



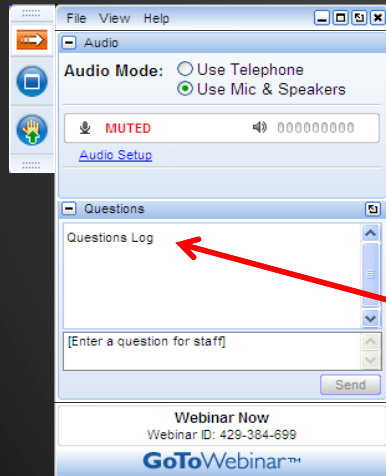
# Looking Back, What Did We Accomplish? I/I Reduction Case Studies and Lessons Learned

Wednesday, December 6<sup>th</sup>, 2017

1:00 - 3:00 PM ET



## How to Participate Today



- Audio Modes
  - Listen using Mic & Speakers
  - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- Submit your questions using the Questions pane.
- A recording will be available for replay shortly after this webcast.



## Andy Lukas, Brown and Caldwell

- Vice President
- Wet Weather Solutions Group Leader
- 27 Years Experience
- BSCE, MSCE
- PE, WI
- WEF CS I/I, PPII Lead



# Opening Remarks on I/I Reduction Programs

Andy Lukas, Brown and Caldwell



## Sources of I/I in Sanitary Sewer Systems

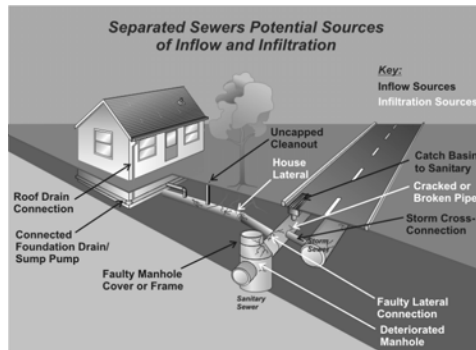


Figure 3-1. Typical Sources of I/I  
Source: WERF, Reducing Peak RDII Rates - Case Studies and Protocol, 2003

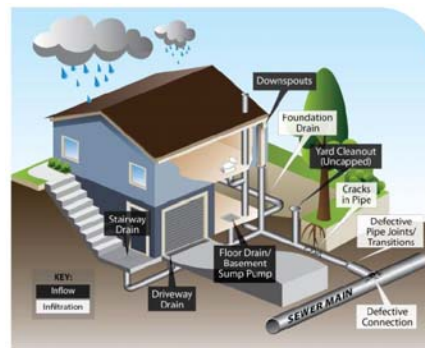


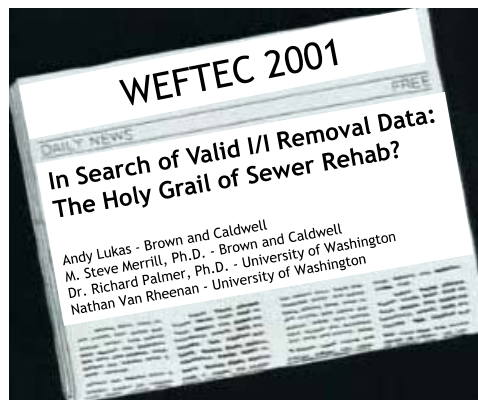
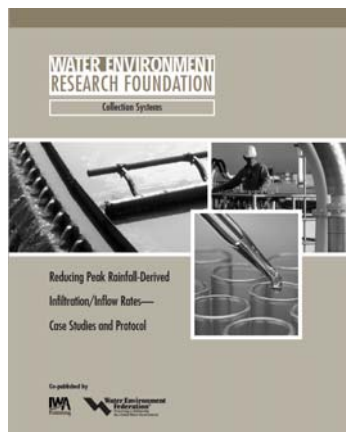
Figure 1. A diagram explaining I/I. Image by Tetra Tech  
Source: WEF, Private Property I/I Fact Sheet, 2016



## Why Do We Pursue I/I Reduction?

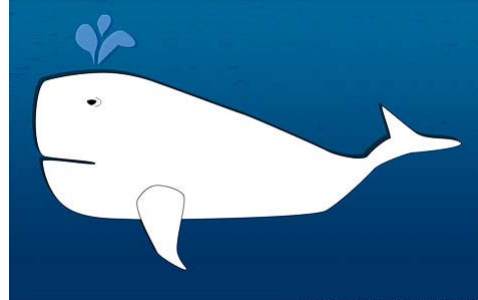
- Because the Regulator Said So
- Because the Boss Said So
- Because the Consultant Said So
- Because It Just Made Sense

## On a Quest to Find I/I Reduction Case Studies



Update on a National I/I Reduction Project Database  
WEF Collection Systems Specialty Conference, 2007

## Cost Effective I/I Reduction: Holy Grail or White Whale?



## Why Is Understanding I/I Reduction Elusive?

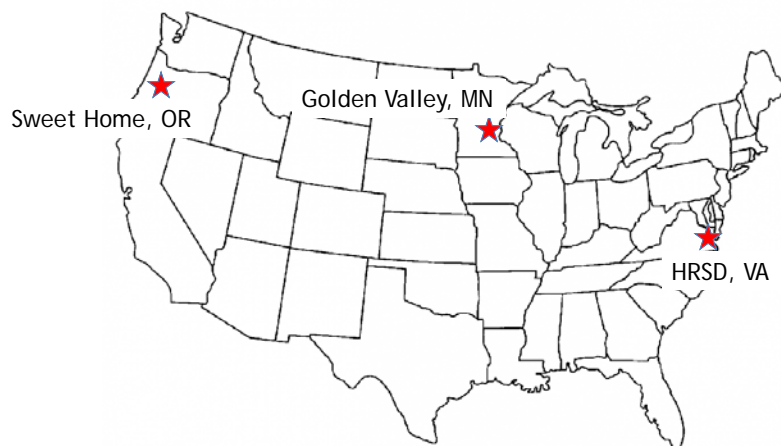
- We Don't Fully Understand Our I/I Before We Do the Work
- We Don't Gather the Right Flow Data
- We Don't Fix the Right Things
- We Don't Fix Things Right
- We Don't Ask the Right Questions

## Should We Bother Chasing Answers to Our I/I Reduction Questions?

- Yes. Rate Payers and Governing Boards Deserve to Know
- Yes. If Your System Can Function More Cost Effectively With Less I/I, Go For It
- Yes. The Money You Spend Chasing Answers Is Far Less Than What You Will Spend on Useless I/I Reduction Efforts.



## Today's Case Studies of I/I Reduction



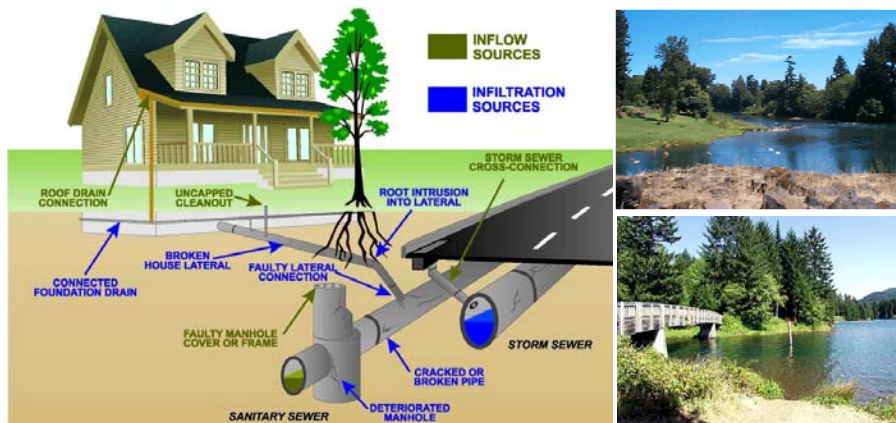
# Sweet Home, Oregon I/I Reduction Success Story



- Jon Holland, Vice President, Brown and Caldwell

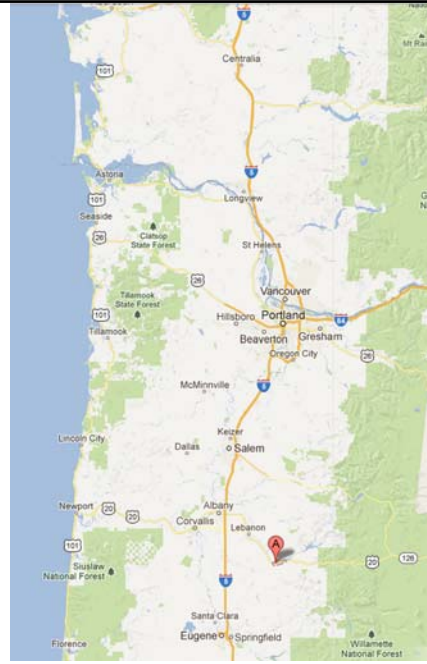


# Sweet Home, Oregon I/I Reduction Success Story



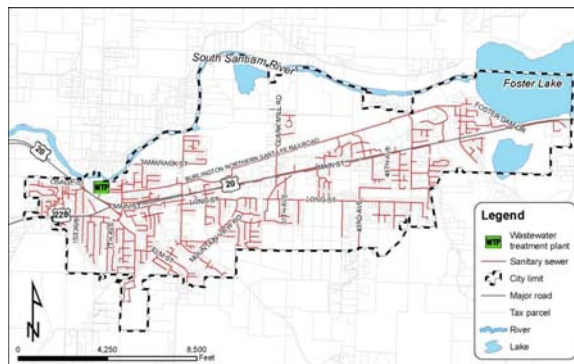
## Background

- Population 9,000
- Former timber economy
- On rainy side of Cascades
- Annual rainfall 55 inches
- Adjacent to South Santiam River
- Few basements



## Collection system and WWTP

- About 50 miles of pipe and 4,000 laterals
- 6 to 24 inches, mostly concrete
- Most 1940's era
- Avg DWF: 1 mgd
- WWTP peak capacity: 7 mgd



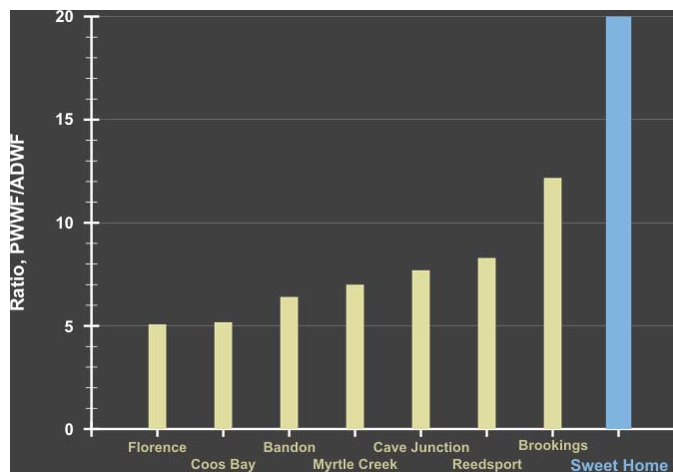


## Regulatory compliance problem

- Repeated sanitary sewer overflows (SSOs) in 1990s and early 2000s
- Oregon DEQ required elimination of SSOs up to the 5-year storm by January 2010
- Mutual Agreement and Order

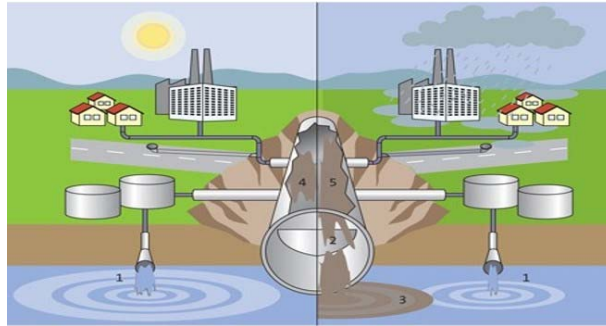


## 2002 Facility Plan showed 22:1 peaking factor



## Alternatives considered

- WWTP improvement: \$17M to upgrade WWTP
- I/I reduction, if not focused,  
75% of sewers and laterals: \$30M



Water Environment  
Federation  
the water quality people

## City's decision process

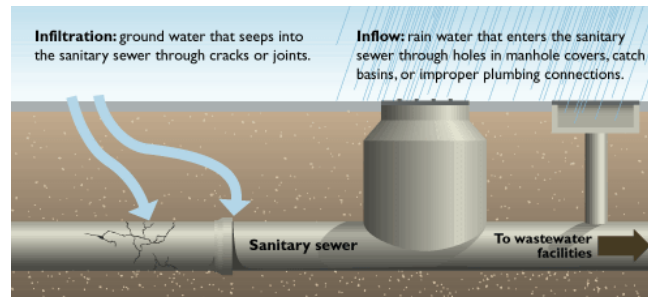
- Looming regulatory deadline
- Wide-spread, costly I/I
- Collection system continuing to deteriorate
- Prior WWTP capacity upgrade



Water Environment  
Federation  
the water quality people

## Fix the sewers, least overall cost

- Must address structural issues anyway
- Prioritize work - focus for best ROI
- Measure progress, document results

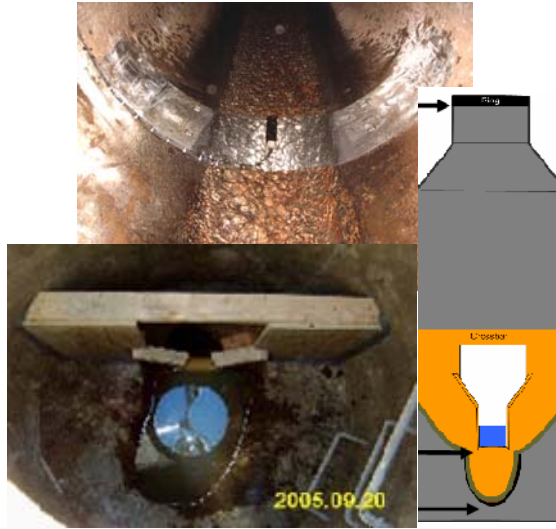


## Step 1: SSES foundation for success

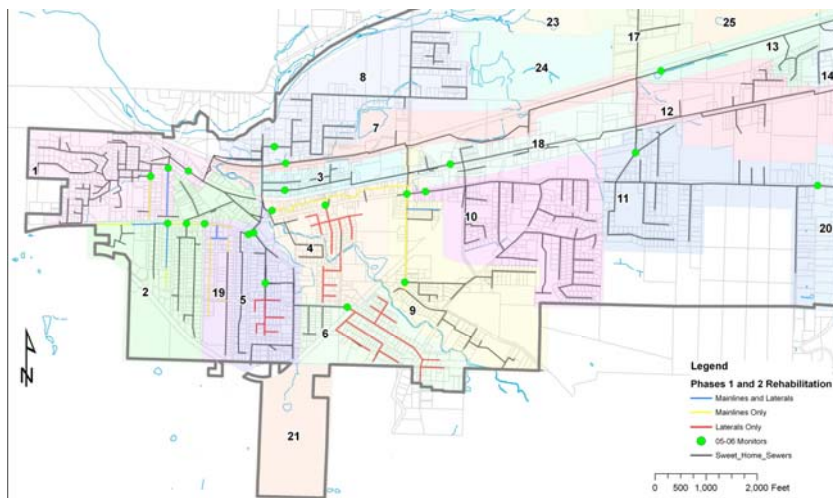
- SSES-sewer system evaluation survey
  - Smoke-testing and dye testing for inflow
  - Flow monitoring prioritizes basins
  - Exfiltration testing where monitoring not practical
  - CCTV and manhole inspections
- Good data prioritizes projects and measures progress
- Focuses effort, relatively low cost

# SSES - flow monitoring

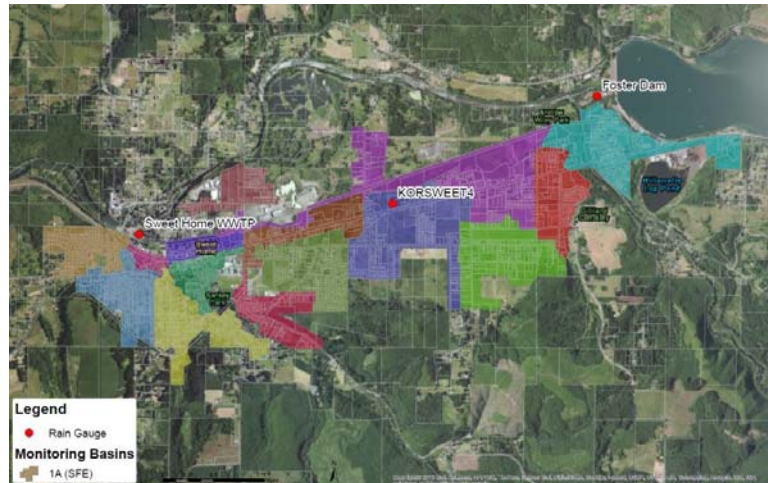
- Area-velocity meters
- Volumetric weirs
- Basin resolution increases as program evolves



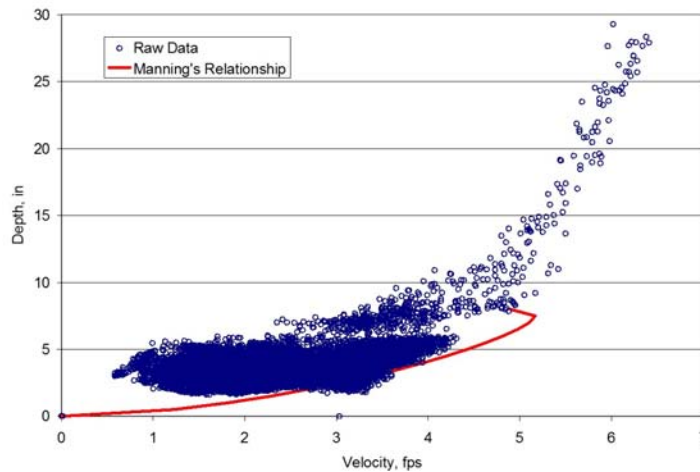
# Flow monitoring at appropriate intensity



## Good rainfall data critical for later analysis



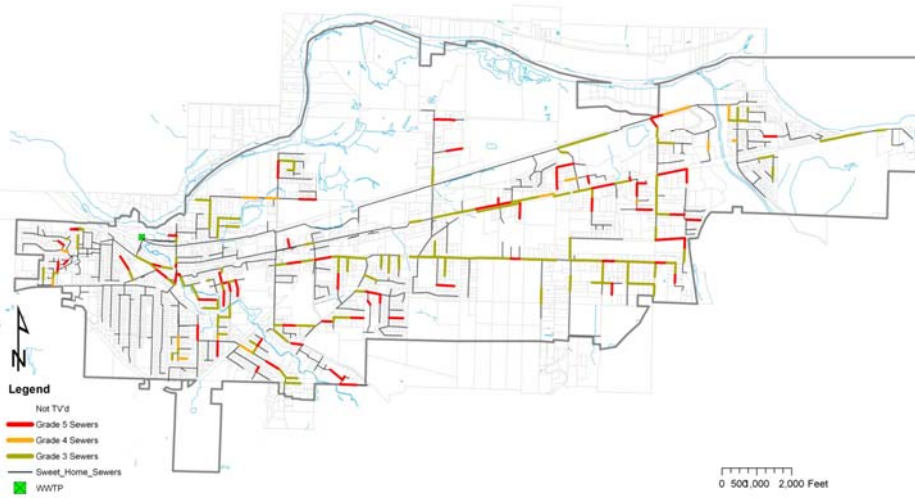
## Regular flow data check key for QA/QC



# SSES - CCTV



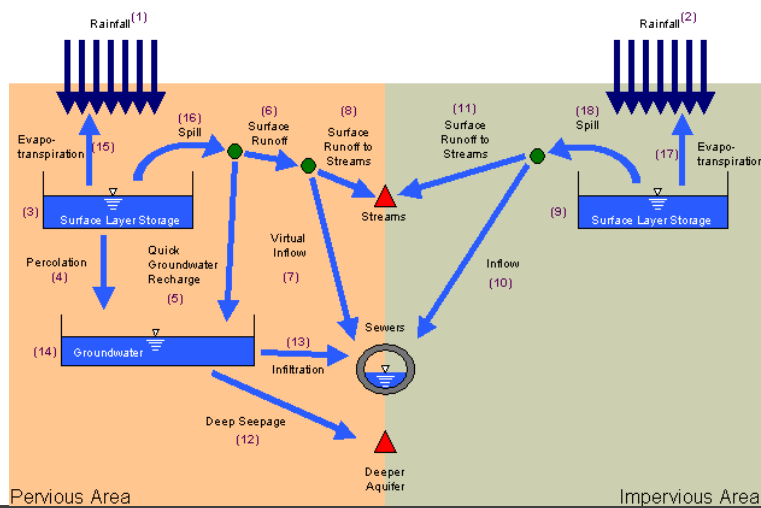
# Structural condition problems



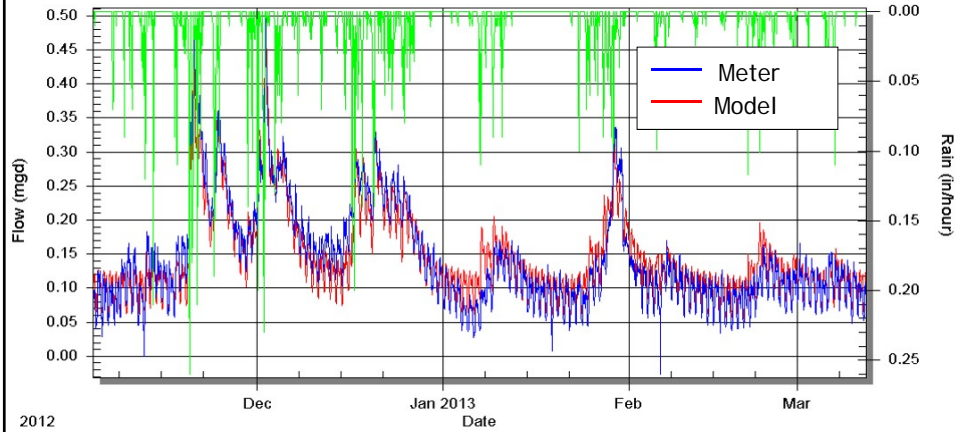
## SSES - smoke testing and MH inspections identify easy fixes



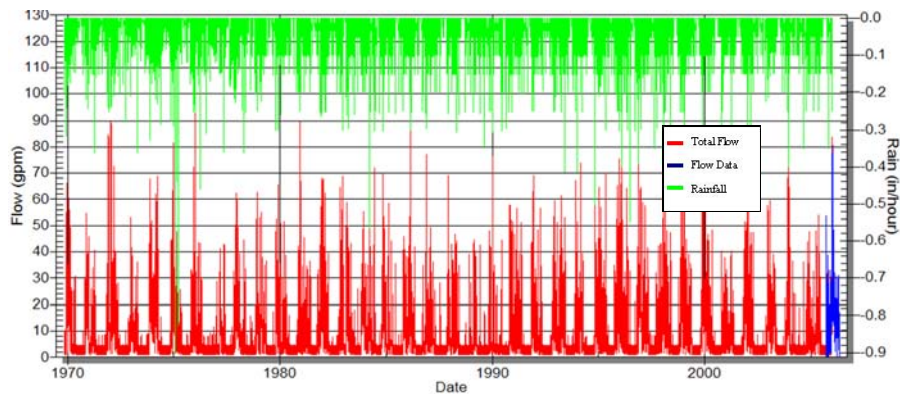
## Step 2: calibrated hydrologic models predict system response to rainfall



## Well-calibrated model allows confident predictions at target event

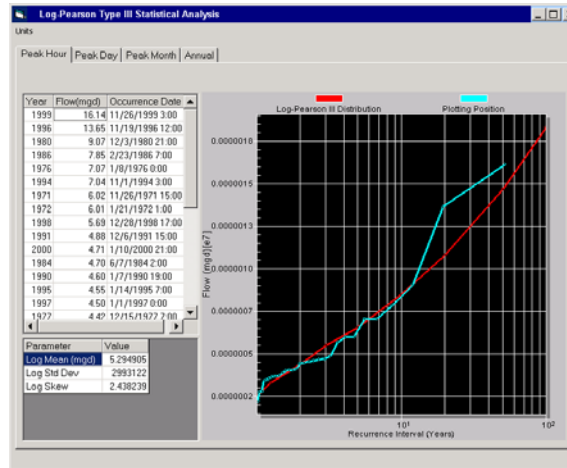


## Historic rainfall record run thru model to predict flows from large events



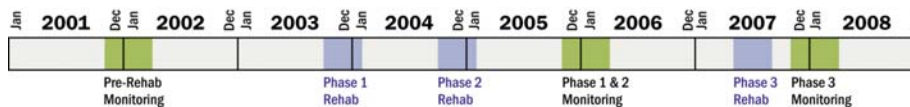


## Statistical analysis of long-term hydrograph identifies flows at various recurrence intervals

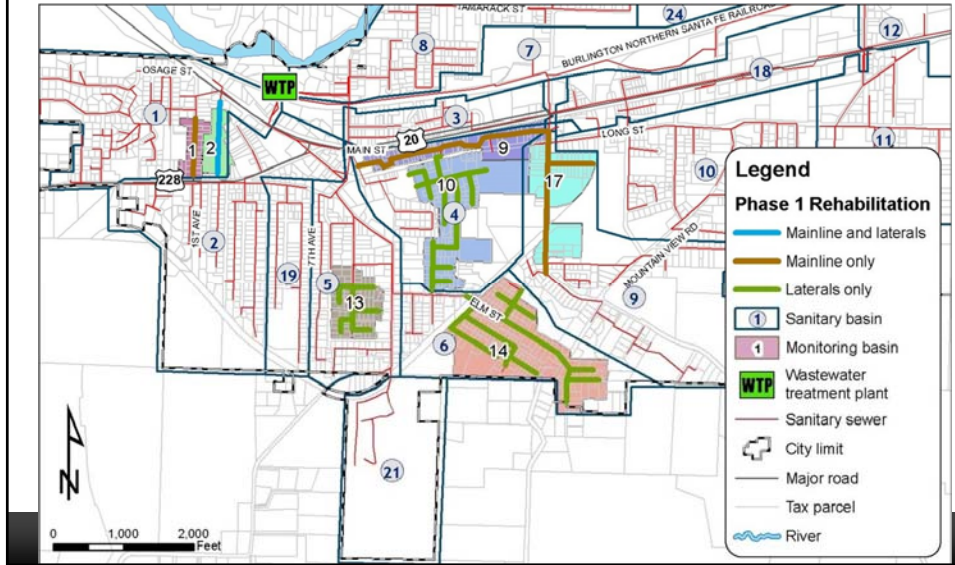


## Step 3: multi-phase rehab program

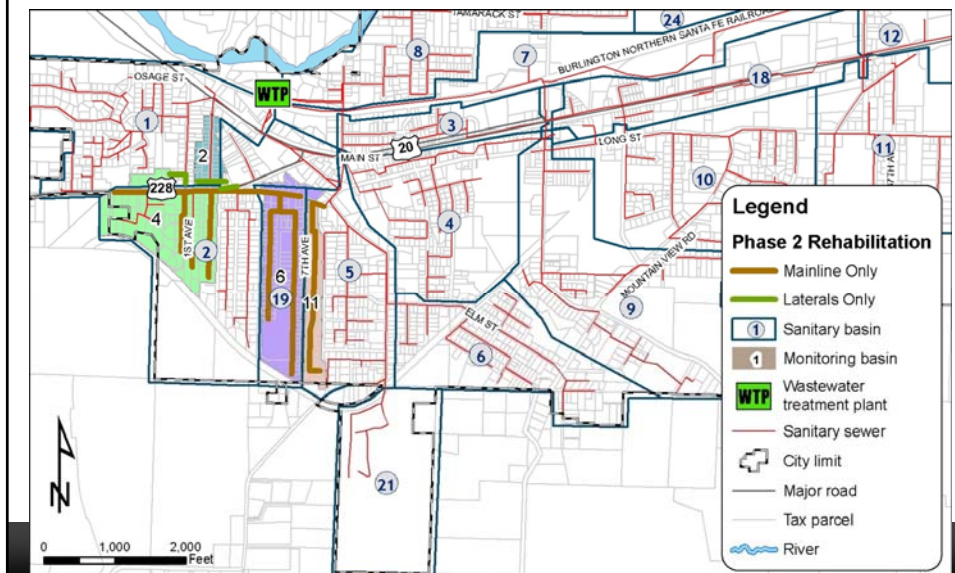
- Four phases of work in Sweet Home
- Each phase had pre/post monitoring/modeling
- 10 years total, Phase 4 completed in 2011-12, monitoring in 2012-13



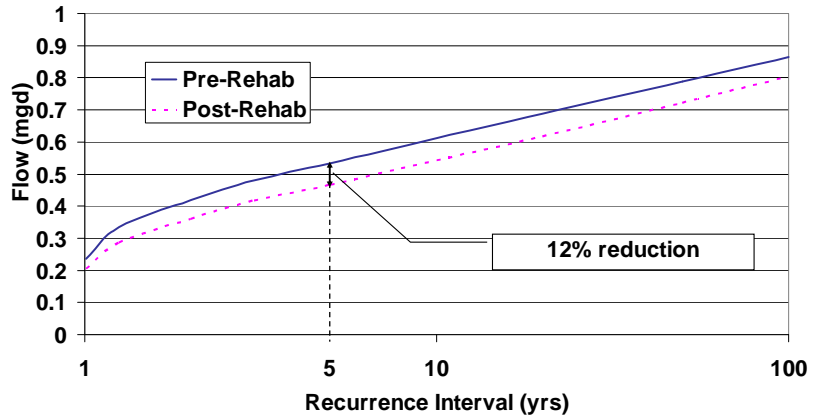
Phase 1 (2003) included areas of laterals only, mains only, and mains and laterals



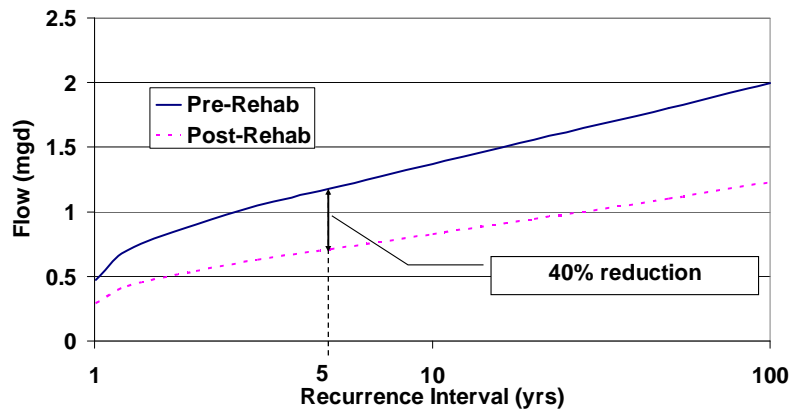
Phase 2 (2004) addressed the mains and lateral connections only



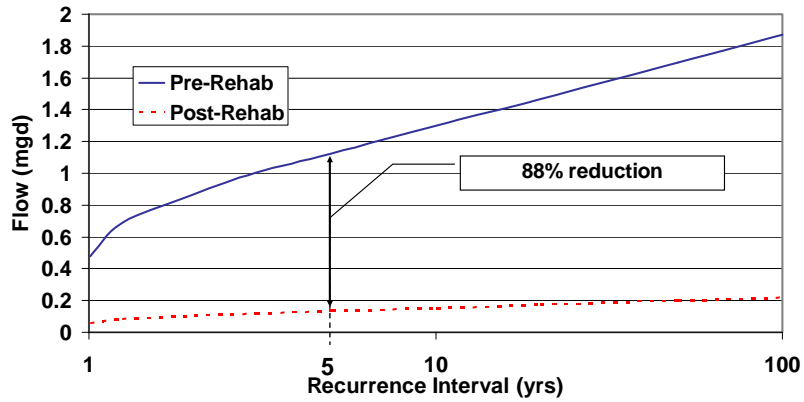
## Pre- and post-construction comparison: mains only



## Pre- and post-construction comparison: laterals only



## Pre- and post-construction comparison: mains and laterals

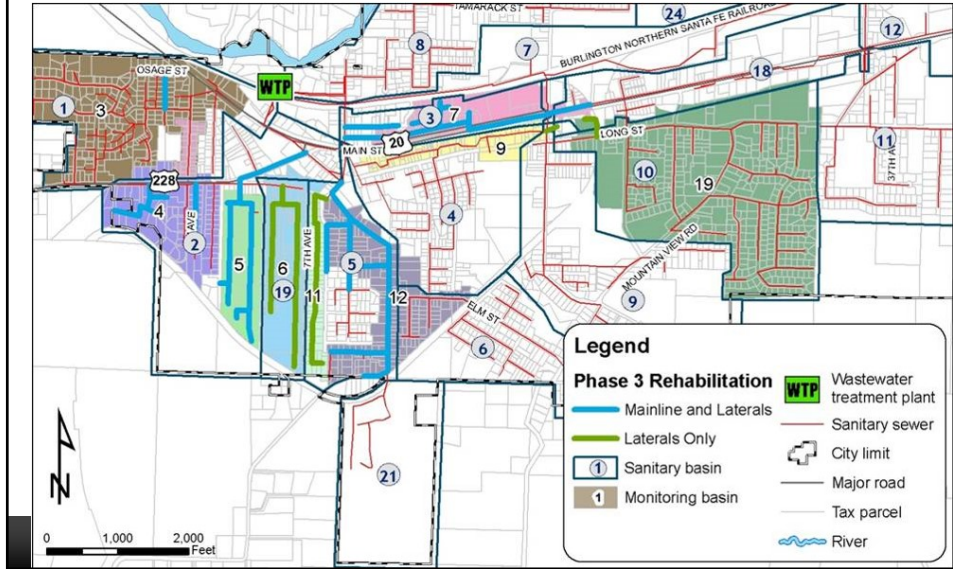


## Cost-effectiveness results from Phases 1 and 2 drive Phase 3 approach

Method	Footage or quantity	Cost, \$	I/I reduction, gallons	\$/gallons removed
Full	1,200 feet and 15 laterals	398,000	970,000	0.40
Mainline only	20,000 feet	1,000,000	36,000	28
Laterals only	330	1,426,000	54,000	26



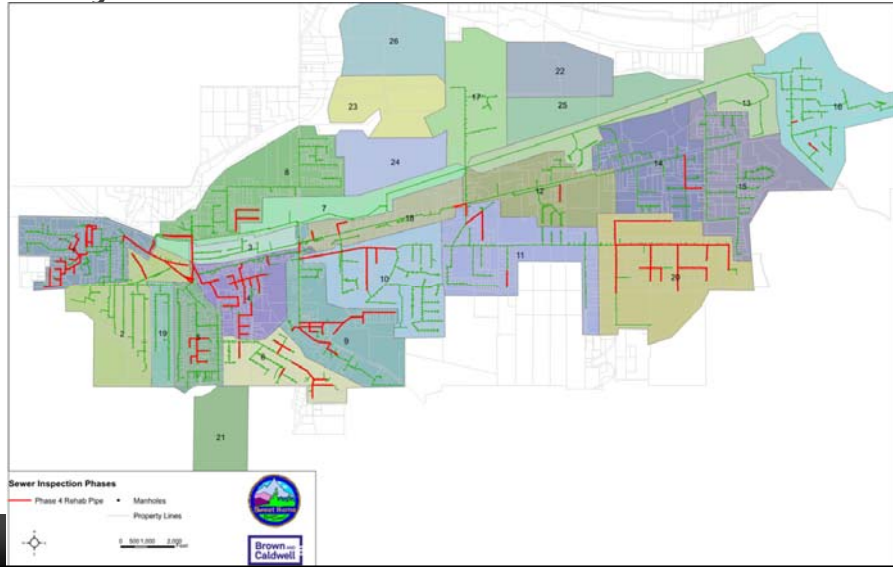
## Phase 3 (2012) addressed new basins and partially completed basins



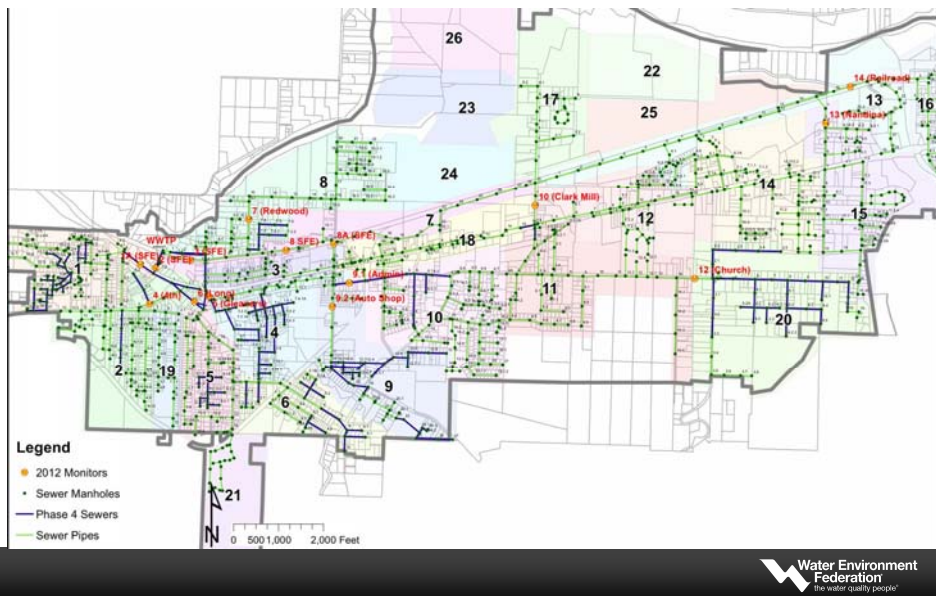
## Full rehabilitation yields 70 percent I/I reduction (Phase 3)

Sanitary Basin	Work performed	Pre-rehab peak-hour flow, mgd	Post-rehab peak-hour flow, mgd	I/I removal, mgd	Reduction in peak-hour flow, %
19	Laterals, by change order (mainlines previously rehab'd)	1.21	0.30	0.91	76
5	Laterals (mainlines previously rehab'd)	0.40	0.09	0.31	77
5	Mainlines and laterals	0.84	0.19	0.65	77
3	Mainlines and laterals	0.38	0.13	0.25	65
2	Mainlines and laterals	0.49	0.25	0.24	50
<b>Total</b>		<b>3.31</b>	<b>0.96</b>	<b>2.35</b>	<b>71</b>

Phase 4 addressed new basins and partially completed basins but laterals only in R/W

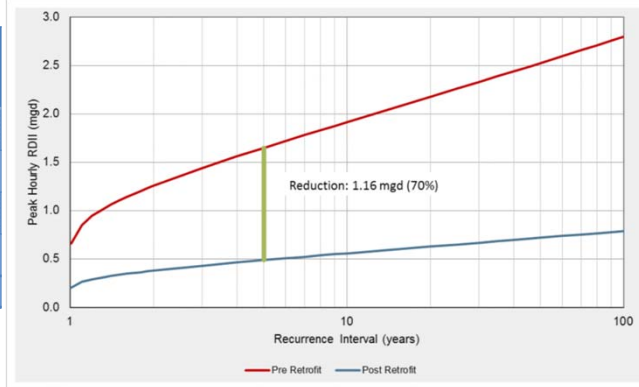


Post-Phase 4 flow monitoring

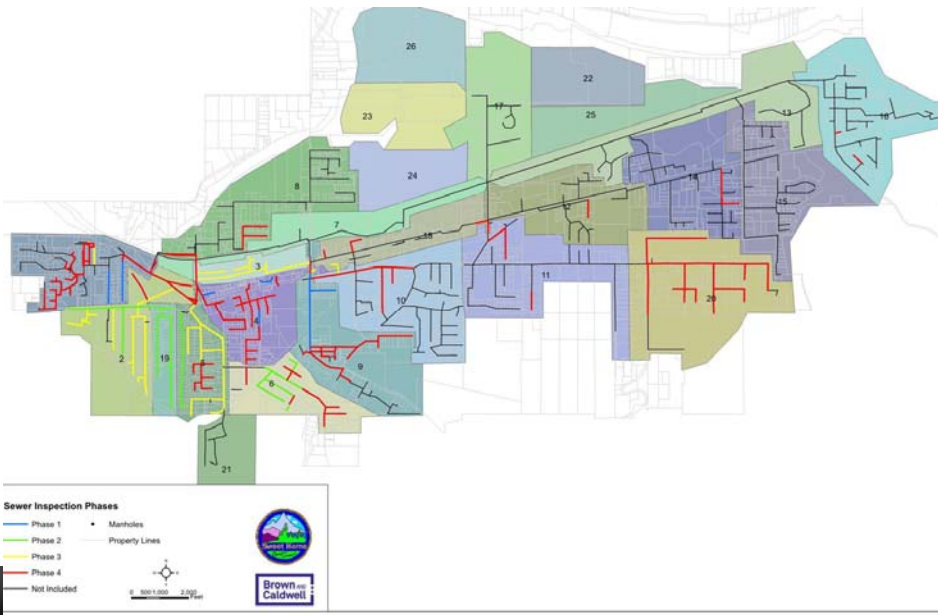


## Post-Phase 4 compared to post-Phase 3

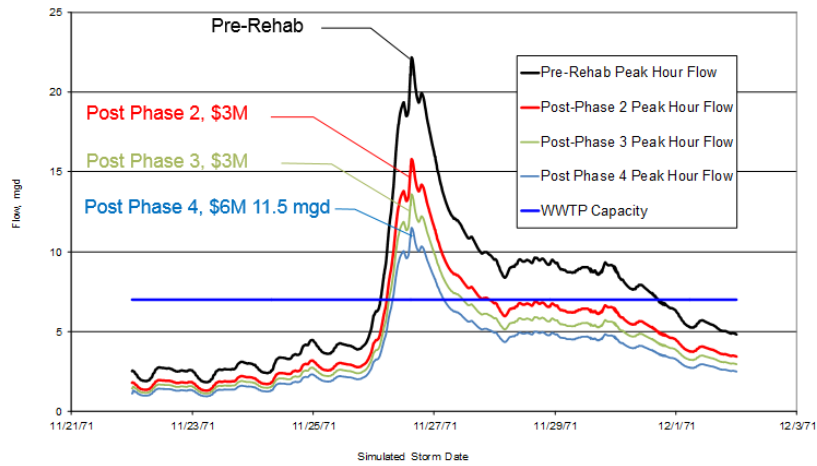
Monitoring basin	% reduction
1	68
4 and 6	70
9	15
20	35
<b>Total</b>	<b>2.1 mgd</b>



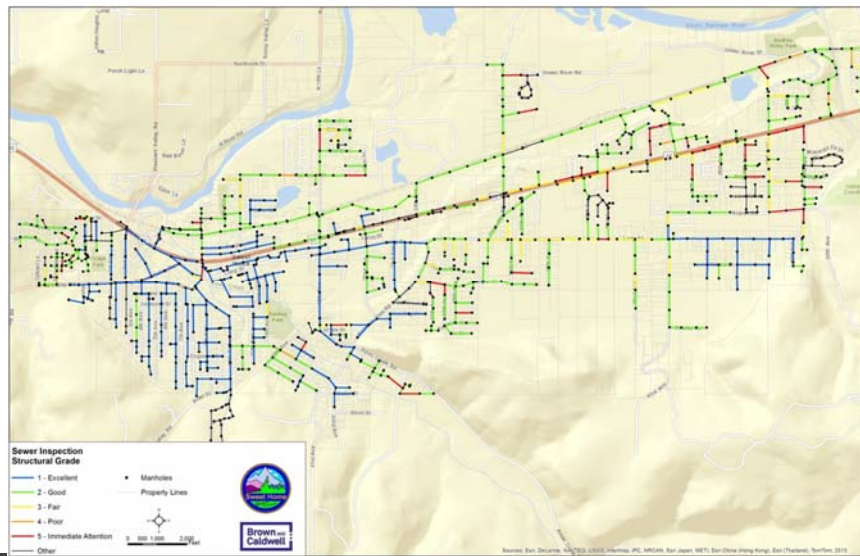
## R&R work completed to date



## Updated 5-year peak hour flow at WWTP



## Structural condition - work still to do





## Condition grades estimated today

Summary of Post-Phase 4 Condition Grades				
Condition grade	Structural		Operational	
	LF	Percent of total inspections	LF	Percent of total inspections
5 (Failed)	16,968	7.4	2,086	0.9
4 (Poor)	3,930	1.7	4,607	2.0
3 (Fair)	26,436	11.5	5,542	2.4
2 (Good)	109,184	47.3	137,059	59.3
1 (Excellent)	74,187	32.1	81,806	35.4

## Progress to date

- \$15M spent total (\$12M construction)
  - Phase 1: \$1.3M
  - Phase 2: \$1.7M
  - Phase 3: \$3.1M
  - Phase 4: \$6.0M
- 35% of main line sewers (92,500 LF)
- 30% of laterals completed (1,200)
- > 50% of peak RDII in system removed, 70% in many basins where full rehab occurred



## Conclusions and lessons learned

- Quality flow monitoring crucial for I/I reduction work
- Prioritize basins to focus investments, maximize ROI
- Private laterals key to I/I reduction
- If all mains had been done but no laterals, only 5 mgd reduction for over \$40M assuming 20% I/I reduction

## Conclusions and lessons learned (cont.)

- SSOs predicted now at 2-year recurrence
- Over \$1.4M in upsizing no longer needed
- Continue to invest in sewer system, but at slower rate
- WWTP upgrades now cost-effective






## Inflow & Infiltration Local Mitigation Efforts


*Jeff Oliver P.E.  
City Engineer*

*Bert Tracy  
Manager, Metropolitan  
Council Environmental  
Service*



## Golden Valley's I / I Problem

- Notified of peak discharge violation in 2005
- Surcharge Implications - \$380,100/yr over 5 years
- Meter change out - sump pump inspections
- Performed 2005 I/I Study





## I / I Study

- City wide problem
- Recommendations
  - Strengthen Sanitary Sewer Ordinance
  - Implement service lateral inspection/repair program
  - Continue “drain tile” service program
  - Continue inspection/repair program on City system



## Golden Valley's I/I Reduction Strategy

- Three-pronged approach
  - MCES (8 miles of pipe)
  - City (113 miles of pipe)
  - Private Laterals (147 miles of pipe)
- Willingness to modify & improve process over time





## Focus of Today's Discussion

- Private System & City System
  - Ordinance (Jeff)
  - Point of Sale inspections (Bert)
  - Ongoing maintenance efforts (Bert)
  - Pavement Management Program (Jeff)
  - Capacity Issues  
I-394 Study



## Ordinance Revisions

- Staff recommendation to Council
  - Develop process to address private system Develop approach based on:
    - Plumbing permits (excess of \$10,000)
    - Planning actions (CUP, Subdivision, Variance)
    - Construction activities (New, Demo, Addition)
- Direction from Council
  - Implement Point of Sale program
  - Include plumbing permits, planning actions





## Point of Sale

### Implementation of a service lateral inspection/repair program

#### SECTION 3.31 CERTIFICATE OF INFLOW AND INFILTRATION ("I&I") COMPLIANCE

**Subdivision 1. Required.** No person shall sell, advertise for sale, give or transact a change in title or property ownership of real property with one or more buildings or structures, without first obtaining a certificate of I&I compliance from the City or complying with Subd. 5 hereof.



## Point of Sale

- Public and realtor notification of Point of Sale program
  - Strong realtor opposition at first, since better
  - Public education and input
    - Sewerfest
    - Mailings, Newsletter
    - Cable TV
    - Meetings with realtors



BT

the water quality people

## Service Lateral Inspection Program Inspection Forms and Correction Notices

- Inspection costs
  - \$250 residential
  - \$750 commercial

[If one full page for window]

Public Works Department | 7000 Golden Valley Road, Golden Valley, MN 55427-4308  
763.253.8000 | FAX: 763.253.8024 | TTY: 763.253.2960 | www.goldenvalleymn.gov

**city of golden valley**

### Sanitary Sewer Service Compliance Inspection

DATE: \_\_\_\_\_ TIME:  AM  PM  POS  PMP (Clear \_\_\_\_\_)

NAME: \_\_\_\_\_ INSPECTION NUMBER: \_\_\_\_\_

HOUSE NUMBER: \_\_\_\_\_ STREET NAME: \_\_\_\_\_

ALTERNATE MAILING ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_ VIDEO DATE # \_\_\_\_\_ TIME:  AM  PM

**SIGNATURES**

OWNER/OCCUPANT SIGNATURE: \_\_\_\_\_ INSPECTOR SIGNATURE: \_\_\_\_\_

**SERVICE LATERAL INSPECTION FINDINGS (Inspector's Note)**

# OF SLOTTES: \_\_\_\_\_ ENTERED SL. # \_\_\_\_\_

Roots \_\_\_\_\_

Offset Pipe Joints \_\_\_\_\_

Mineral Deposits \_\_\_\_\_

Unknown Deposits \_\_\_\_\_

Sag/Pipe Deflection \_\_\_\_\_

Cracked Pipes \_\_\_\_\_

Broken Other \_\_\_\_\_

Final Cleanout	4" to 6" Transition	Length of Service
<b>SUMP PUMPS</b>	<b>FOUNDATION DRAINS</b>	<b>FURTHER INVESTIGATION</b>
Number Discharged _____	Number Discharged _____	<input type="checkbox"/> No one home
Connectivity _____	Connectivity _____	<input type="checkbox"/> Access to Service Lateral needed
Unknown _____	Unknown _____	<input type="checkbox"/> Other _____

**Staff Use Only**

Compliant  Non-compliant REASON CODE: \_\_\_\_\_ REVIEW DATE: \_\_\_\_\_

This document is available in alternate formats upon a 72-hour request. Please call 763.253.8000 (TTY: 763.253.2960) to make a request. Examples of alternate formats may include large print, electronic, braille, audio/cassette, etc.

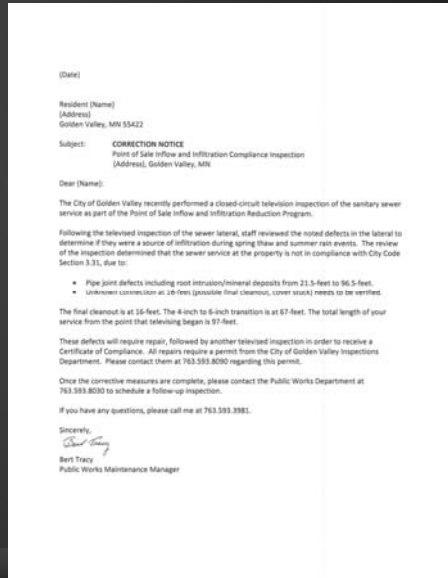
White Copy: Property Owner Yellow Copy: City of Golden Valley/SEH

Picture on the left is a floor drain under the concrete floor, on the right is beaver board discharging into floor drain



## Correction notices need to be clear and concise as possible.

- Service repair costs
  - Range \$500 - \$8,000
  - Average \$3,500



## Compliance Certificate





## Ongoing Maintenance Efforts

- Replace MH covers (100% complete, 2880 covers replaced)
- MH Sealing (30% complete)
- Televising (5-7 miles/year)
- Lining mains in areas of concern (1-2 miles/year)
- Flow monitoring (on-going)
  - 14 meters
  - Identify problem areas
  - Monitor Progress



Water Environment  
Federation  
the water quality people



## Pavement Management Program

- Replacement - broken pipes
- Sewer lining
  - Primary rehab for I/I
  - Early-2000s - pipe lining, short liners
  - Mid-2000s - full length liners
  - 50-75% City mains in PMP repaired each year
  - 100% City Mains 2015-17 PMP

Water Environment  
Federation  
the water quality people



## Pavement Management Program

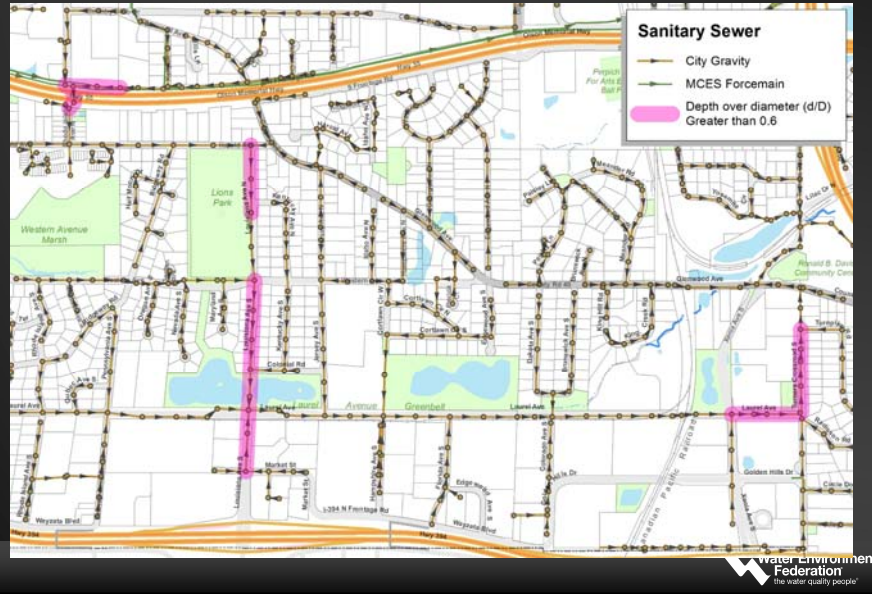
- Reconstruct & seal manholes
- Install water tight castings
- Drain tile system - sump connections



## PMP Inspections: Evolving process 2006-2014

- 2010 New voluntary repair program
  - Pre-qualified contractors
  - Master contract with City
  - Assessment option
    - Recently extended city wide
- Resident inspections
  - Follow POS process
  - No charge for inspection
  - Informed decisions

## 2014 I-394 Study



## 2014 I-394 Study

- June 2013 Rainfall Event - increased flow rate of 310 gpm (0.45 MGD)

Table 1: June 2013 Flow Data

Peak Flow	1670	gpm
Peak Allowable Flow: ADF x 3.4	1360	gpm
Difference due to I/I	310	gpm

Table 2: Incremental I/I Reduction

	Change in Flow (MGD)	Equivalents of:		
		Apartments (Units)	Office (Employees)	Retail (SF)
30% I/I Reduction	0.13	1,190	8,370	3,720,000
50% I/I Reduction	0.22	1,984	13,950	6,200,000

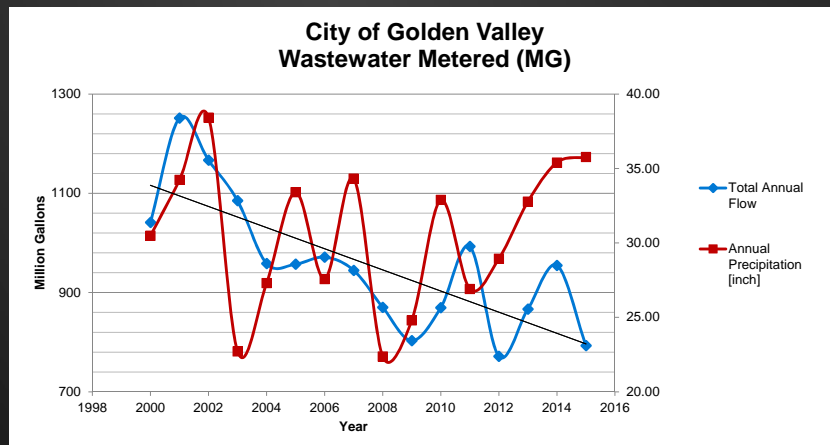


## How are we doing? *Private service compliance*

- 8,000 total services in City
- 10+ years of inspection tracking (2007-17)
  - 55% of services inspected
  - 47% now compliant
- Only 10% of services pass first inspection, 90% require some repair



## How are we doing? *Total Flows*





## 2016 MCES Study

- Started in 2004
- 24% reduction in total flow
- 28% reduction in I/I flow
- No peak flow violation since 2014



## 2017 Comprehensive Wastewater Plan

- System Modeling
- “All previously known capacity issues no longer exist due to I/I reduction”



## More work to be done

- Flows from western Golden Valley still a concern (future PMP area)
- Additional focus on development
- Point of Sale a long-term solution
  - Lengthened by depressed real estate market
  - Realtors now using I/I compliance as a selling point in our community



## Thank You

Questions / Comments

[joliver@goldenvalleymn.gov](mailto:joliver@goldenvalleymn.gov)

[bert.tracy@metc.state.mn.us](mailto:bert.tracy@metc.state.mn.us)

# Locality System Monitoring and Condition Assessment (Design-Bid-Build)

December 6, 2017

Presented by:  
Phil Hubbard, P.E.



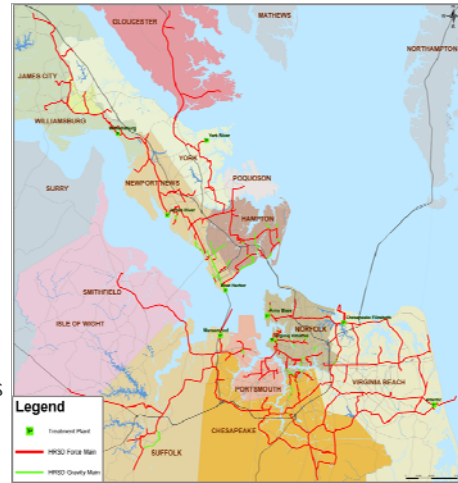
## Agenda

- Background
  - Memorandum of Agreement
  - Potential SSES for Localities
- Project Scope
- Construction



## HRSD System

- 3,087 sq. mile service area
- 18 Cities and Counties
- 1.7 million population
- 9 Wastewater Treatment Plants
- 250 MGD Permitted Capacity
- 450,000+ connections
- 5,800 miles gravity sewer
- ~ 4000 miles private sewers
- 1,580 public sewer pump stations
- ~ 1500 private sewer pump stations
- 1,120 miles of force main



## HRSD

- A political subdivision of the Commonwealth of Virginia
- Formed in 1940 through public referendum to address pollution of Chesapeake Bay waters and closure of oyster beds
- Commission appointed by Governor's office





## Regulatory Issues

- EPA declared their intention to institute an enforcement action in 2005
- Region comes together and develops a State Consent Order covering HRSD and 13 Localities in 2007
- EPA and HRSD negotiate a Federal Consent Decree similar to the State Order in 2008 & 2009
- Federal Decree entered with court in 2010. Objectives included compliance with the Clean Water Act and elimination of SSOs from the HRSD/Regional Sanitary System. Three additional modifications.



## Hybrid Regionalization

- Regionalization Study
- Localities retain ownership of their assets
- HRSD takes responsibility for capacity for all public assets
- HRSD pays for and executes rehab and capacity enhancements in both their and Locality systems
- Memorandum of Agreement memorializes the deal



## Criteria for I/I in Localities

Table 8-2. Criteria for I/I Reduction Program Plan Types

Criteria	Comprehensive Approach	Data-Driven Approach	General Approach
SSES Data Availability	Any amount of SSES data was acceptable for planning	Smoke Testing and MH Inspection Data Greater than 75% of Catchment and CCTV Greater than 25% of Catchment	CCTV Less than 25% of Catchment
Assumed Rehabilitation to Replacement Ratio used for Budgetary Cost Estimate	70%/30% Replacement/Rehabilitation	50%/50% Replacement/Rehabilitation	50%/50% Replacement/Rehabilitation
Public system R/R	100%	Manholes and pipes included based on known defects. Manholes based on connection to scoped public pipe	Sliding scale for R/R scope based on I/I density
Single Family Private R/R	Target 100%, with an assumed 70% participation rate	Laterals based on known defects or connected to scoped public pipe	Target equal to % Public R/R
Non-Single Family (NSF) R/R	May apply to all scoping approaches if one of the following criteria are met: <ul style="list-style-type: none"> <li>• Top 30% of leakiest catchments in TP service area</li> <li>• Private NSF equivalent length &gt;50% of entire catchment</li> </ul>		



## Potential SSES in Localities

Table 8-1. HRSD I/I Reduction Program Planning Criteria

	I/I Density, 10-Year Peak RDII GPD/Acre Sewered Area (GPAD)	
	Minimum	Comprehensive Level
TP		
AB	7,900	12,000
AT	5,200	12,000
BH	8,600	19,000
JR	6,500	16,000
NA	3,500	8,000
VIP	8,700	20,000
WB	3,600	9,800
YR	3,400	7,500



## Pilot Programs

### Goals

- Test pros and cons of procurement/contracting approaches
- Test assumptions of cost and I/I removal effectiveness
- Work out interactions with Localities
- Work out interface with public and property owners

ID	Contract Method	Rehab Type	Public or Private	% Public	Peak I/I, mgd	GPAD
VB340	Design-Build	Data Driven	Public	50%	1.23	10,709
VB111	Unit Price	Data Driven	Both	45%	1.26	13,735
NN008	Design-Bid-Build	Comprehensive	Public	56%	2.13	21,515

## Scope of Project

- CIPP of 9,750 LF of 6 to 12-inch gravity sewer main
- Open cut excavation to replace 300 LF of 8 to 10-inch gravity main
- 6 open cut point repairs <25'
- Rehabilitated 42 manholes
- Replaced 3 manholes
- Completed numerous cleanout installations
- CIPP of 94 laterals
- Replaced 48 laterals



## Locality Coordination

- Worked closely with City of Newport News from design through construction. City provided input during:
  - Design
  - Submittal review
  - Progress meetings
  - Construction issues
  - Post CCTV reviews
  - Warranty review
- Resident Notification
  - Held public meeting at local Police Station
  - Passed out fliers to residents, made special visits to daycare and school



## CIPP Liner - TriState



- Liner material: Applied Felts – polyester needle felt with one side coated with polyester polyurethane
- Resin: Interplastic Corp. COR72-AT-470HT
- Curing: Steam inversion
- Liner is resin impregnated in a factory
- Liner kept in refrigerated truck to
  - prevent premature curing
- Wet out reports



# Before and After



# Laterals Before & After - BLD



## Results

- Post construction flow analysis was completed by Brown & Caldwell
- Of the 3 pilot studies, largest I/I reduction
- Pre-Construction Peak I/I = 2.13 MGD
- Post-Construction Peak I/I = 0.77 MGD
- Reduction in Peak I/I = 1.36 MGD. A 63% reduction!
- Not one smoking gun resulting in excessive I&I - required comprehensive rehabilitation of the basin

## Non-Single Family Criteria

Table 8-3. I/I Density Threshold for NSF R/R	
TP	NSF GPAD Minimum
Army Base	9,900
Atlantic	12,400
Boat Harbor	18,950
James River	13,700
Nansemond	7,780
VIP	19,100
Williamsburg	9,200
York River	7,800

# Private Property Assumptions

Table 8-4. Private Infrastructure Equivalent Length Assumptions

Asset Type	Private Single Family	Private Non-Single Family < 1 Acre	Private Non-Single Family > 1 Acre
Gravity System Length, Feet	N/A	Multi-Family Parcels N/A	Multi-Family Parcels Max Calculation Area = 15 acres Diameter = 8 inches Length = (126.2 x Parcel Area) + 208.9
		Commercial Parcels Diameter = 6 inches Length = (242.2 x Parcel Area) + 34.8	Commercial Parcels Max Calculation Area = 15 acres Diameter = 8 inches Length = (68.3 x Parcel Area) + 208.7
Lateral Length, Feet	Diameter = 4 inches Length = (58.1 x Parcel Area) + 19.8 Length ranges from 25 to 120 ft. Max Calculation Area = 1.7 acres	Multi-Family Parcels Diameter = 6 inches Length = 40 ft. per building located within parcel	Multi-Family Parcels Diameter = 6 inches Length = 40 ft. per building located within parcel
		Commercial Parcels N/A	Commercial Parcels Diameter = 8 inches Length = 40 ft. per building located within parcel if building count >1
Manhole Length, Feet	NA	N/A	Multi-Family Parcels Manhole Spacing = 150 ft. Manhole Depth = 5 ft. Manhole Diameter = 48 inches
Manhole Length, Feet			Commercial Parcels Manhole Spacing = 200 ft. Manhole Depth = 5 ft. Manhole Diameter = 48 inches



# Percent I/I Removed

Table 8-5. I/I Reduction Based on % R/R for General Plans

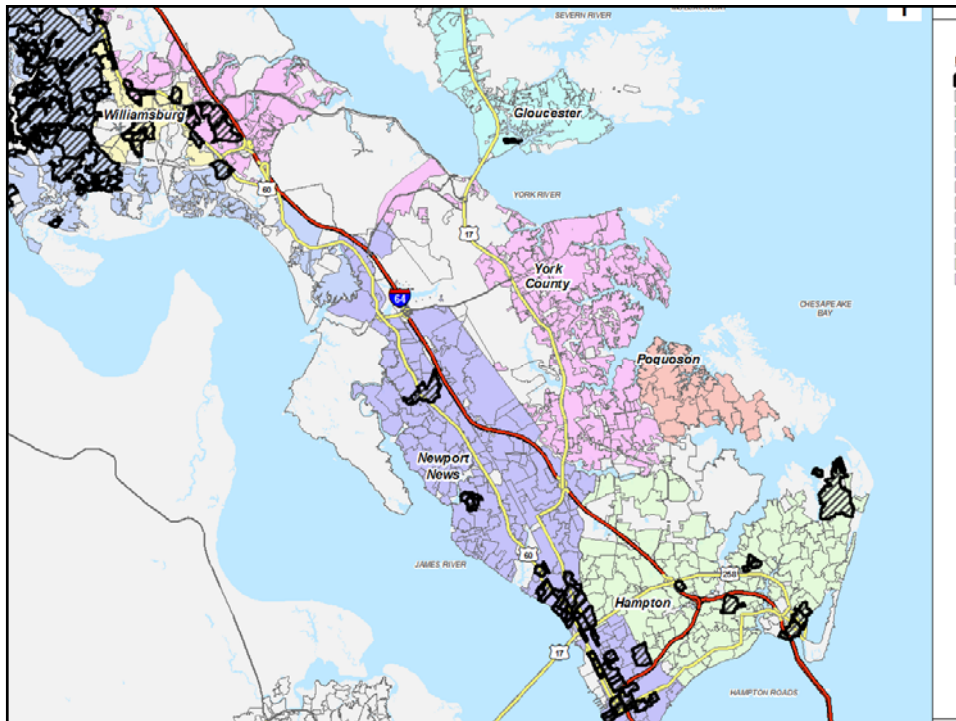
% R/R	Corresponding Peak I/I Flow Reduction
30%	21%
40%	28%
50%	35%
60%	42%
70%	49%
80%	56%
90%	63%



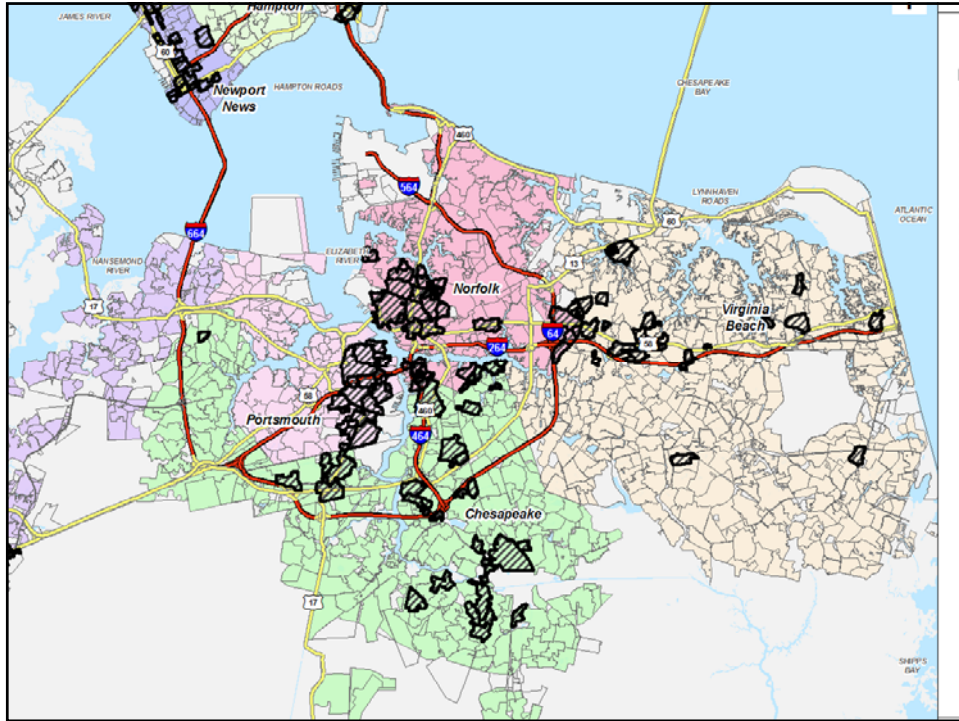
# Total I/I Reduction

Table 8-7. Summary of I/I Reduction Program by TP Service Area

Treatment Plant	Number of I/I Reduction Areas in Program	Public		Private		Total	
		I/I Reduction (MGD)	Cost (\$Million)	I/I Reduction (MGD)	Cost (\$Million)	I/I Reduction (MGD)	Cost (\$Million)
Army Base	0	0	\$0	0	\$0	0	\$0
Atlantic	45	18.0	\$141.3	9.2	\$35.2	27.2	\$176.5
Boat Harbor	28	7.7	\$59.8	2.2	\$6.6	9.9	\$66.4
James River	16	4.8	\$37.9	1.9	\$6.7	6.7	\$44.6
Nansemond	20	12.9	\$112.5	5.5	\$23.1	18.4	\$135.6
VIP	50	34.3	\$262.9	7.3	\$22.7	41.6	\$285.6
Williamsburg	26	14.2	\$108.4	4.2	\$15.4	18.4	\$123.8
York River	6	1.7	\$17.4	0.9	\$2.4	2.6	\$19.8
<b>Total</b>	<b>191</b>	<b>93.6</b>	<b>\$740.2</b>	<b>31.2</b>	<b>\$112.1</b>	<b>124.8</b>	<b>\$852.3</b>







## Questions?

