



# City of Columbia, Missouri

July 22, 2009

**Presentation for:**

## Pilot Inflow & Infiltration Study

City of  
Columbia, MO  
38194



**Prepared by:**

**TREKK**  
DESIGN GROUP LLC



# Introductions

## TREKK

- **Cliff Cate, P.E. – Water/Wastewater Manager**
- **Ron Thomann – Project Manager**

## City of Columbia

- **Steve Hunt, P.E. – Manager of Environmental Services**

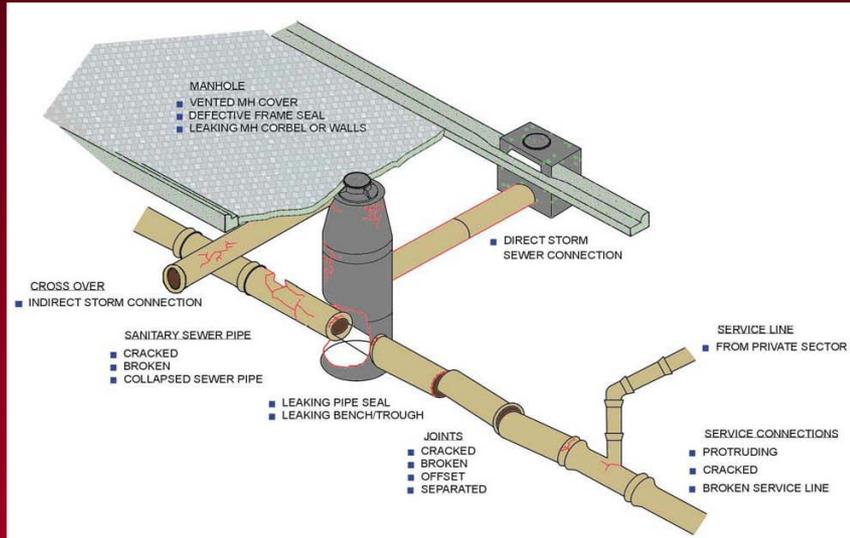
# I & I – What is it?

- **Inflow – surface water which enters the sewer through direct connections such as down spouts, sump pumps, area drains, cross connections with storm sewers, etc.**
- **Infiltration – groundwater that seeps into sewers through sewer pipe and manhole defects such as cracks, broken pipe joints, bad service connections, manhole defects, etc.**

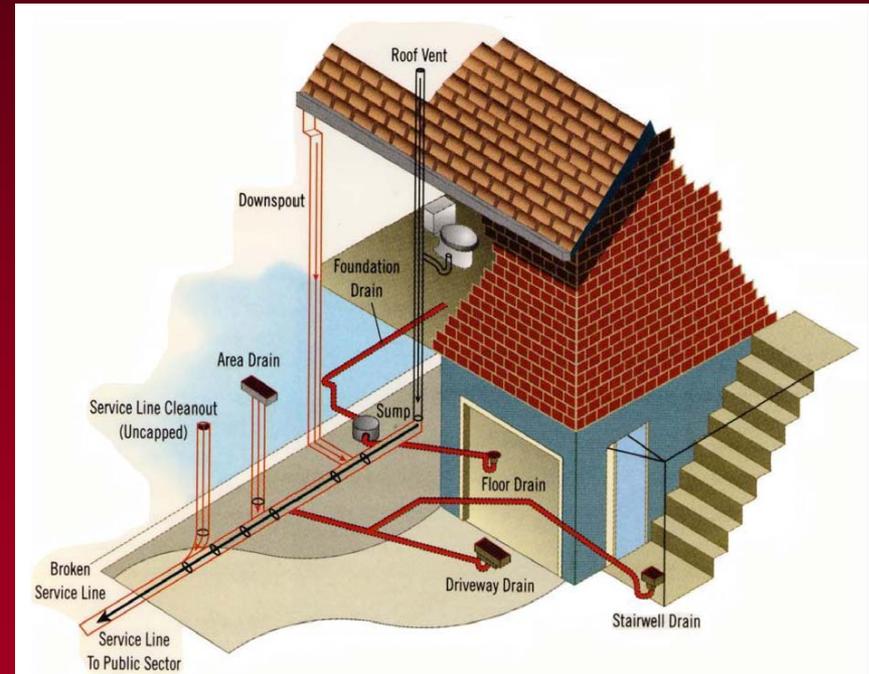


# How it gets into the system

## Public Sector

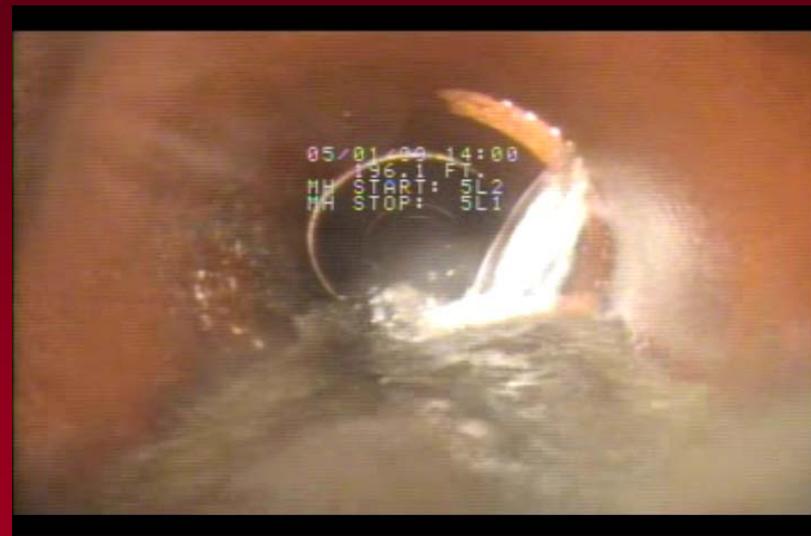


## Private Sector



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# Active I&I



# Impact of I&I on WWTP

<b>Year</b>	<b>Precipitation (inches)</b>	<b>Avg daily flow (mgd)</b>
<b>2006</b>	<b>28.9</b>	<b>13.4</b>
<b>2007</b>	<b>32.0</b>	<b>13.9</b>
<b>2008</b>	<b>57.0</b>	<b>16.9</b>
<b>2009 to date</b>	<b>28.5</b>	<b>16.2</b>



# Impact of I&I on Collection

## 2004 Sewer Utility Master Plan

Identified approximately \$26,000,000 of relief sewers that are needed now due to manhole overflows, basement backups and surcharged sewers.



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### McBaine Avenue

Dyed-Water Testing and CCTV  
Inspections  
(pin-points I&I location)



# Public Sewer I&I Removal Cost

- 300 miles of VCP sewer: \$44,000,000
- 9,500 MH: \$6,000,000



# Public Sewer I&I Removal Utility Funds Currently in Place

<b>Annual Project</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>
<b>Sewer main &amp; MH rehab</b>	<b>\$1,000,000</b>	<b>\$807,500</b>	<b>\$500,000</b>
<b>Sewer Improvement</b>		<b>\$250,000</b>	<b>\$500,000</b>
<b>Total</b>	<b>\$1,000,000</b>	<b>\$1,057,500</b>	<b>\$1,000,000</b>

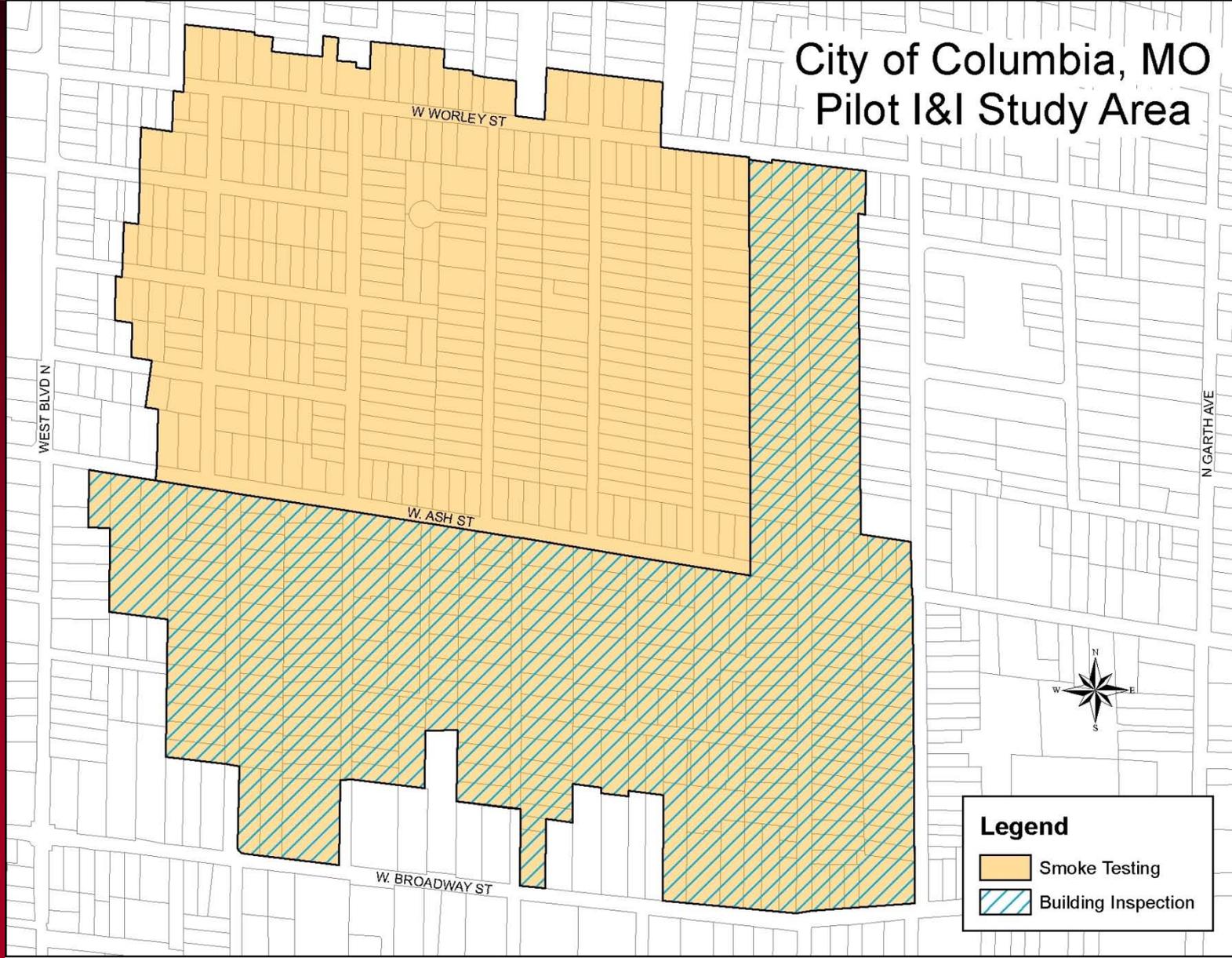


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# City of Columbia, Missouri

## Pilot Inflow & Infiltration Study

### City of Columbia, MO Pilot I&I Study Area



**Legend**

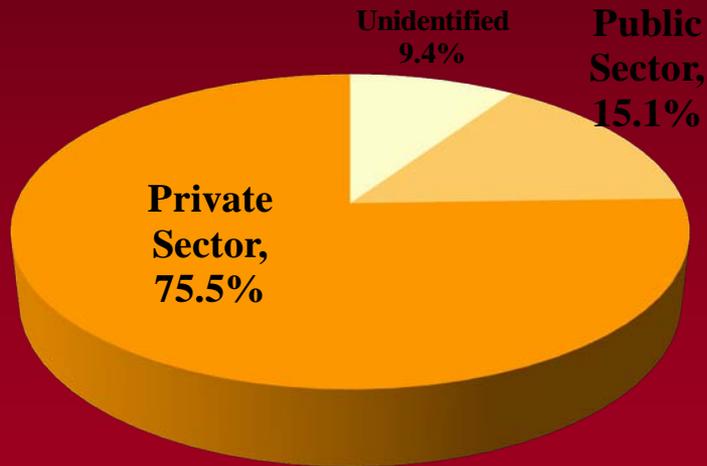
-  Smoke Testing
-  Building Inspection



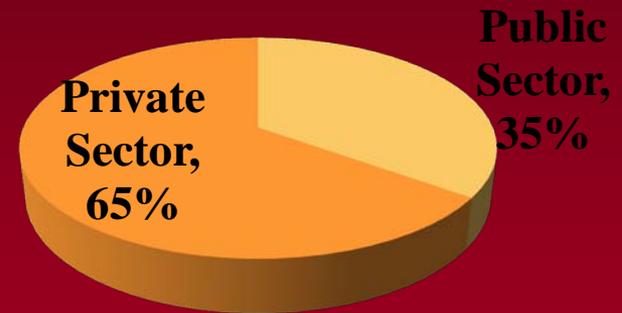
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# Public vs Private I&I

## Studies from WERF



## Columbia's Pilot Study



# Pilot Study Inspections

Inspection Type	Totals
Manhole Inspections	107 Manholes
Smoke Tested	25,000 LF
Internal/External Buildings	186 Buildings
External Only Buildings	71 Buildings
Service Lateral Inspections	16 Laterals
Dyed-Water Tests	58 Each
<b>Total Public Defects</b>	<b>194 Defects</b>
<b>Total Private Defects</b>	<b>90 Defects</b>



# Pilot Area Private Sewer I&I Removal

Item	Cost to Remove
30 uncapped cleanouts	\$1,500
19 Sump Pumps	\$38,000
3 Down Spouts	\$1,200
Total	\$40,700

# Removing I&I From Private Sources - Who pays?

- Home owners
- Sewer Utility

## Private Sewer I&I Removal Funding Utility Funds Currently in Place

<b>Annual Project</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>
<b>I&amp;I Investigation</b>	<b>\$500,000</b>	<b>\$250,000</b>	<b>\$500,000</b>
<b>Private I&amp;I Removal</b>		<b>\$250,000</b>	

# Future Bond Issues

## Factors to consider

- **WWTP**
- **Sewer Extension**
- **Private Common Collector Elimination**
- **\$50 million for Public I&I Removal**
- **Private I&I Removal**

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# Questions?

