Department of Public Works
Environmental Engineering Section

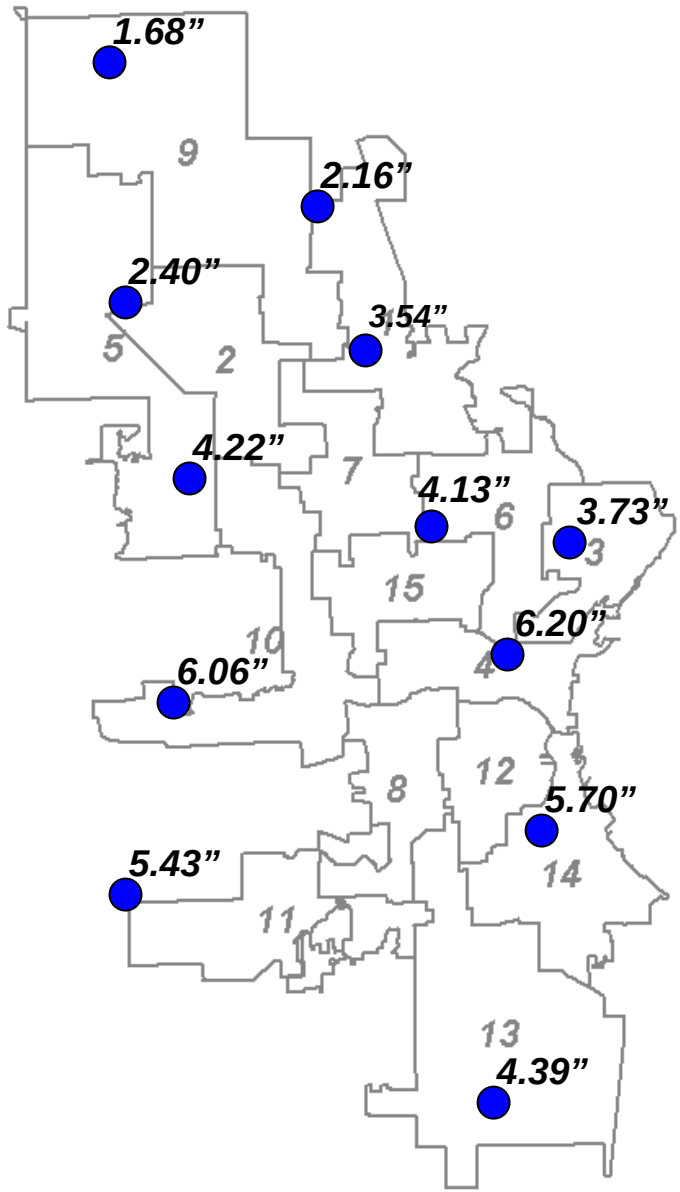
Review of Rain Events from

June 19, 2009

Rainfall totals

Rainfall data publically available on MMSD's website

Rainfall totals at several sites exceeded the 1% probability of occurrence for 1-hour, 12-hour, and 24-hour time periods.



June 19, 2009 Rain Events

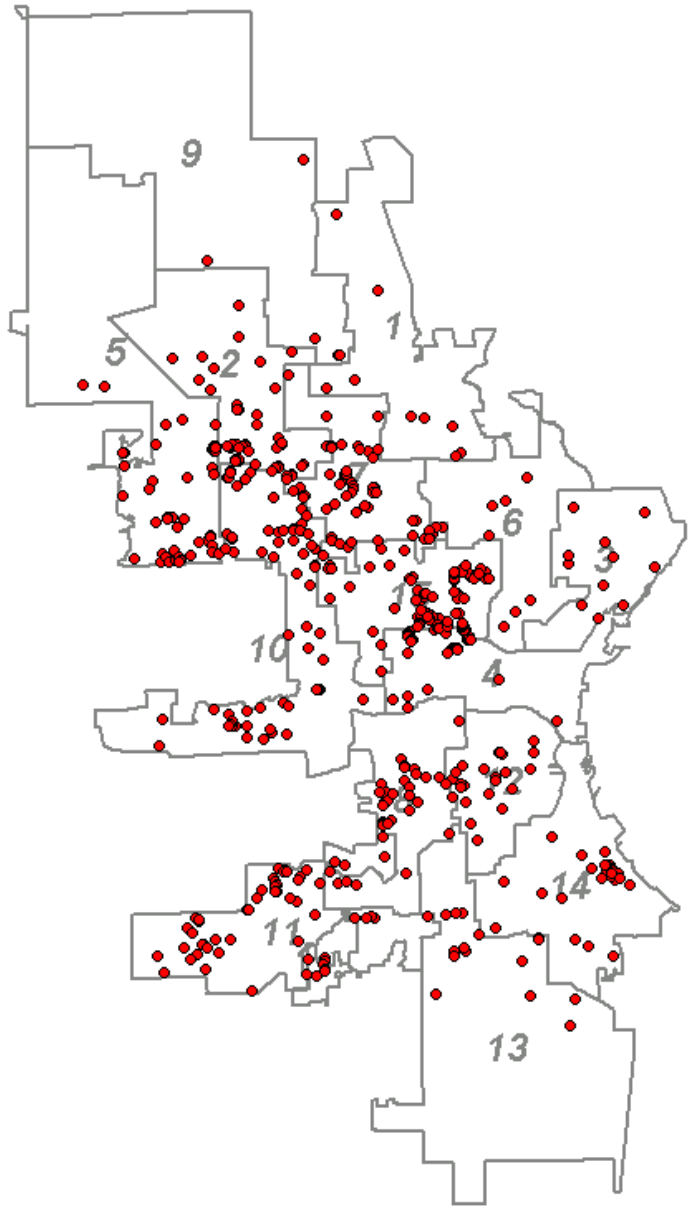
June 19, 2009 Rain Events

Backwaters

658 calls placed to DPW Call Center

By Aldermanic District:

1st	9
2nd	70
3rd	12
4th	49
5th	63
6th	8
7th	56
8th	38
9th	6
10th	85
11th	81
12th	28
13th	20
14th	34
15th	99

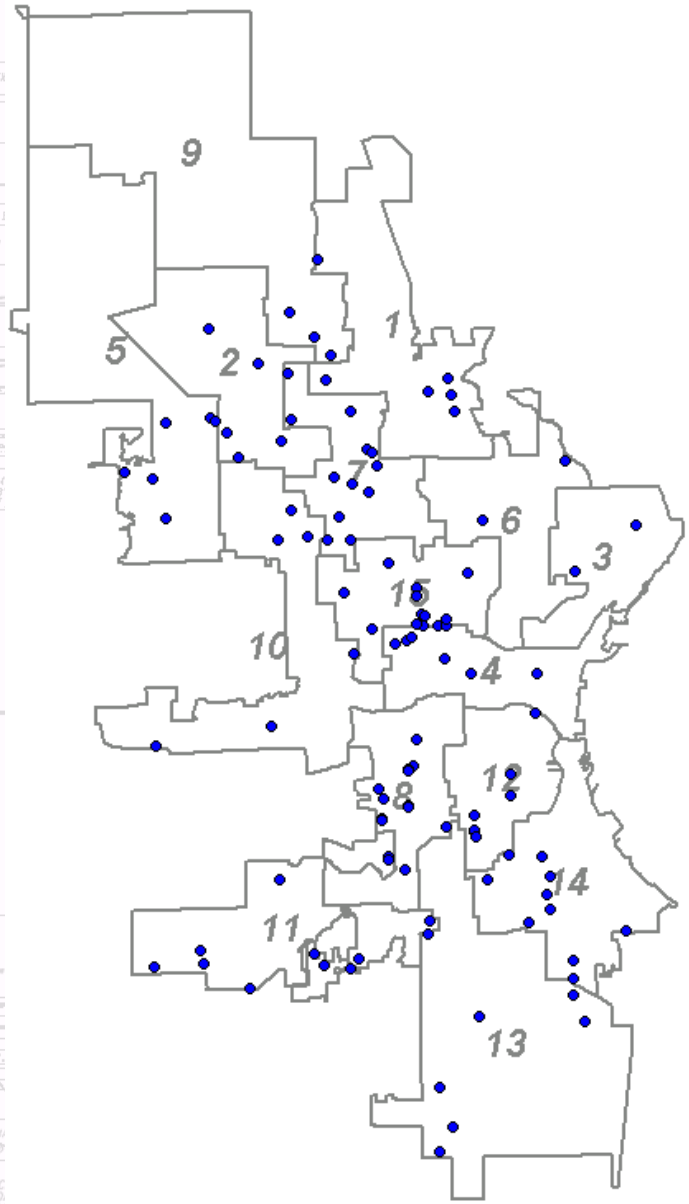


Surface Ponding

172 calls placed to DPW Call Center

By Aldermanic District:

1st	8
2nd	8
3rd	4
4th	10
5th	9
6th	5
7th	18
8th	20
9th	4
10th	10
11th	23
12th	13
13th	7
14th	13
15th	20

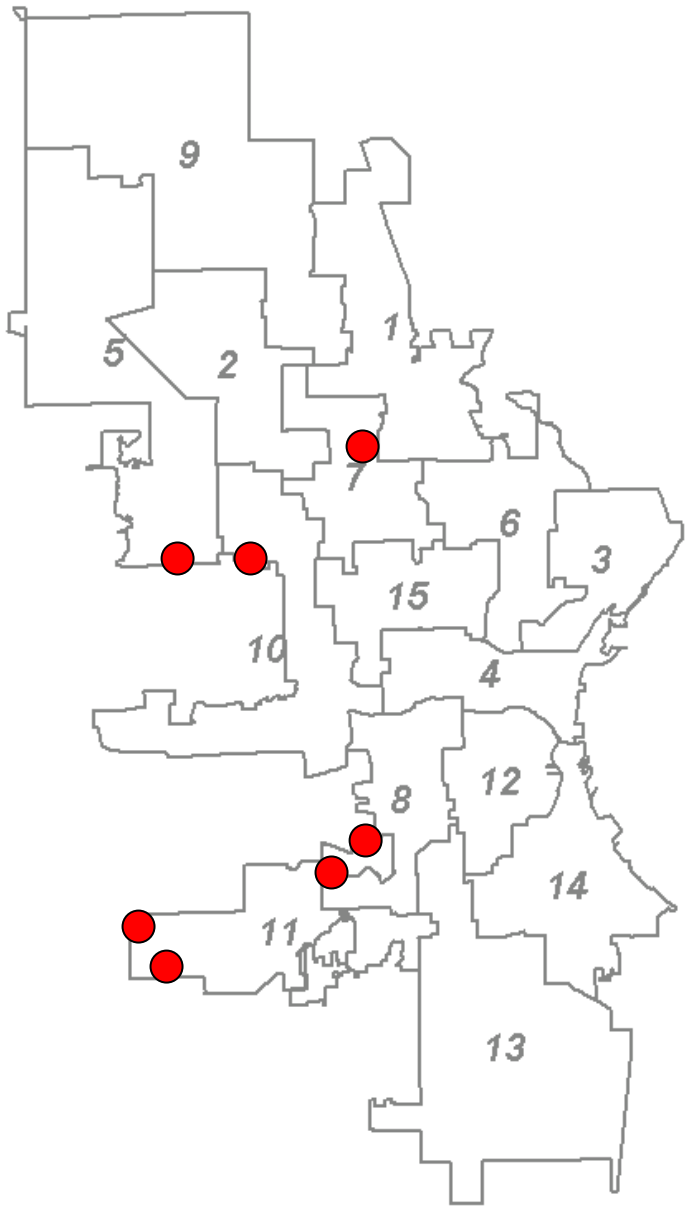


Sanitary Sewer Overflow (SSO)

Any discharge from the collection system to the waters of the state or land surface

Bypass Pumping Stations

On June 22, 2009, the City reported that seven sanitary bypass pumps had operated



Sources of Inflow and Infiltration (I/I)

The next three slides show potential sources for rain water to enter the sanitary sewer system

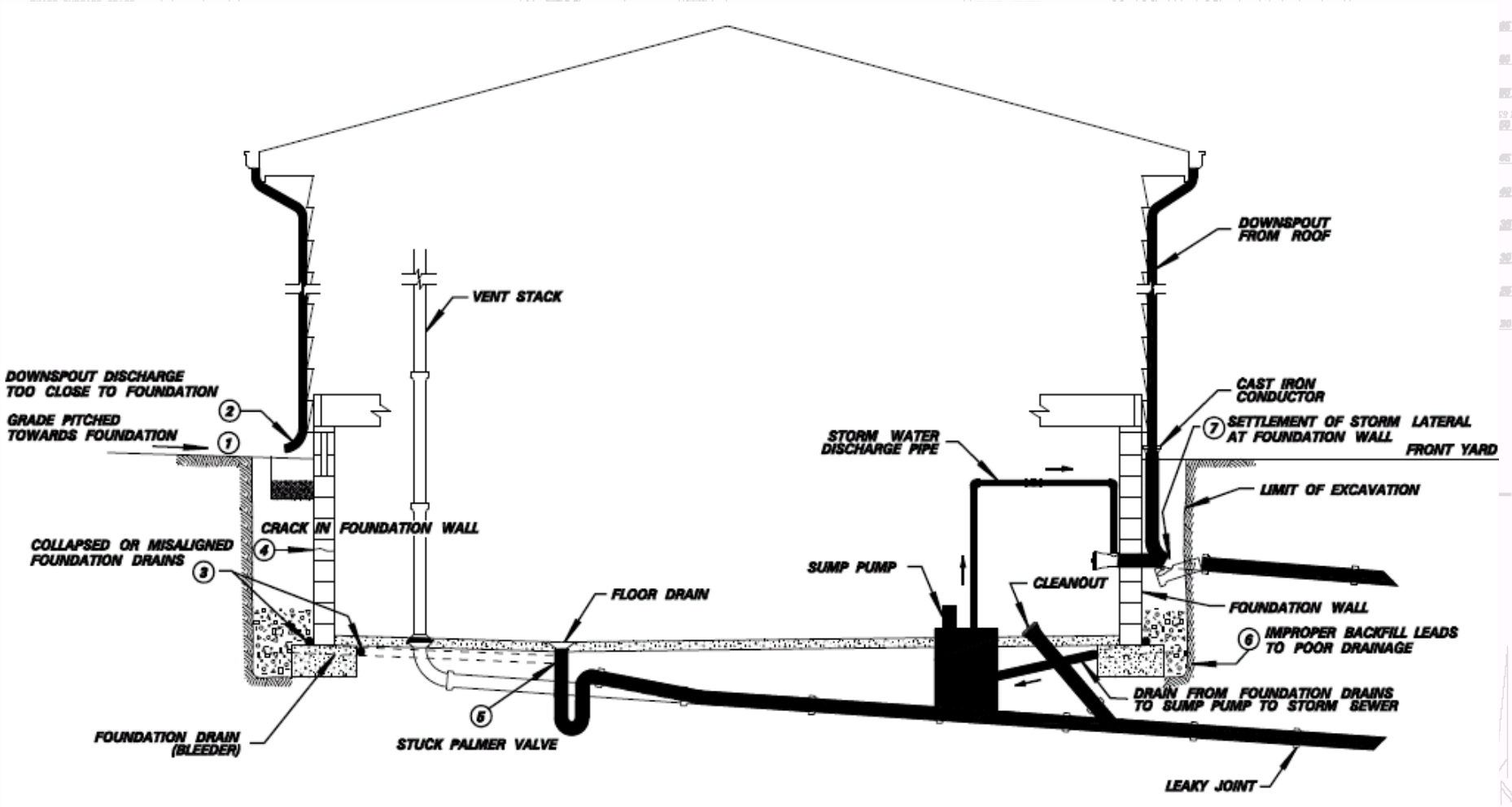
Private:

- Improper downspout connections and improper grading
- Foundation drains (pre-1954)
- Sump pumps discharging to floor drain or basement sink
- Cracks and open joints in sanitary building lateral

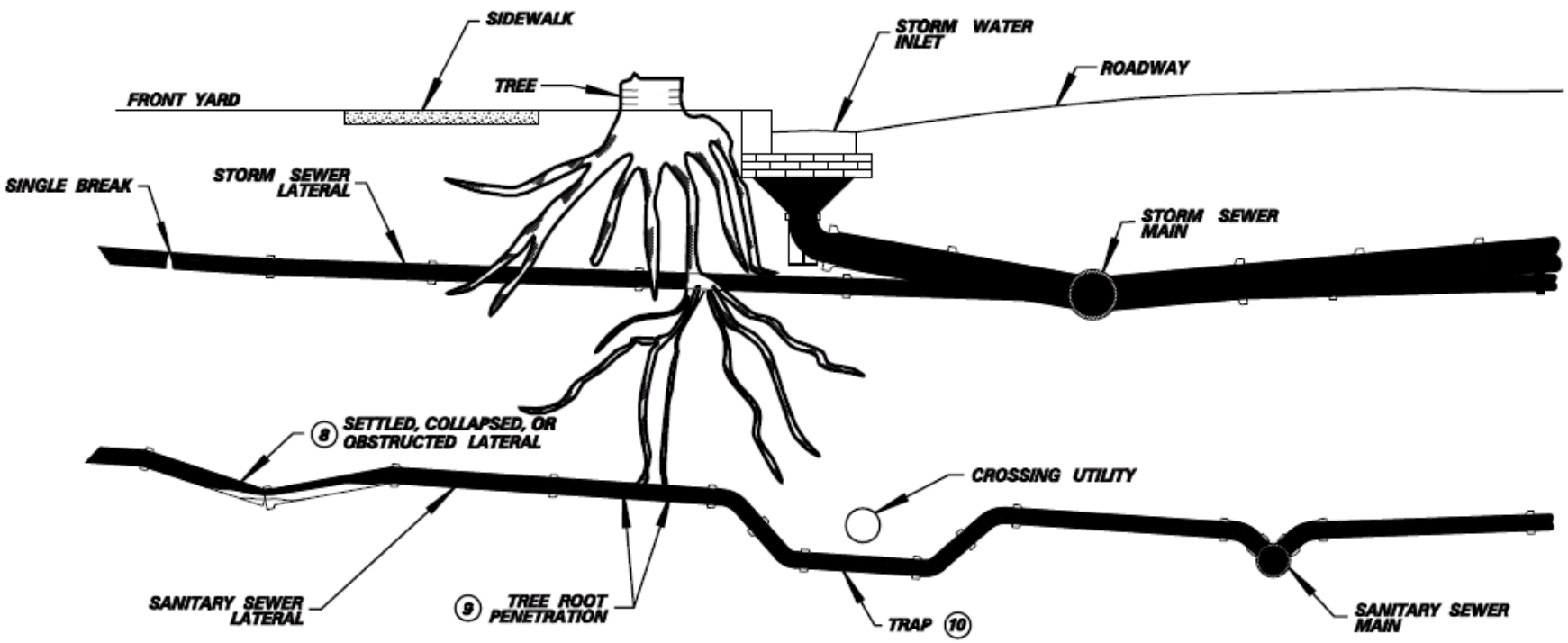
Public:

- Improper catch basin connections to sanitary sewer
- Cracks and open joints in sanitary sewer mains
- Leaky sanitary manholes

June 19, 2009 Rain Events



June 19, 2009 Rain Events



June 19, 2009 Rain Events

INFILTRATION: The water entering a sewer system from the ground through such means as, but not limited to, defective pipes, pipe joints, connections, or manhole walls. Infiltration does not include, and is distinguished from, inflow.

INFLOW: The water discharged into a sanitary sewer system from such sources as, but not limited to, roof leaders, service connections, cellar, yard and area drains, foundation drains, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, storm waters, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

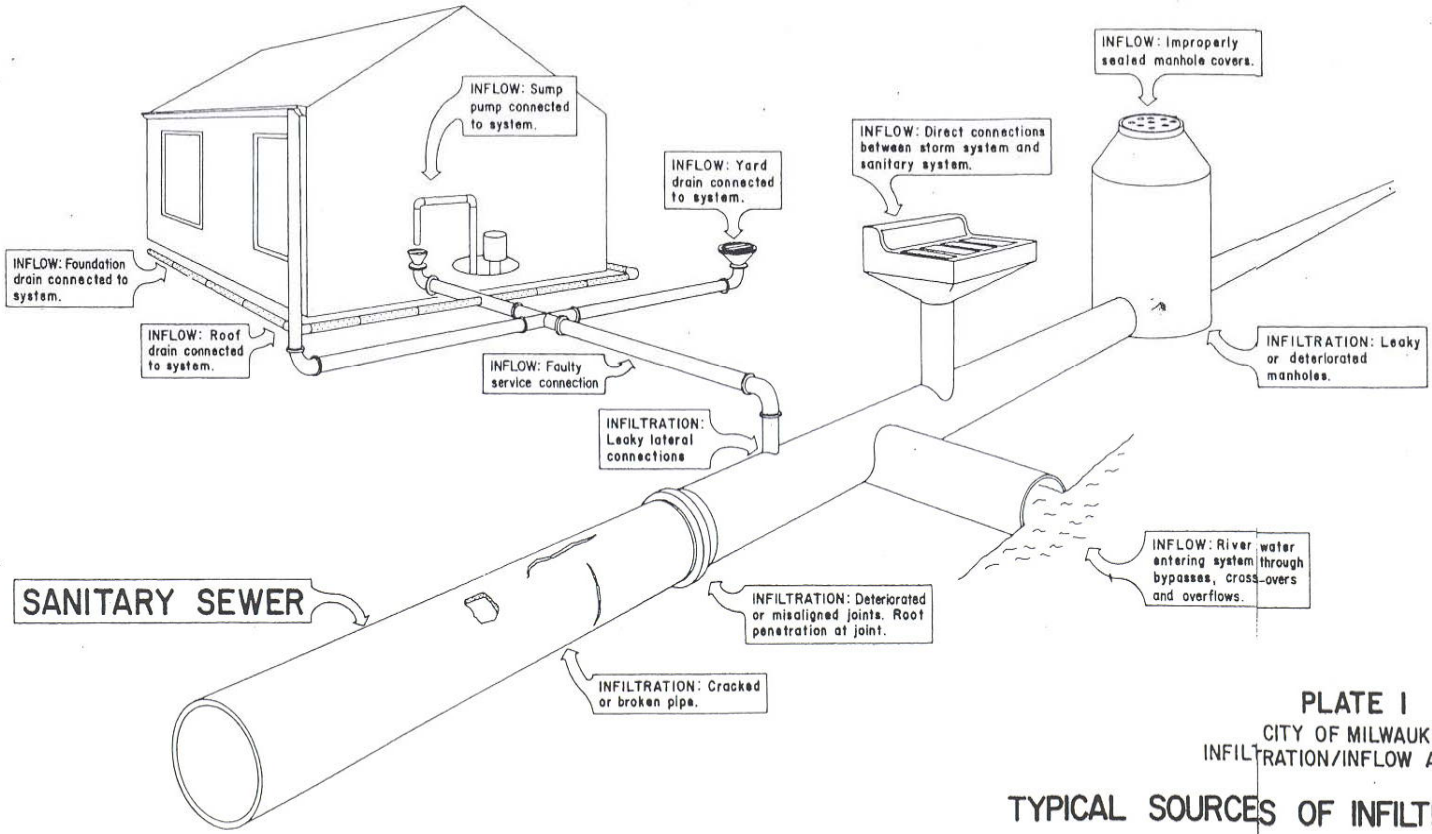


PLATE I

CITY OF MILWAUKEE
INFILTRATION/INFLOW ANALYSIS

TYPICAL SOURCES OF INFILTRATION / INFLOW

DONOHUE & ASSOCIATES INC. CONSULTING ENGINEERS -1976- SHEBOYGAN WISCONSIN

City of Milwaukee efforts to reduce I/I

The City is in the 4th year out of 5 for inspection and 3rd year out of 5 for rehabilitation of all sanitary manholes. (MH Rehab performed on select systems since 1999).

$7.9M for manhole inspection, rehabilitation, and dye testing since 2006.

The City has performed Storm Sewer Dye Water Flooding in select systems.

Results:

77% of dyed water enters sewer main from laterals

15% of dyed water enters sewer main from main to lateral connection

7% of dyed water enters sewer main through sewer main joints

1% of dyed water enters sewer main through cracks in the mains sewer

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Questions?