The Flow Must Go On Mansfield's Proactive Approach to I&I Reduction



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City of Mansfield

- DFW metroplex (South-Central)
- Estimated population of 82,285
- Large conveyance system across three counties (~365 miles)
- Does not operate WWTP







Mansfield & FNI Background

- 25-year professional relationship
- Regular master plans updates
- 20+ successful projects
- Emphasis on proactive asset management & long-term planning



TWUA Award Ceremony

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Sanitary Sewer Evaluation Study (SSES)

- Identify, reduce sources of I&I
- Flow monitoring, smoke testing, etc.





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Why Perform SSES?

- Proactive management
- SSO reduction
- Delay/eliminate capacity CIP
- Reduce wholesale peak charges



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SSES Examples

- Manhole Inspections
 - No manned entry required
- Smoke Testing
 - Identifies potential I/I access points
- Closed-Circuit Television
 - Non-destructive diagnostic tool







Mansfield Ongoing Efforts

- 5 Service Trucks (F-550 with full crane bodies)
 - Running SL Rat, replacing manhole lids
- 1 Gap Vax Combination Truck
 - Suction and Cleaning
- CCTV Camera Van
 - 9 employees NASCO Trained
 - Field Operations 16 employees (crew side)



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Project Background

- Inspects approximately 1,000,000 LF of pipe each year (SL Rat and CCTV)
- Owns and operates inspection equipment
- Need: Prioritized areas to inspect based on I/I severity







Project Scope

- Temporary flow monitoring
- Flow meter data analysis
- I/I characterization and SSES
 prioritization
- I/I Reduction Strategy Program



I/I REDUCTION STRATEGY PROGRAM

PHASE I

Sanitary Sewer Evaluation Study (Temporary Flow Monitoring Analyses)

Prepared for:

City of Mansfield

March 2023



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Flow Meter Site Selection

- 22 temporary flow meters
- 2 rain gauges
- 60-day monitoring period
- Comparable coverage amongst flow meters
- Utilizing previous sites where feasible



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Flow Monitoring Results – Dry Weather

- Diurnals developed for each flow meter basin
- 15" and smaller: d/D < 60%
- Larger than 15": d/D < 75%
- Only 1 flow meter basin exceeded criteria



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Flow Monitoring Results – Wet Weather

- Flow meter data observed during storm events
- 4 recorded storm events

Wet Weather d/D

- Recommended d/D of less than 100%
- 9 flow meter basins exceeded criteria

Date	Duration (hours)	RG1 Depth (inches)	RG2 Depth (inches)
4/4/2022	1	0.91	0.72
4/24/2022	6	1.54	1.65
5/24/2022	6	1.62	1.42
6/3/2022	3	3.72	3.00



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Flow Monitoring Results – Wet Weather

Peaking Factors

- Simple ratio
- Recorded wet weather flow: dry weather flow
- Does not incorporate basin size or upstream meters



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Flow Monitoring Results – Wet Weather

Rainfall Derived Infiltration and Inflow (RDII)

- RDII = flow during rainfall event – average dry day flow
- RDII normalized per LF
 per inch of rainfall



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Projected Design Storm RDII

Projected RDII for 3.65-inch design storm





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Projected Design Storm RDII NORMALIZED RDII (gal/LF/in) TURNER WAY LS 0.0 - 2.0 Manchester I ifetime Arlington Mete 2.0 - 3.0 GIS aids visualization 3.0 - 5.0 RIPLE DIAMOND FM03/FM04 BANKSTON TRA Mete of high I/I COUNTRY MEADOW IS (1.29)FM2 Powerful stakeholder RUSTIC MEADOW LS communication tool ANORDALE LS MOODY LS OPPER COVE LS Efficient planning and GARDEN HEIGHTS LS ARRANT CO FM17 ARRANT CO JOHNSON (LLIS CO SEETON LS LAKEVIEW LS resource allocation **FM18** (2.94)BEST MAID LS TRA

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I/I Reduction Strategy Program

- SSES activities: basins with high RDII & peaking factors
- High priority (1-5 years)
- Intermediate-term (5-10 years)
- Long-term (10-15 years)

FM Basins	# Manholes to Inspect	LF of Pipe to Inspect	Budgetary Cost	
High Priority Rehabilitation				
7	1,049	361,291	\$2,723,700	
Intermediate Rehabilitation				
6	1,648	564,087	\$4,254,400	
Long-Term Rehabilitation				
8	1,711	569,057	\$4,303,800	
Reduction Strategy Program Totals				
21	4,408	1,494,435	\$11,281,900	





Field Work Efforts

- Starting with High-Priority Basins identified from study
 - FM Basins 14, 17, 18, 22, and 3/4
 - Over 330,000 gravity main LF inspected
 - Nearly 1,000 manholes inspected



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Field Work Efforts Cont.

- Gravity Mains
 - Relatively good condition
 - CCTV and cleaning
- Manholes
 - Primary source of I/I
 - Replace top sections
 - 2-part injectable epoxy coating
 - Replace rings and lids





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Year 1 Statistics

- MH Repaired/Resealed: 228
- Sewer Cap Replaced: 31
- Sewer Line Repaired: 48
- I/I Reduction (\$\$\$): TBD



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Next Steps

- Complete high-priority basin inspections and rehab
- Flow Monitoring Round 2
- Begin intermediateterm inspections







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Thank You!

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