging

Capacity Concerns



What Is Causing Backups?

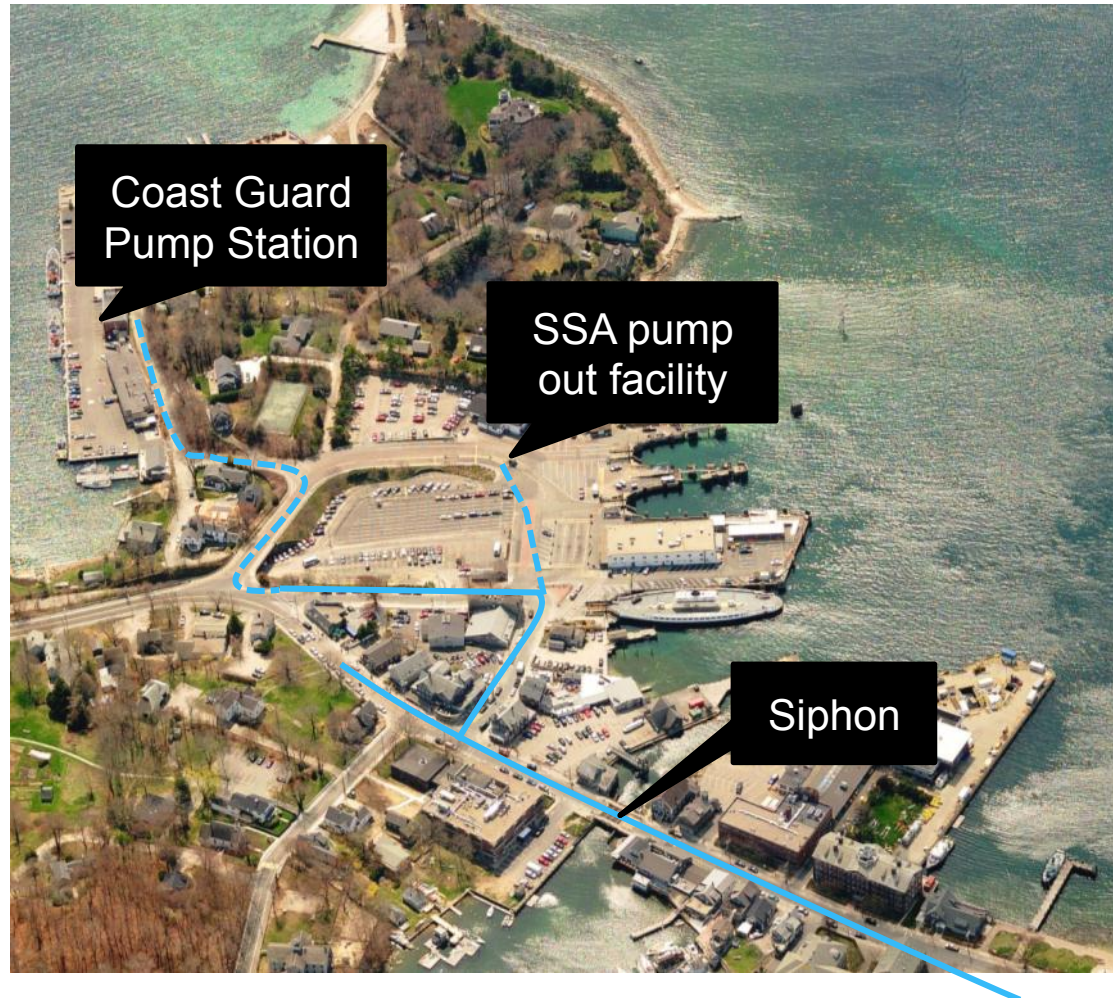
Q: Has anything changed?

A: Yes, the Steamship Authority (SSA) recently constructed a marine pump out facility that discharges to the collection system.

Q: How do we know if that's the problem, and how do we fix it?

A: By looking at the big picture.

The big picture



Capacity Evaluation

- **Use Sewer Model to identify capacity under current conditions based upon**
 - Previous CFM data
 - Ground Survey (to confirm elevations)
 - Site visits to SSA pump out and Coast Guard

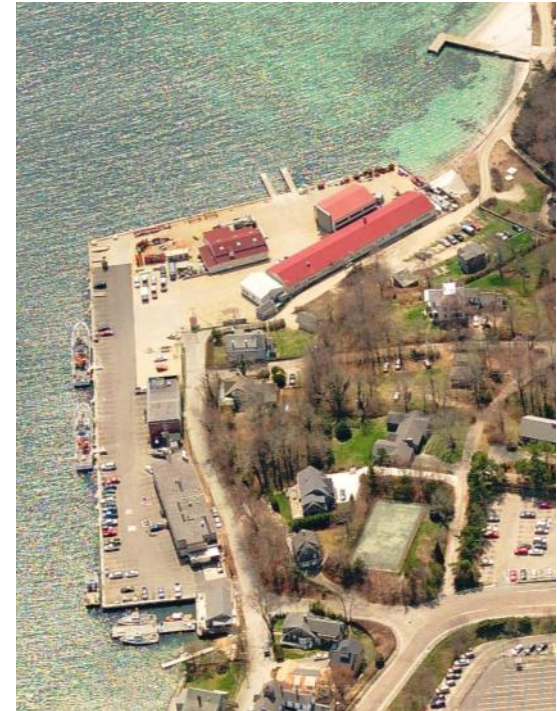
Coast Guard

■ Coast Guard Station Woods Hole

- Search and Rescue
- Recreational Boating Safety
- Fisheries Enforcement
- 29 Active duty/ 14 Reservists

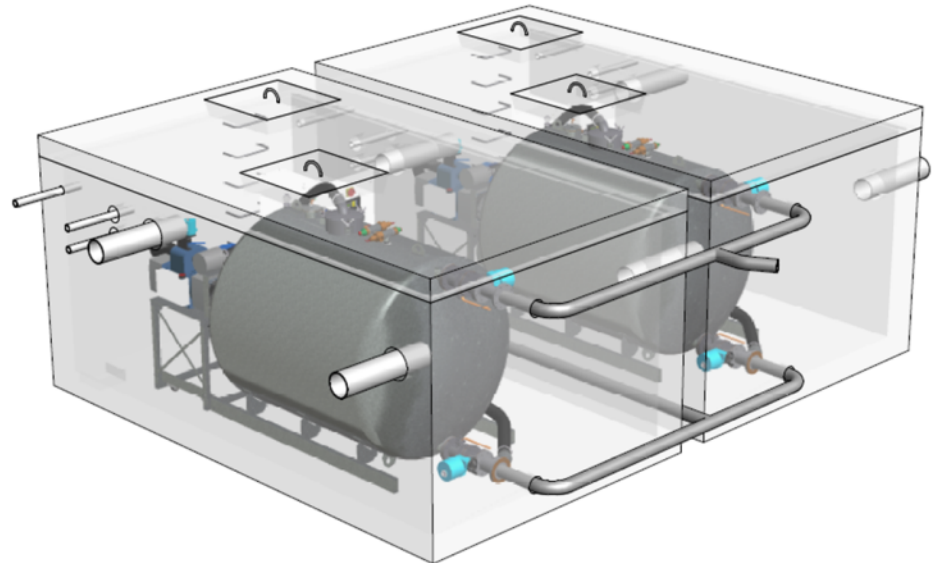
■ Pump Station

- 2 @ 7.5gpm submersible pumps
- 150 GPM
- Float control



Steamship Authority

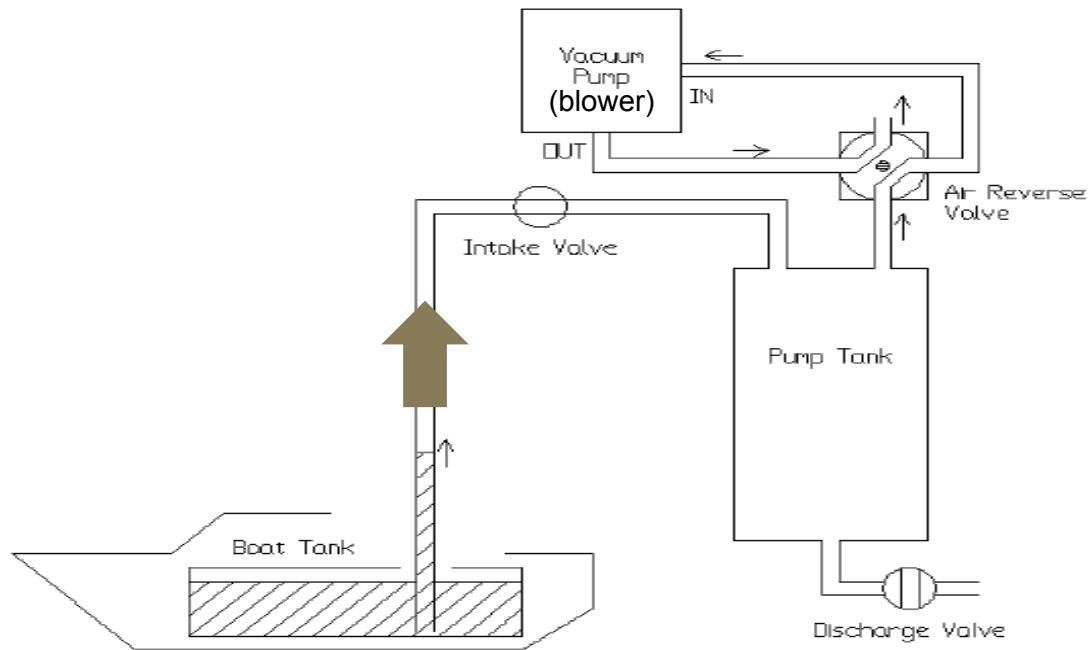
- SSA vessels used to discharge treated wastewater to ocean
- Vineyard Sound became no discharge zone
- SSA installs Pneumatic Marine pump out facility



CHR1500 J-2T

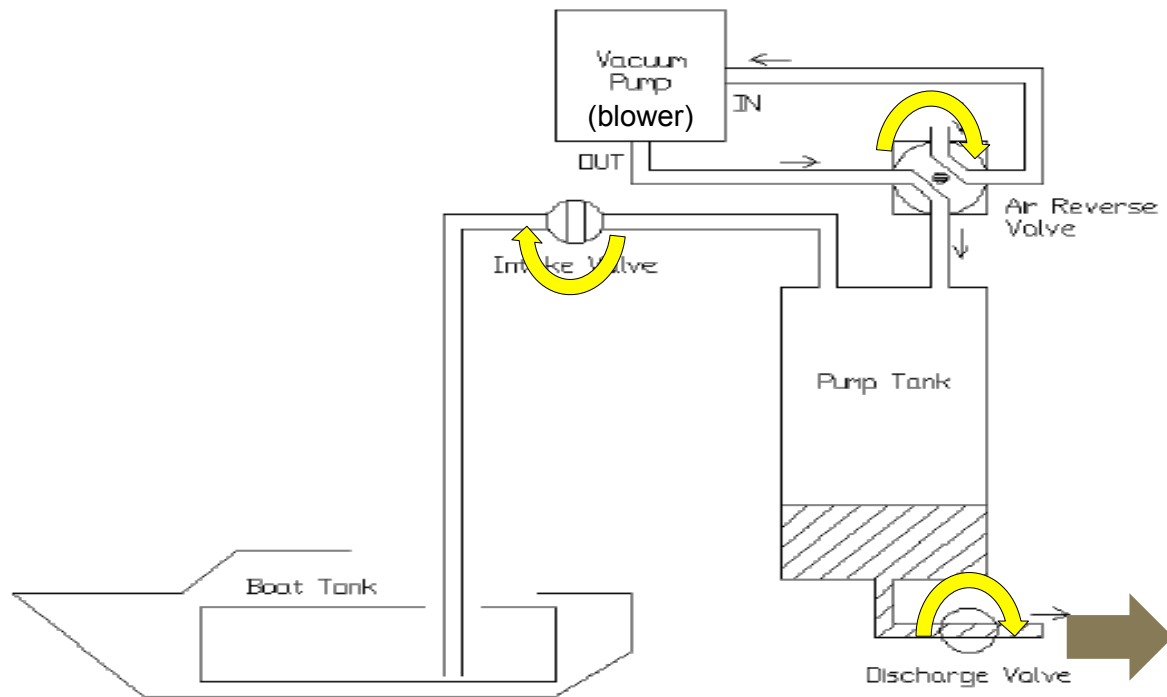
Steamship Authority

- SSA uses pneumatic system to evacuate ferry holding tanks



Suction Phase

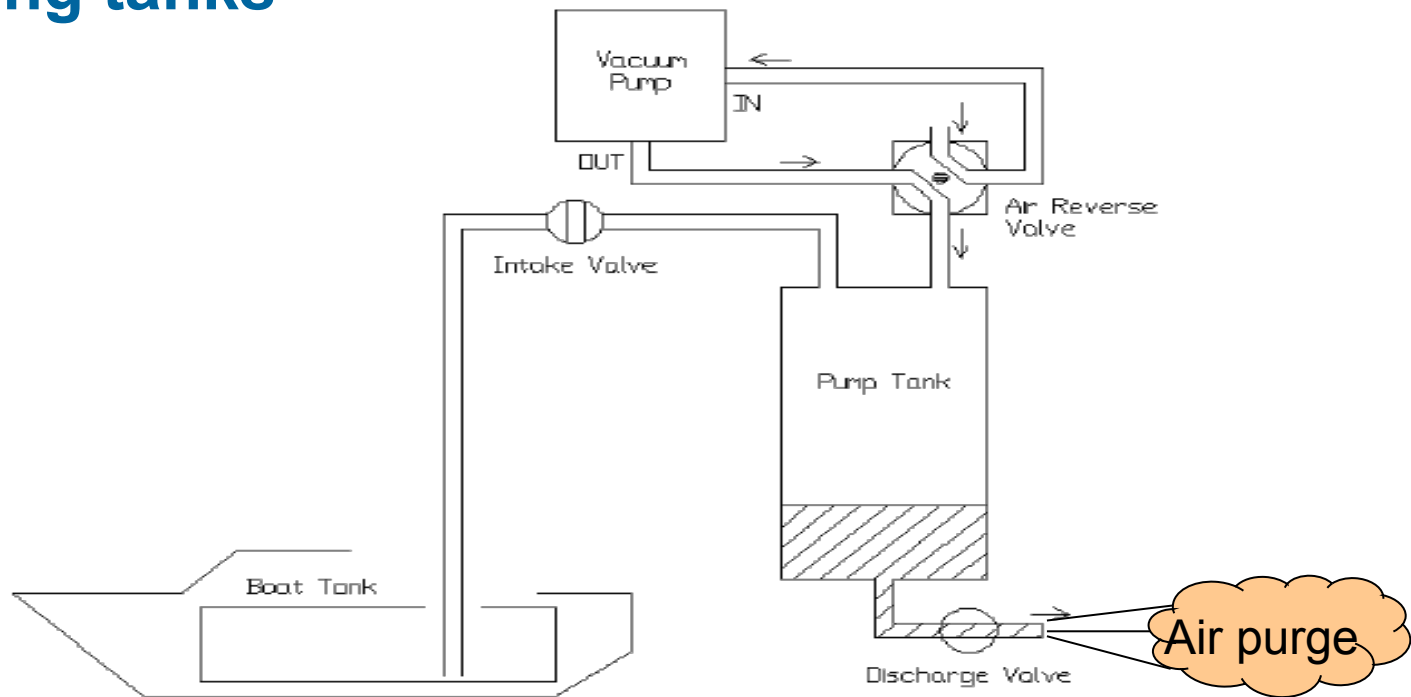
Steamship Authority



Discharge Phase

Steamship Authority

- SSA uses pneumatic system to evacuate ferry holding tanks



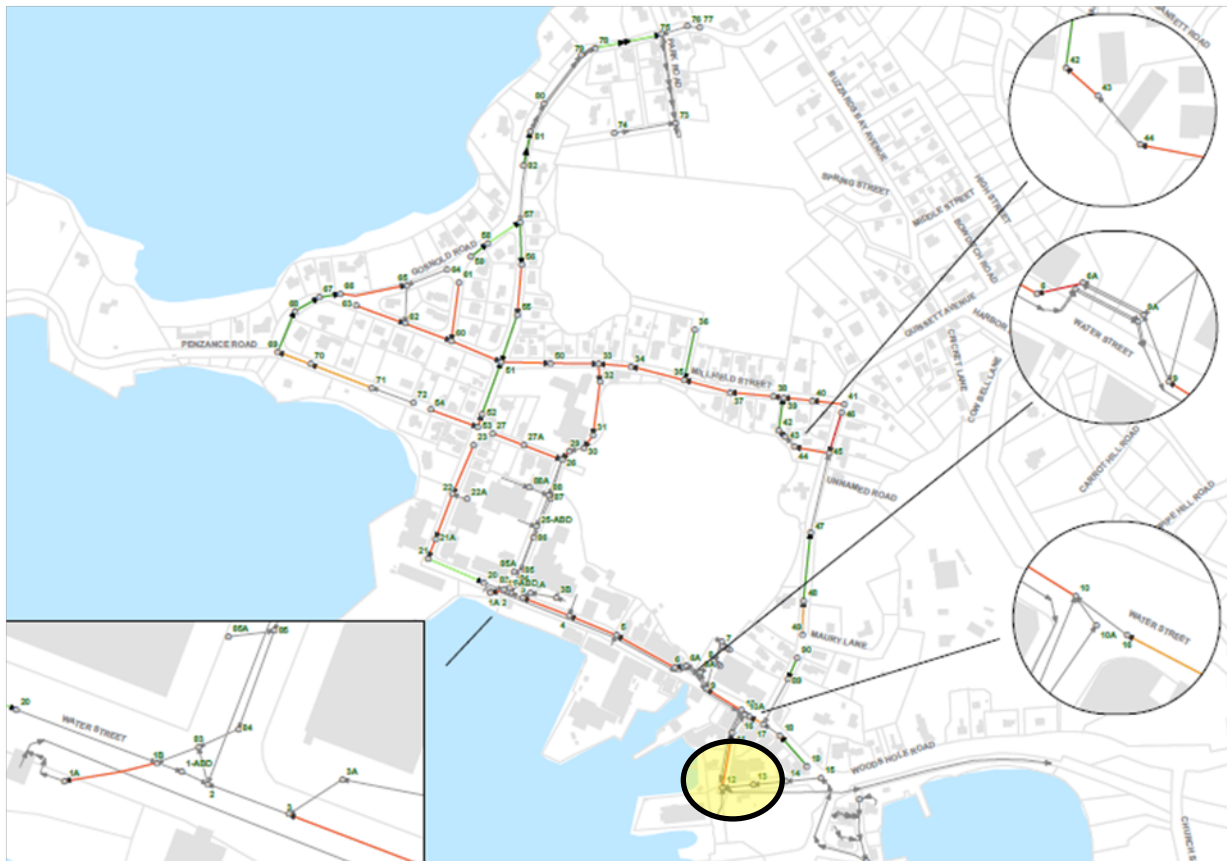
Discharge Phase

Steamship Authority

- **SSA uses pneumatic system to evacuate ferry holding tanks**
- **Flow is based upon air pressure/ vacuum but it's not linear**
- **Air purge was added feature due to concern of freezing**
 - Air was originally discharged to the sewer, caused splashing
 - Air purge re-directed to carbon canister

Steamship Authority Field Visit

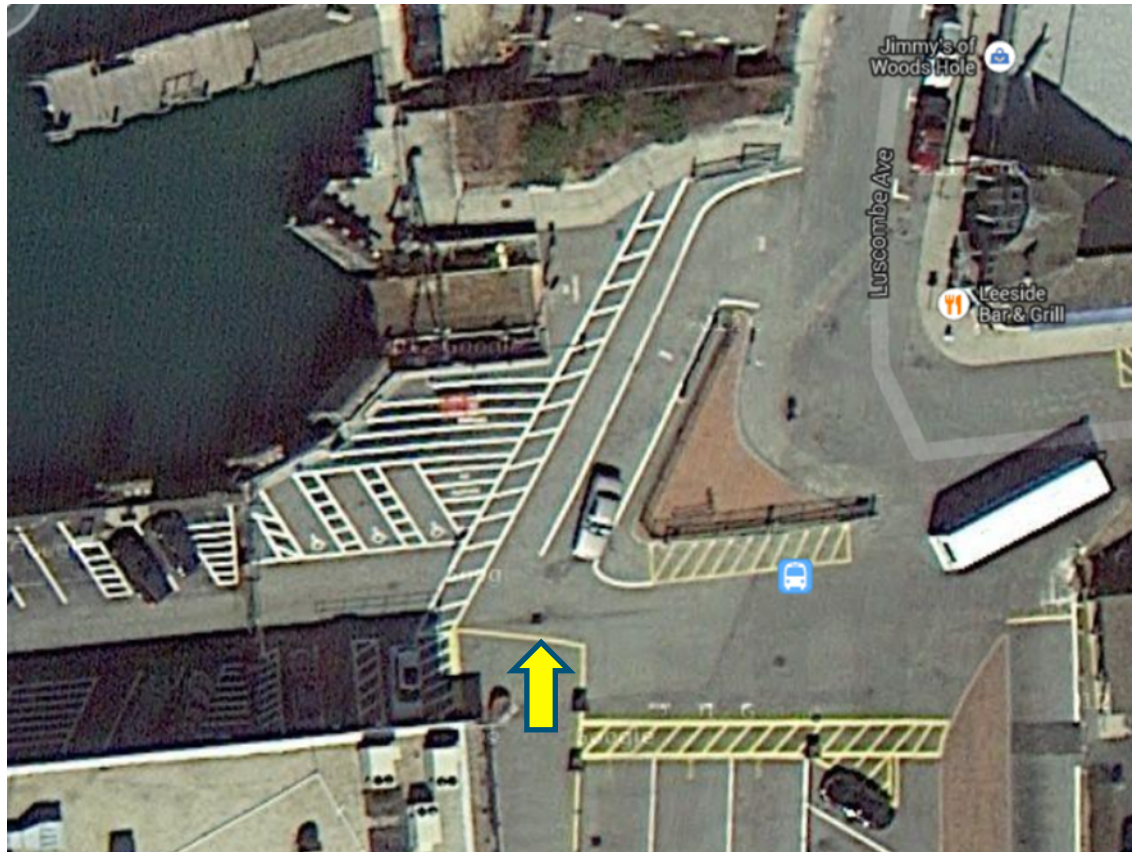
■ The Big Picture



Steamship Authority Field Visit



Steamship Authority Field Visit



Steamship Authority Field Visit

Tie in manhole layout



Steamship Authority Field Visit

Tie in manhole layout



Steamship Authority Field Visit

Tie in manhole layout



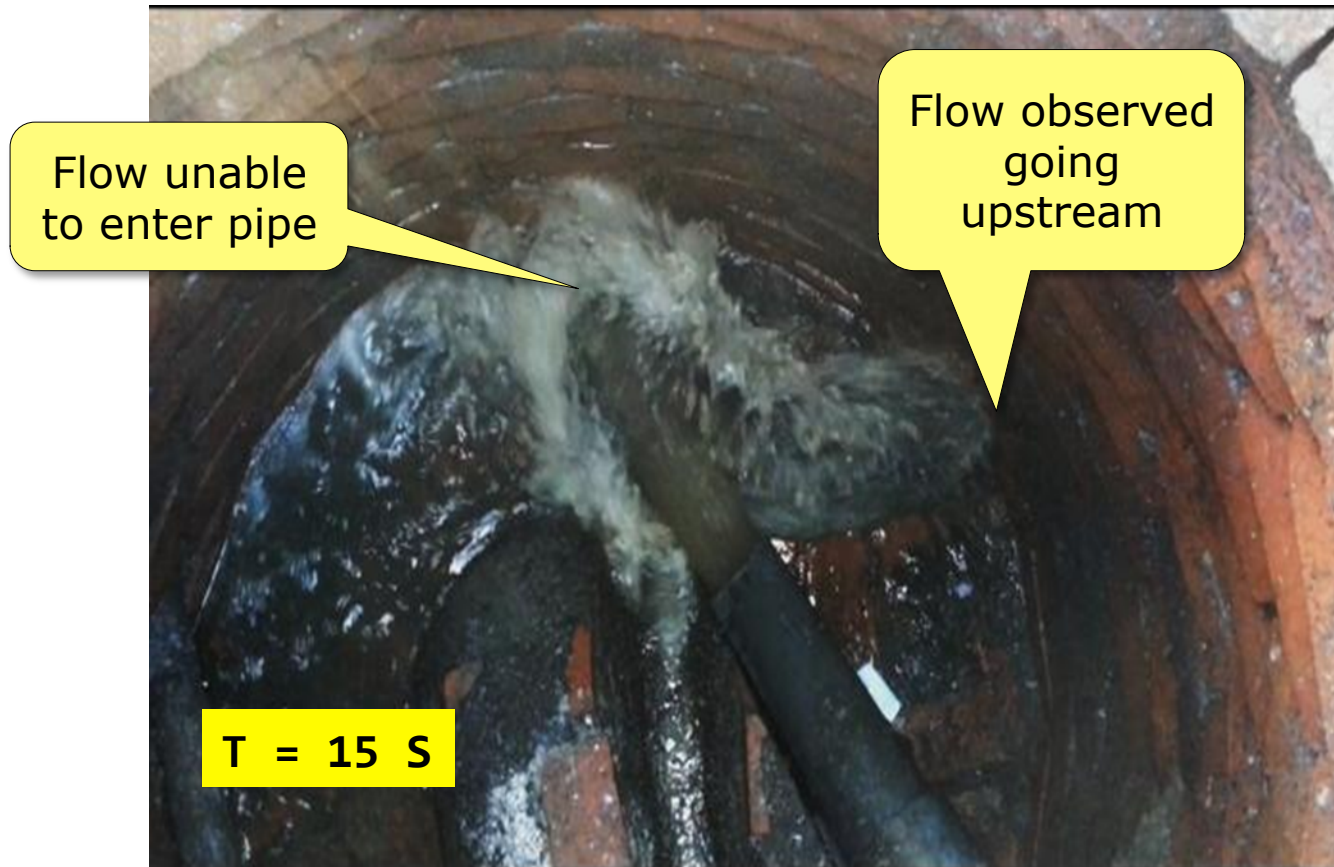
Steamship Authority Field Visit

Lets watch a discharge cycle

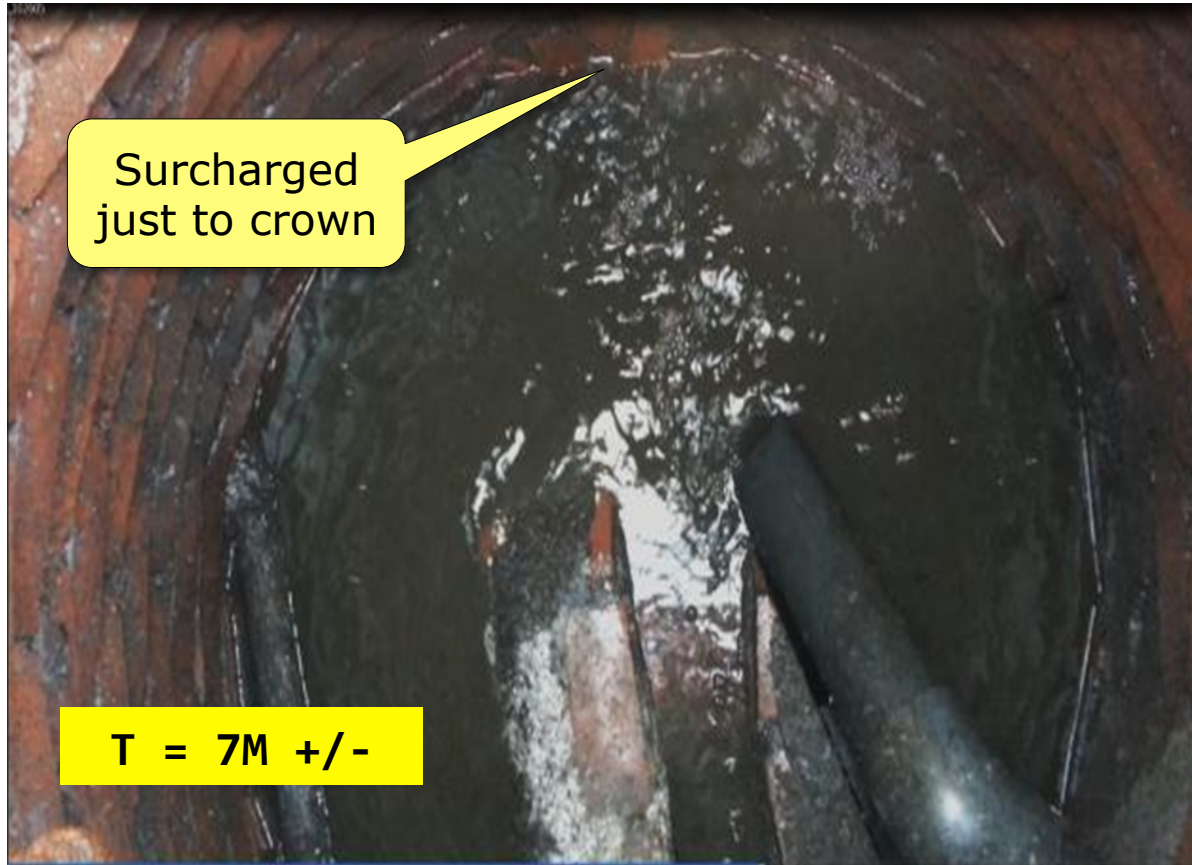


Steamship Authority Field Visit

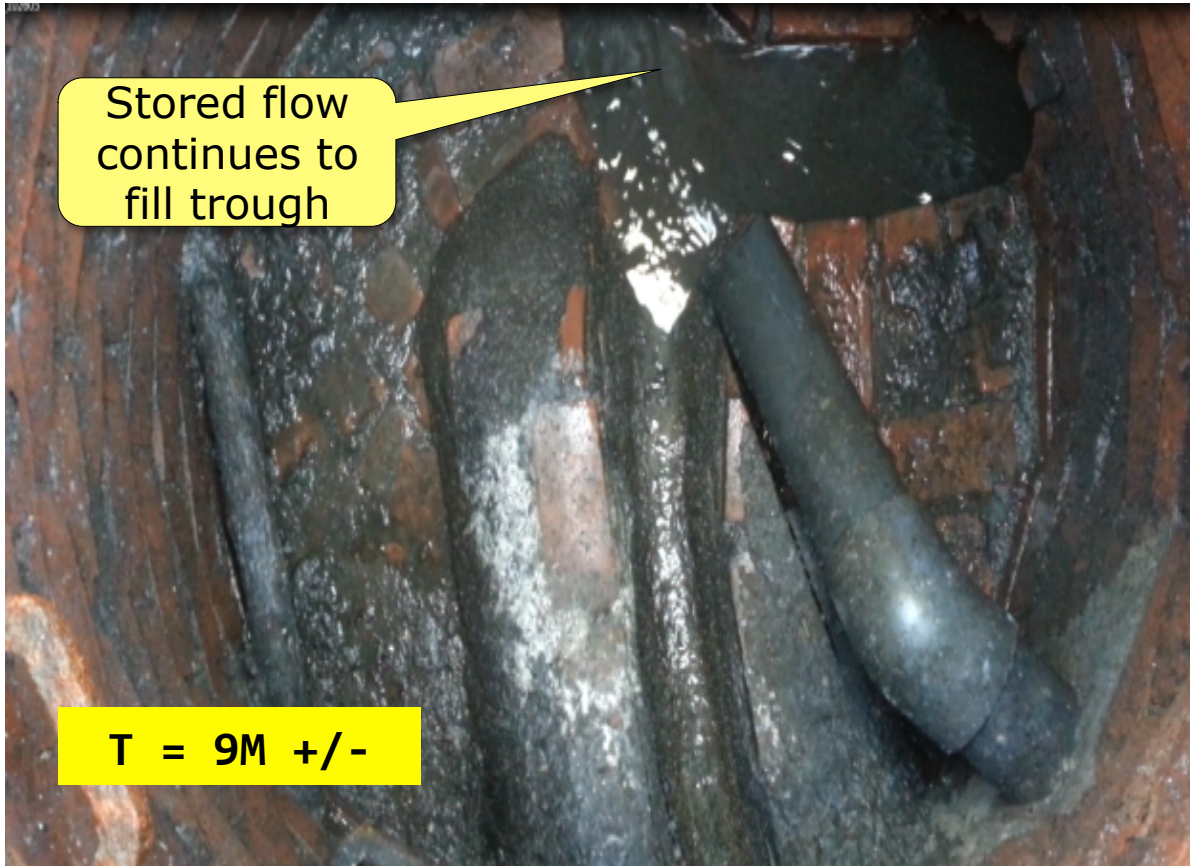
Lets watch a discharge cycle



Steamship Authority Field Visit



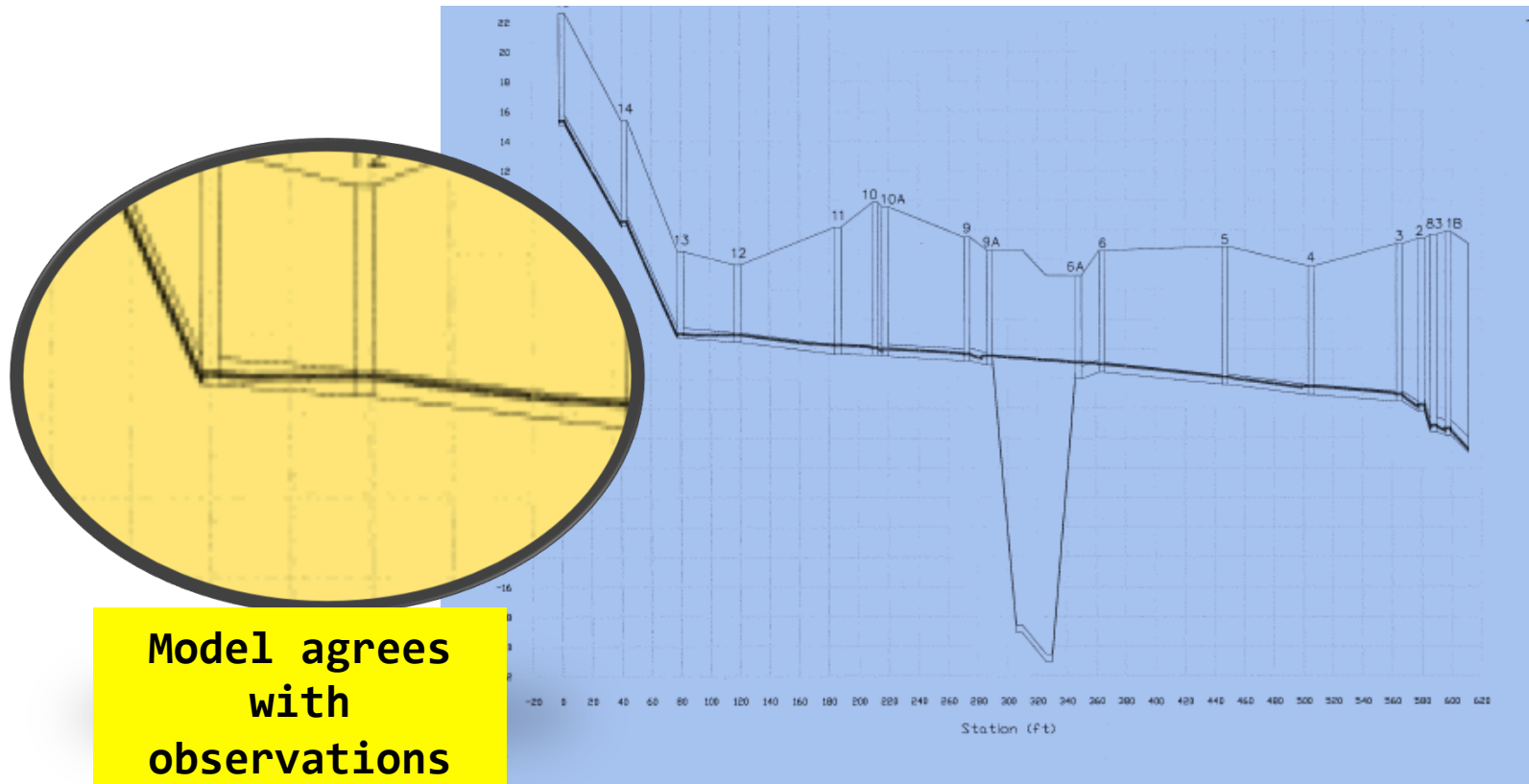
Steamship Authority Field Visit



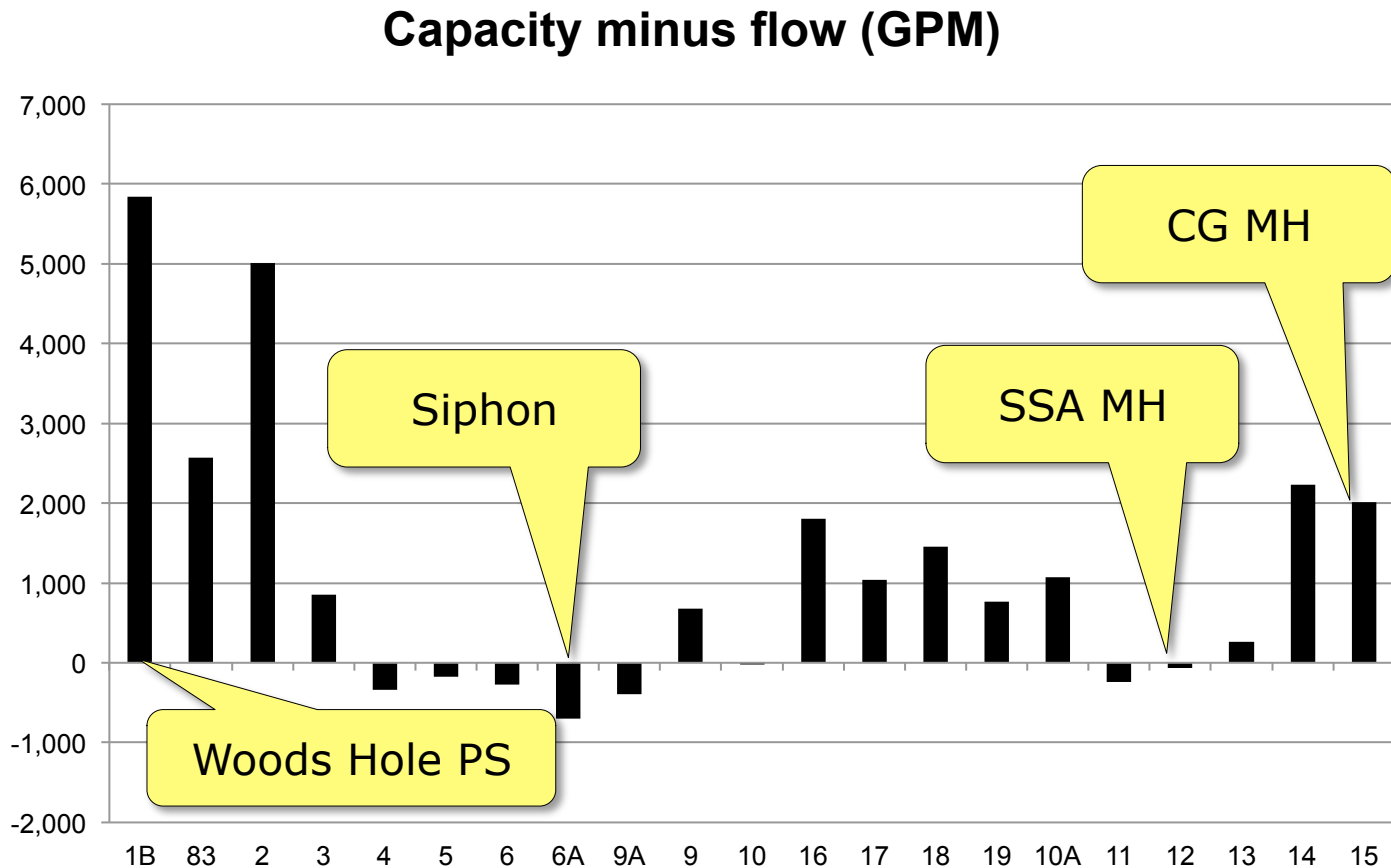
Flow =
250-300 GPM

What can the system accommodate?

■ Hydraulic model results



What can the system accommodate?



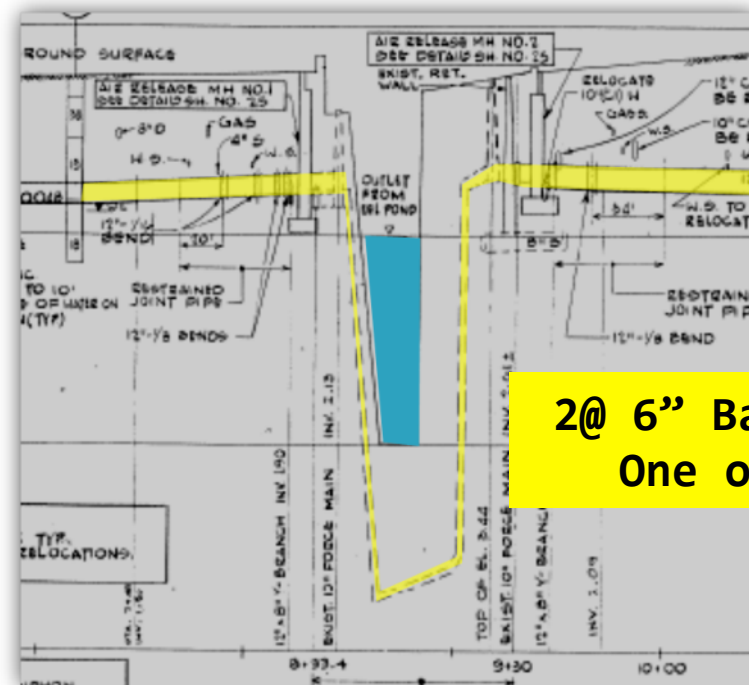
Capacity Conclusion

■ Siphon is limiting factor

- Need to reduce SSA discharge

■ Other factors

- Flat slopes
- Reverse slope (1)
- FOG



2@ 6" Barrels
One open

DRAFT 9/9/2014

34

How to reduce SSA flow?

■ First step, what are options?

- Change discharge pressure
- Reconfigure VFD
- Reduce impellor efficiency
- Add blow off

■ SSA concerns

- Limited time in dock, ***need to maintain schedule***
- Operational concerns
 - » Vessels have different schedules and capacities

■ Approach

- Both parties respected each others concerns
- Try least impact measure first

Can we reduce flow?

■ SSA makes operational changes

- Reduces discharge pressure
- Discontinues air purge

■ Results

- Flow decreases to 150 GPM, target 200 GPM

Siphon Issues

- **Surcharges**
- **Fouls with grease**
- **Difficult to maintain**



Siphon Issues

- **Surcharges**
- **Fouls with grease**
- **Difficult to maintain**



Can we fix the siphon?



■ Short answer

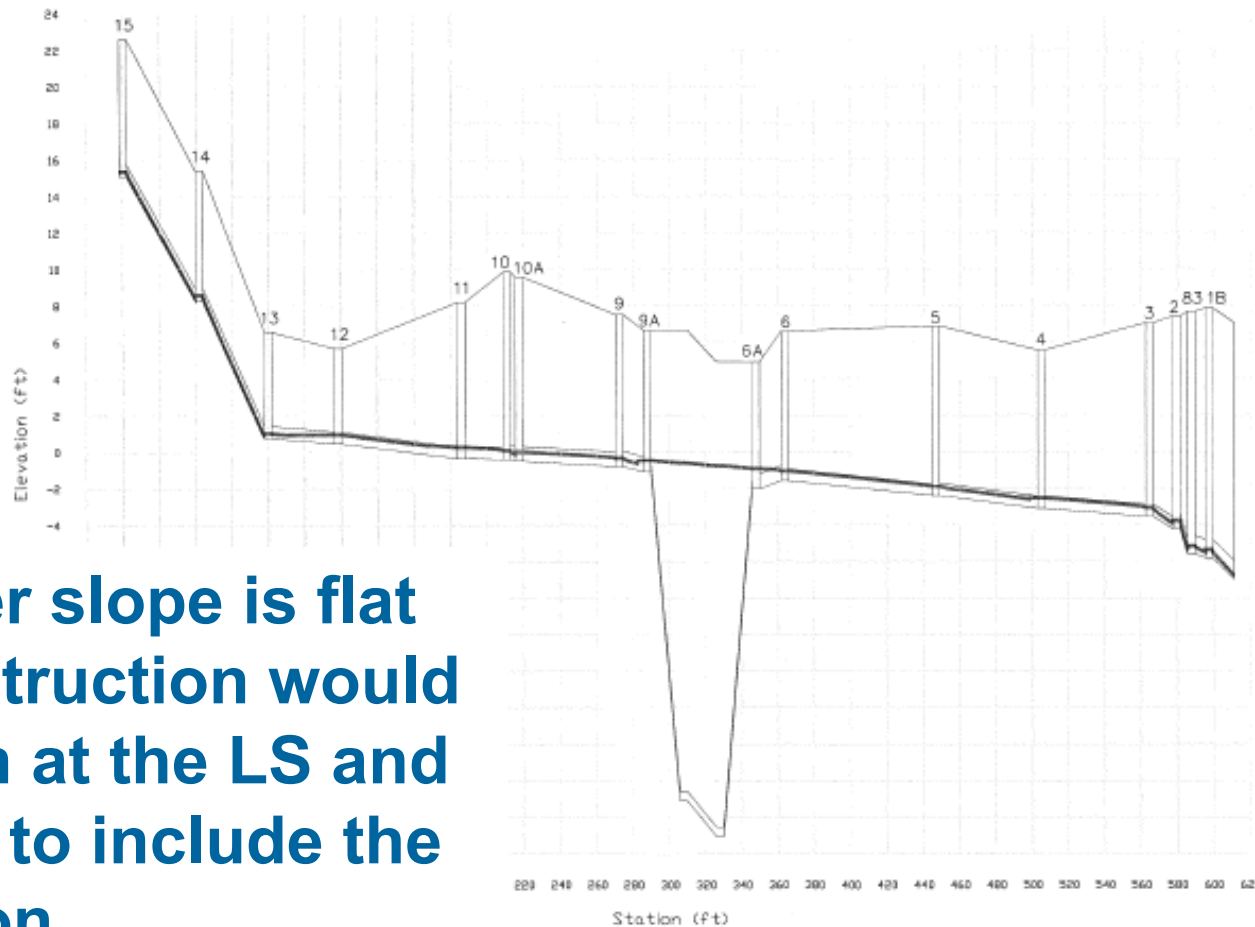
- Not without rebuilding it

■ Longer answer

- Improve entrance
- Improve flow
- Will go a long way

Pipes with negative slope

Hydraulic Profile (Various Alternatives)



- Sewer slope is flat
- Construction would begin at the LS and need to include the siphon

Flat slope laterals

- Mainline sewer is flat
- Lateral comes in at 9 o'clock
- Not much can be done
- Installation of check valves?
- Grinder pump?



RECTORSEAL

CLEAN CHECK

Stop Sewage Backups
A simple but revolutionary extendable backwater valve that eliminates the need for expensive and unsightly manholes regardless of the burial depth.

- Complies with the requirements of IAPMO/UPC, ICC, IPC & CSA Standards
- Easy to perform maintenance & inspection from ground level
- Capable of handling back pressure up to 75 psi

NO costly manhole.
NO more indoor backwater valves which could be hidden by cabinets, stairwells or floor coverings.
NO more sewer gas or mess inside a building during maintenance inspection.



The image shows a person installing the Rectorseal Clean Check valve into a pipe. The valve is a vertical, extendable unit. A large image of the valve is shown on the right, with a QR code and the text 'Scan to view video demo'.

UL
UL 100-1000

ES
ES PWG

How does it all wrap together

- 
- Sewer rehab addresses Groundwater Discharge Permit
 - SSA Pump Out modifications reduce surcharging
 - Siphon improvements enhance performance
 - Sewer lateral check valves stop the backups

Questions?

