Department of Public Works
Environmental Engineering Section

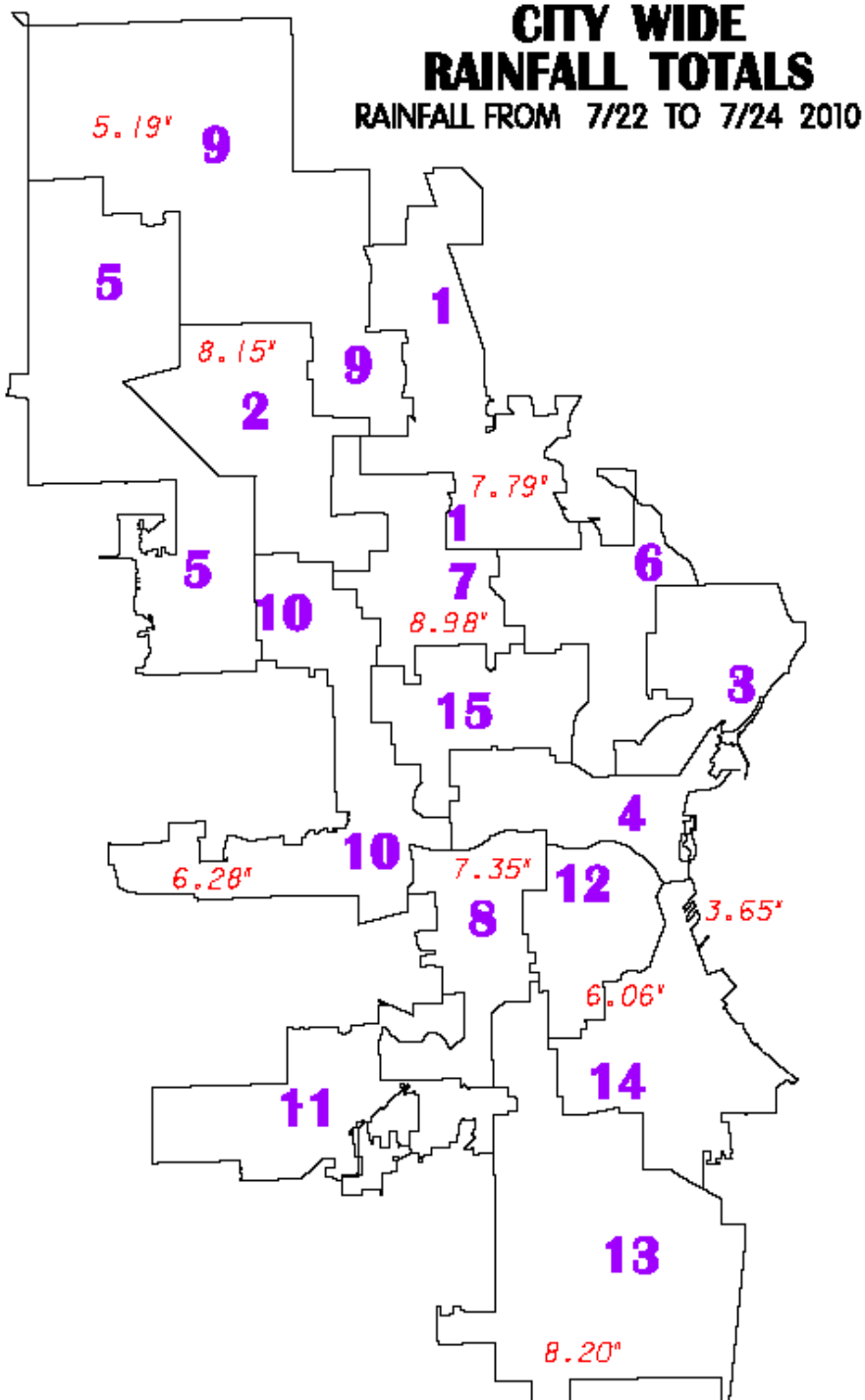
Michael J. Murphy, Alderman 10th District

Tim Thur, Chief Design Engineer

Tuesday September 21, 2010

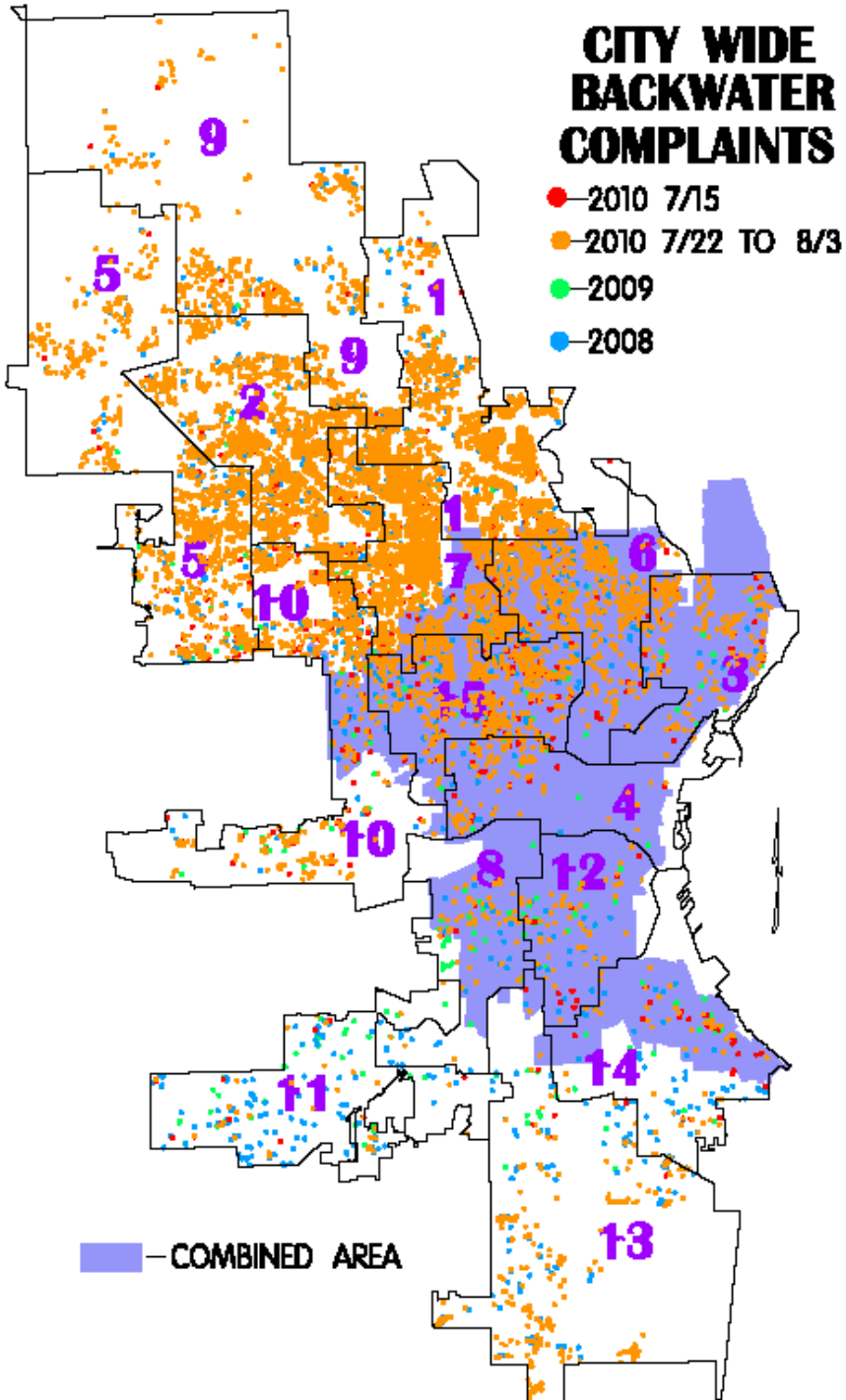
at

Mother of Good Counsel


CITY WIDE
RAINFALL TOTALS
RAINFALL FROM 7/22 TO 7/24 2010
5.19"
9
5
1
8.15"
9
2
7.79"
1
5
7
6
10
8.98"
3
15
4
10
7.35"
12
6.28"
8
3.65"
6.06"
14
11
13
8.20"

City of Milwaukee Sewers

- Storm Sewers are designed to accommodate 1.5 inches of rain per hour
- Combined Sewers are designed to accommodate 2.0 inches of rain per hour
- On July 22, 2010 some areas of the City of Milwaukee received more than 3.5 inches of rain in 1 hour


CITY WIDE
BACKWATER
COMPLAINTS
2010 7/15
2010 7/22 TO 8/3
2009
2008
9
5
1
9
2
1
5
7
6
10
3
15
4
10
8
12
14
11
13
COMBINED AREA

2008-2010 Backwater Totals

Aldermanic District	Alderpersons	July. 22	July 22 to August 3	2009	2008	3 year total
1	Ashanti Hamilton	133	1,819	9	253	2,214
2	Joe Davis Sr.	122	1,859	70	303	2,354
3	Nik Kovac	58	281	12	12	363
4	Robert Bauman	44	120	49	20	233
5	James A. Bohl, Jr.	131	1,061	63	161	1,416
6	Milele A. Coggs	96	762	8	104	970
7	Willie C. Wade	289	2,123	56	374	2,842
8	Robert G. Donovan	10	61	38	26	135
9	Robert G. Puente	37	648	6	95	786
10	Michael J. Murphy	241	722	85	117	1,165
11	Joe Dudzik	20	43	81	109	253
12	James N. Witkowiak	22	62	28	23	135
13	Terry L. Witkowski	17	250	20	119	406
14	T. Anthony Zielinski	43	64	34	50	191
15	Willie L. Hines Jr.	175	616	99	107	997
	Total =	1,438	10,491	658	1,873	14,460

The City of Milwaukee studied 6 areas in Alderman Murphy's District

1. Area bounded by: North 89th Street to North 95th Street from West Wisconsin Avenue to West Hawthorne Avenue

2. Area bounded by: North 72nd Street to North 76th Street from West Burleigh Avenue to West Center Street

3. Area bounded by: North 66th Street to North 76th Street from West Capitol Drive to West Nash/Vienna Street

4. Area bounded by: North 60th Street to North 64th Street from West Nash Street to West Keefe Avenue

5. Area bounded by: North 49th Street to North 60th Street from West Keefe Avenue to West Locust Street
   - District 10 Eastern Boundary

6. Area bounded by: North 60th Street to North 72nd Street from West Center Street to West Burleigh Street

City of Milwaukee work in Study Area 2: Area bounded by: North 72nd Street to North 76th Street from West Burleigh Street to West Center Street

- Closed circuit television exams were conducted on selected sanitary and storm sewers in this area
- A hydraulic analysis was completed for all sewers in this area
- Based on the CCTV selected sanitary sewers are programmed to be relayed in 2011
- Based on the hydraulic analysis selected storm sewers are programmed to be relayed in 2011

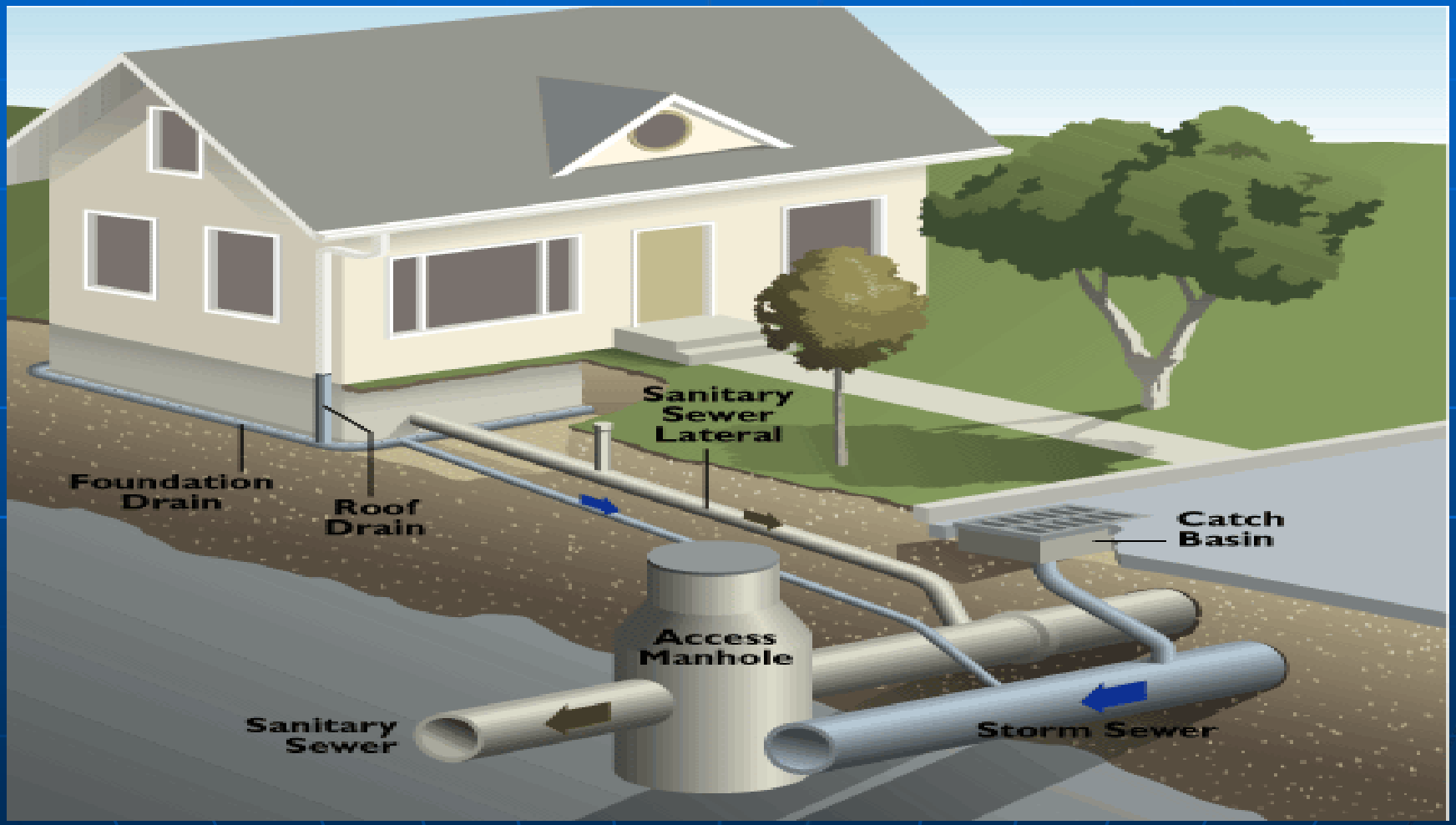
Proposed Sewer Relay Locations

Below is a list of locations planned to be rehabilitated in 2011

1. North 73rd St – West Hadley Street to West Burleigh Street
2. West Hadley Street – North Lefeber Avenue to North 74th Street
3. West Hadley Street – North Lefeber Avenue to North 76th Street
4. North 75th Street – West Hadley Street to West Locust Street

Why Is This Happening?

Building sewer connections



Outside of historic rain events the main cause of basement backups is Inflow and Infiltration

Sources for rain water to enter the 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 building laterals**

Public:

- **Cracks and open joints in sewer mains**
- **Leaky manholes**

City of Milwaukee Dye Testing Results

77% of dyed water enters sewer main from laterals

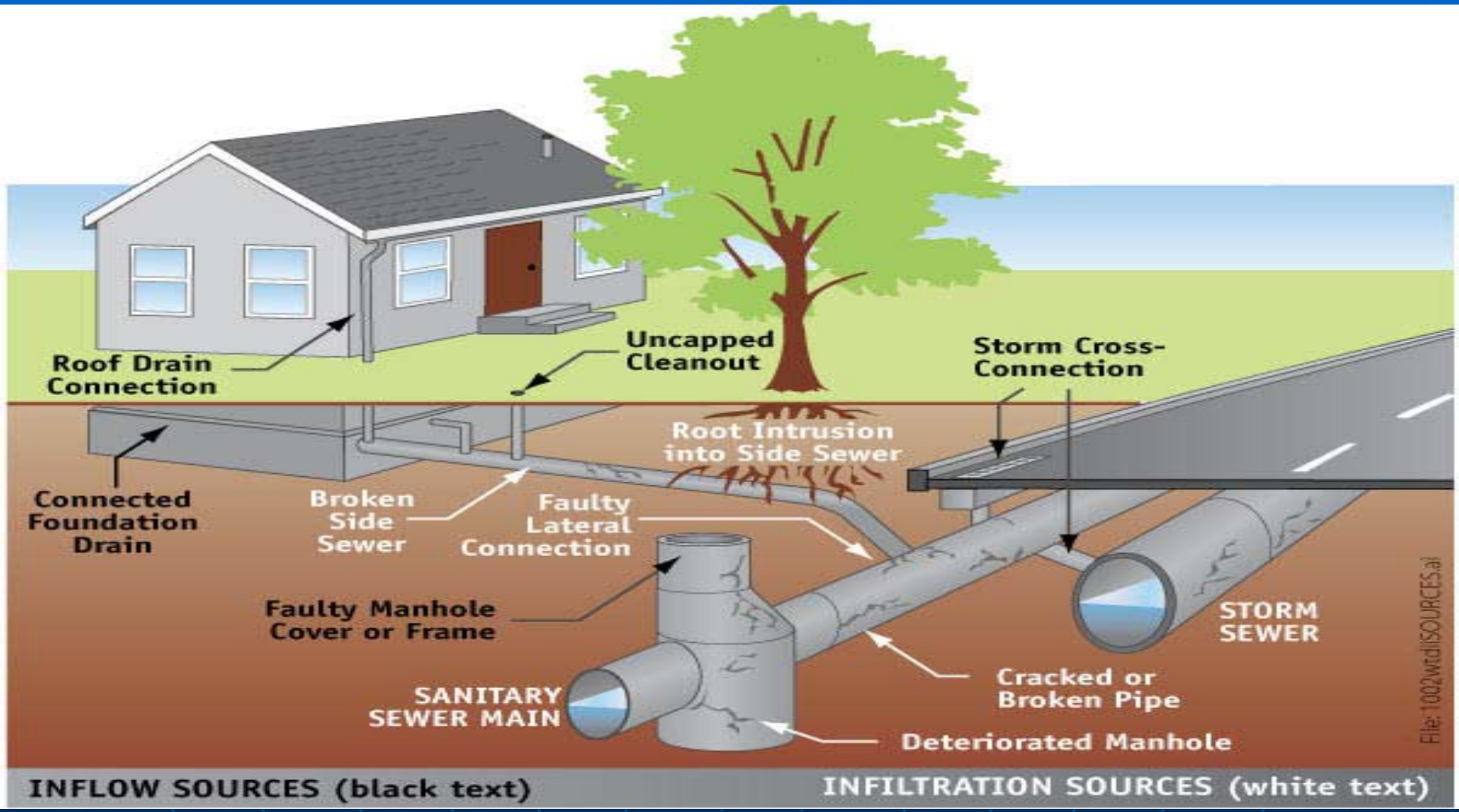
15% of dyed water enters sewer main from main to lateral connection

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

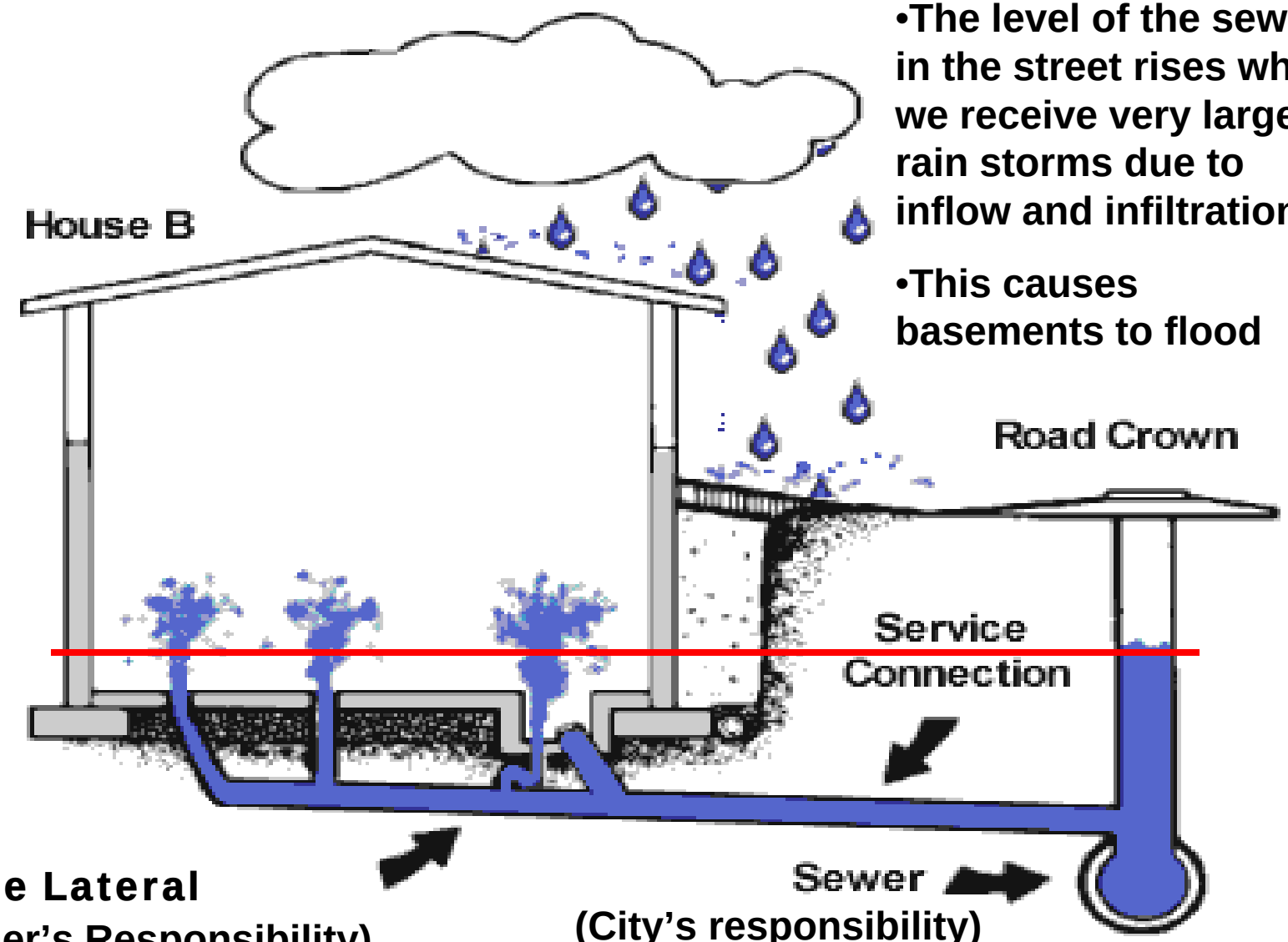
1% of dyed water enters sewer main through cracks in the mains sewer

*The City can rehabilitate its sewers, but this does not guarantee that no basement backups will occur

Faulty Sanitary building lateral showing Inflow and Infiltration (I/I)



- **The level of the sewer in the street rises when we receive very large rain storms due to inflow and infiltration**
- **This causes basements to flood**



Private Lateral
(Homeowner's Responsibility)

(City's responsibility)

City of Milwaukee efforts to reduce I/I

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

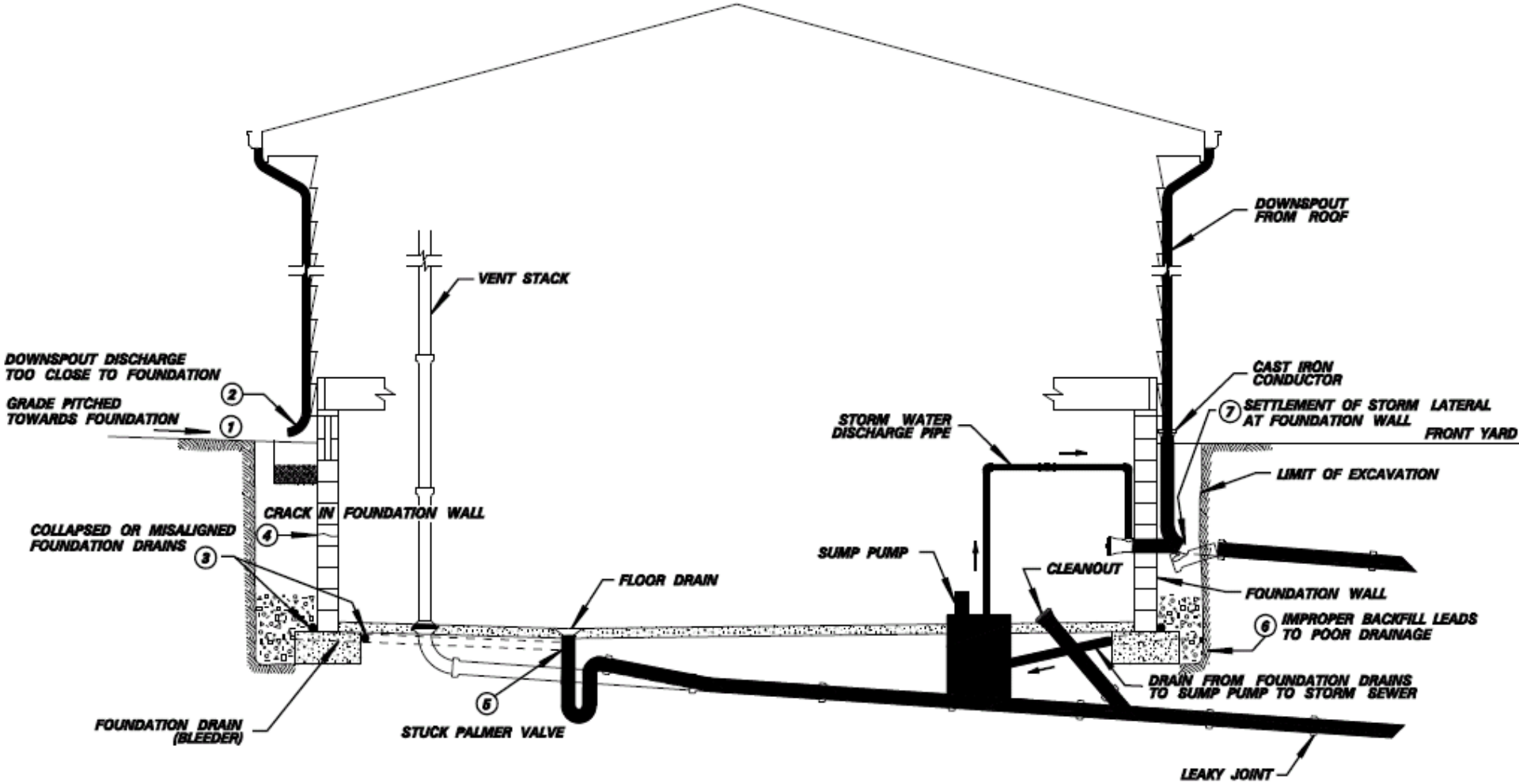
- City has spent $61.0 M for sanitary sewer rehabilitation since 2006.

- Rehabilitation work include manhole rehabilitation, sewer relays, cured-in-place lining projects.

What can Residents Do?

- Install Backflow Preventers
- Install Ejector Pumps
- Install Sewer Stops
- Install Pneumatic Plugs
- Disconnect Downspouts
- Install Rain Barrels

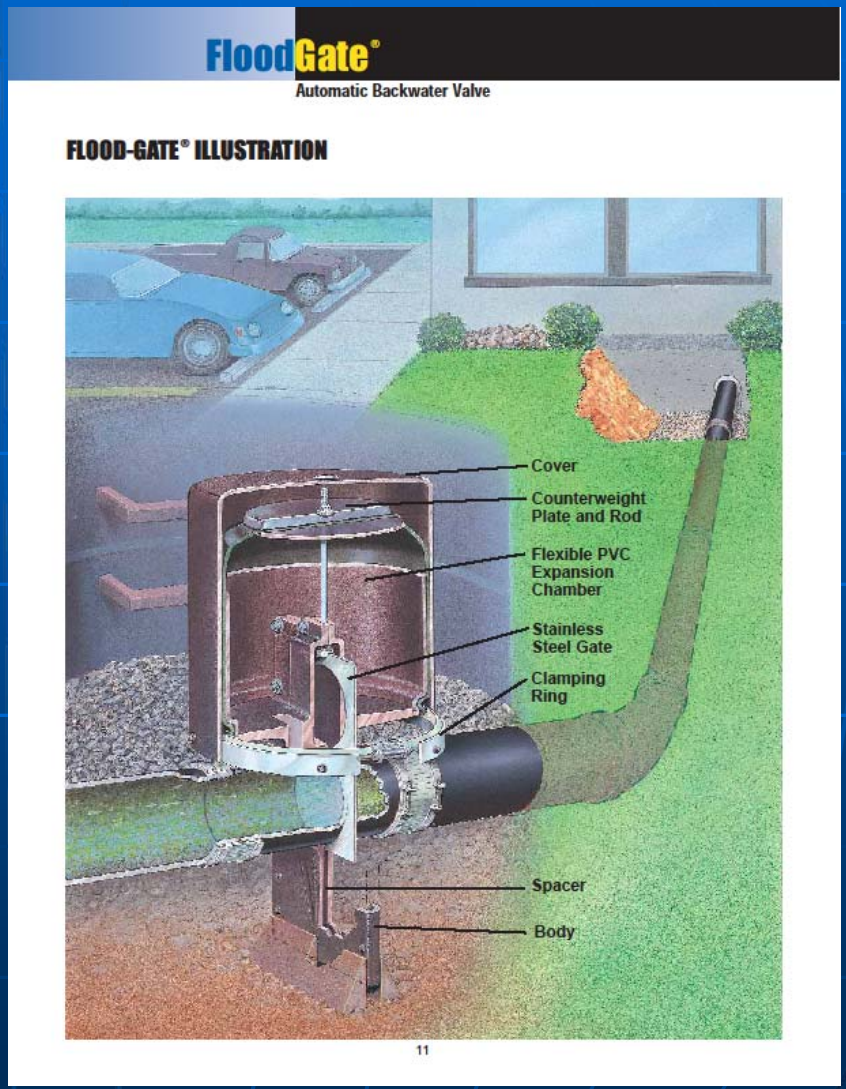
Private Plumbing Details



Options to Residents to protect their homes from flooding

- **Backwater Valve: Prevents backflow from the sewer outside to the basement. Estimated Cost ≈ $3,000 - $5,000 including installation**

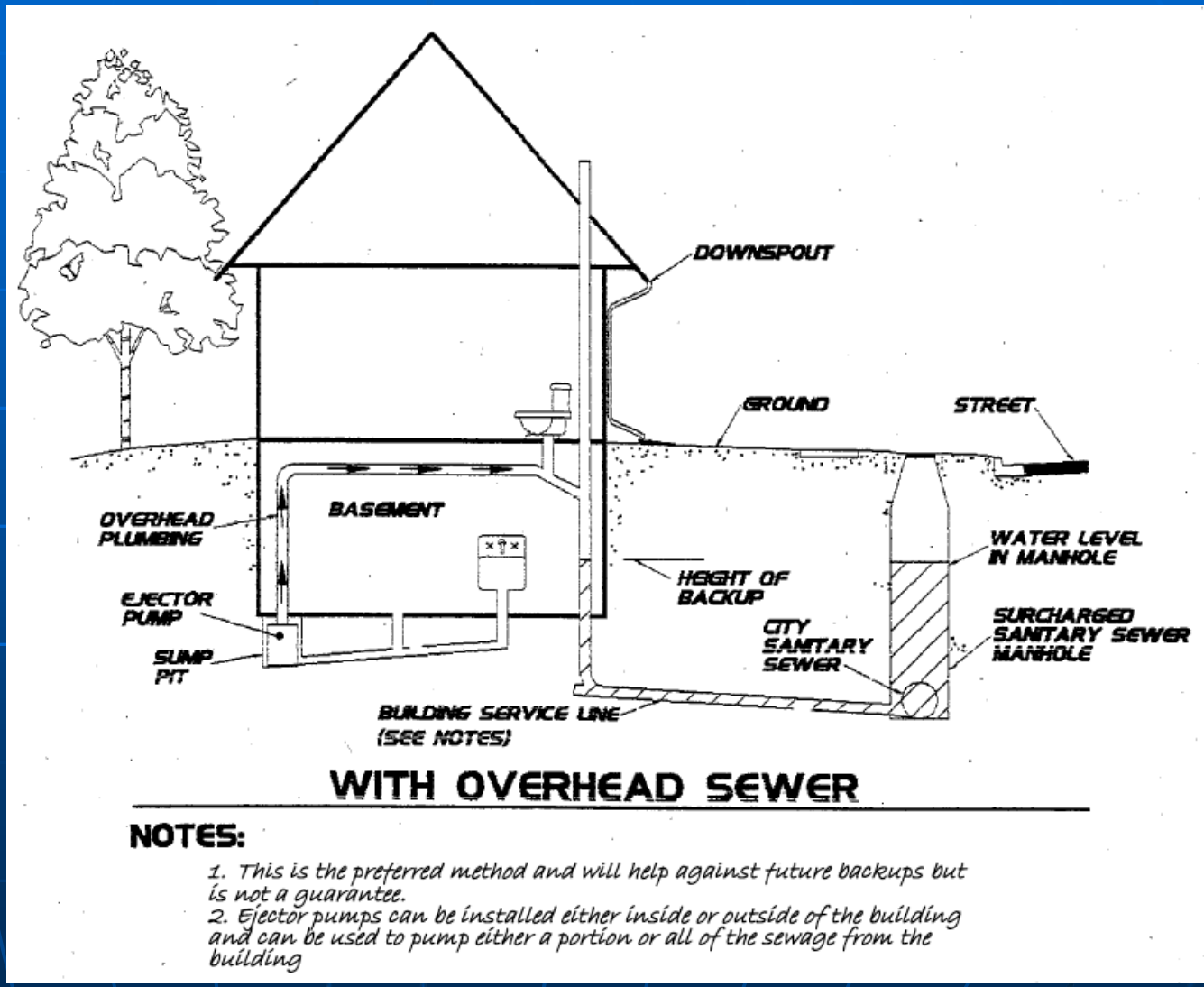
Backwater Valve



Options to Residents to protect their homes from flooding

Ejector Pump

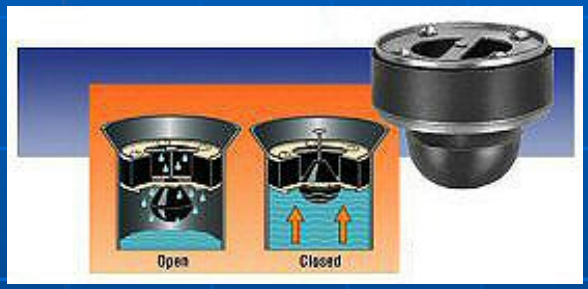
- **Ejector Pump: Pumps sewage up above the flood level. This doesn't allow water to back up in the basement through the floor drains. Estimated Cost ≈ $3,000 - $6,000 including installation**



Less Expensive Options for Residents to protect their homes from flooding

- **Sewer Stops: Seals floor drain and allows for water to flow into not out of the drain. Estimated Cost ≈ $40**

- **Pneumatic Plugs: Plugs that can be installed in basement toilets to prevent backflow from the sewer. Estimated Cost ≈ $55**



- **Disconnect Downspouts**

- **Install Rain Barrels**

Milwaukee Metropolitan Sewerage District

Executive Director

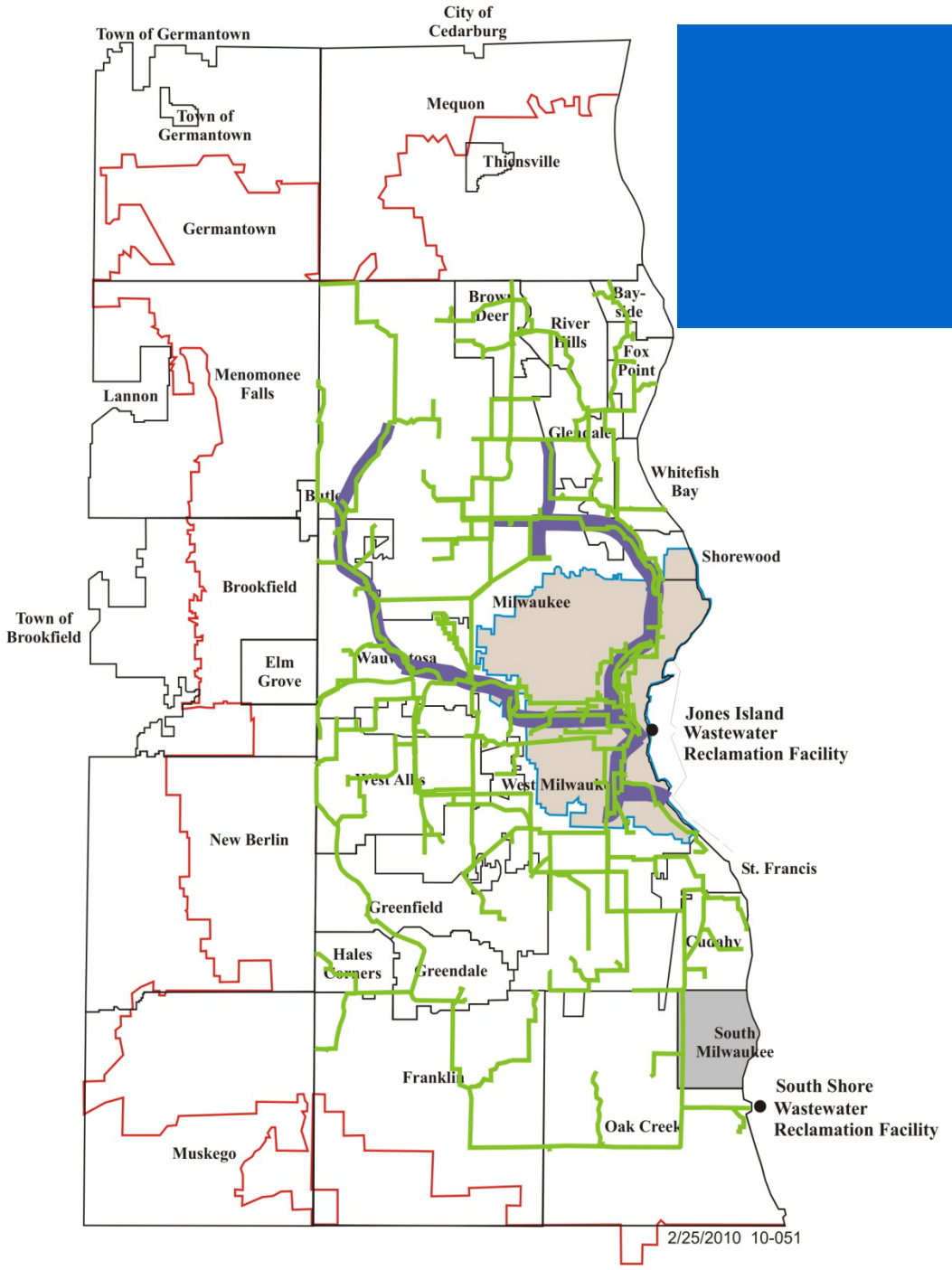
Kevin Shafer P.E.

Sewers

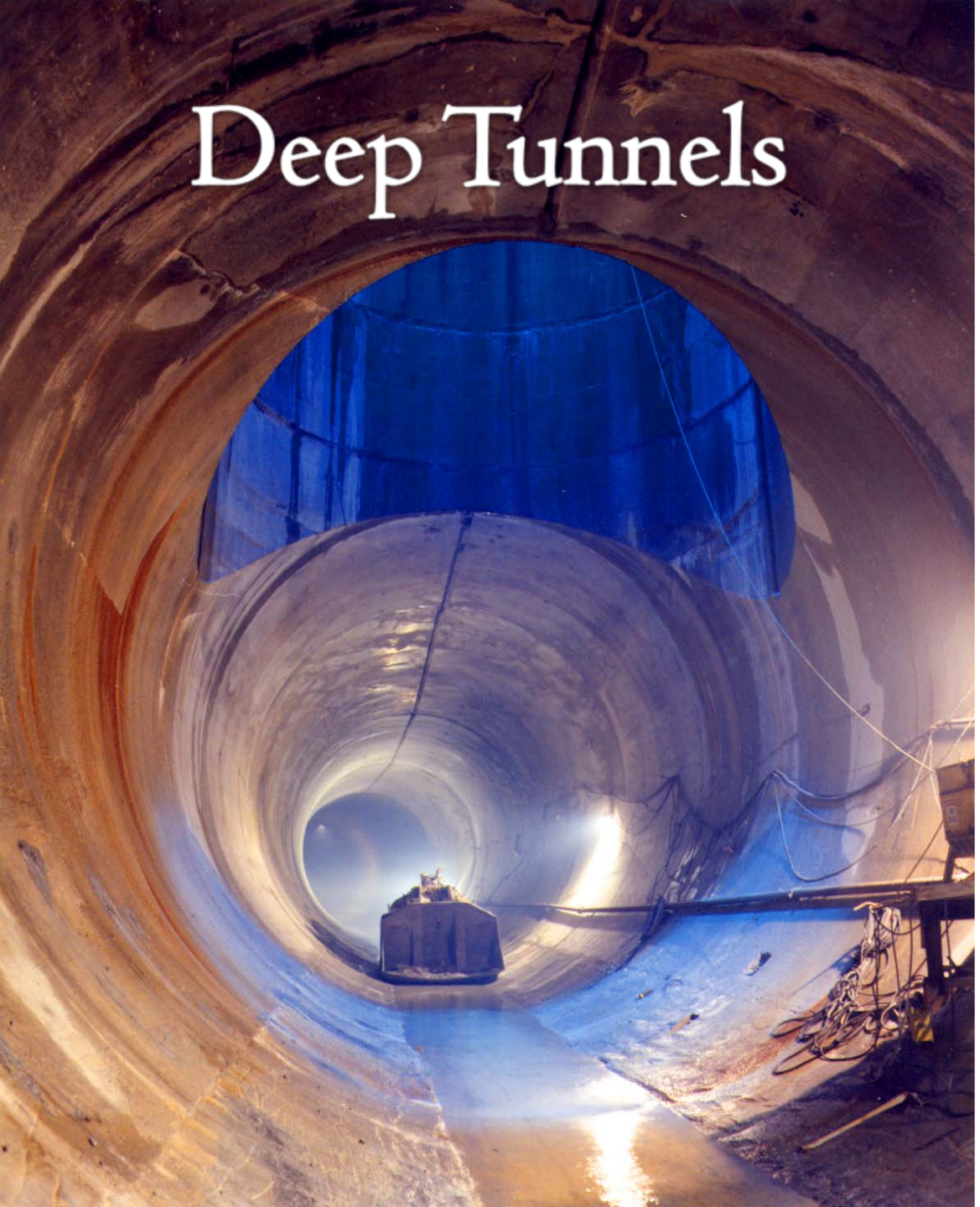
300 Miles
MMSD Sewers

3,000 Miles
Municipality Owned Sewers

3,000 Miles
Private Laterals



Deep Tunnels



300 Feet
Below ground

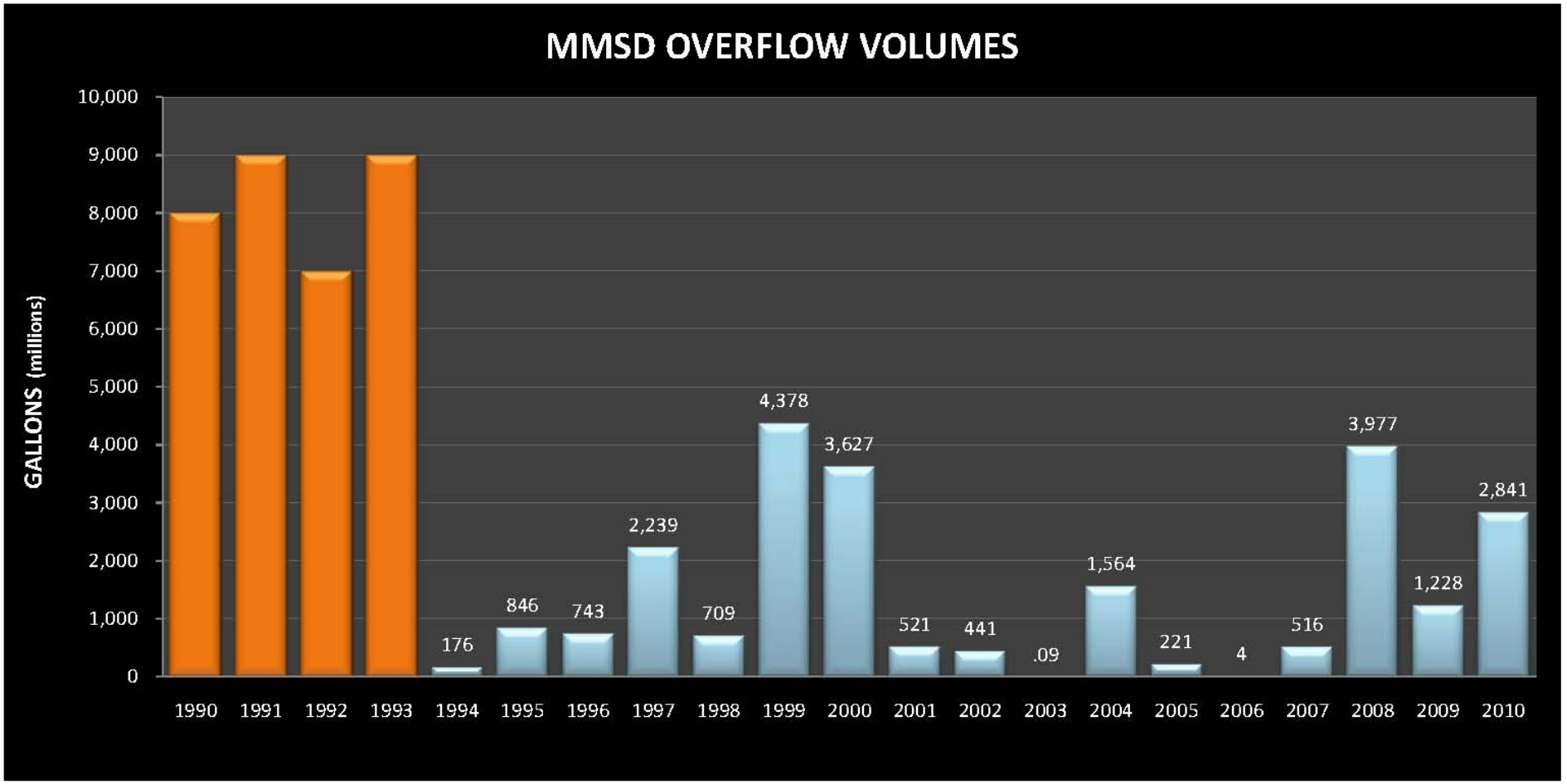
521 Million
Gallons of Storage

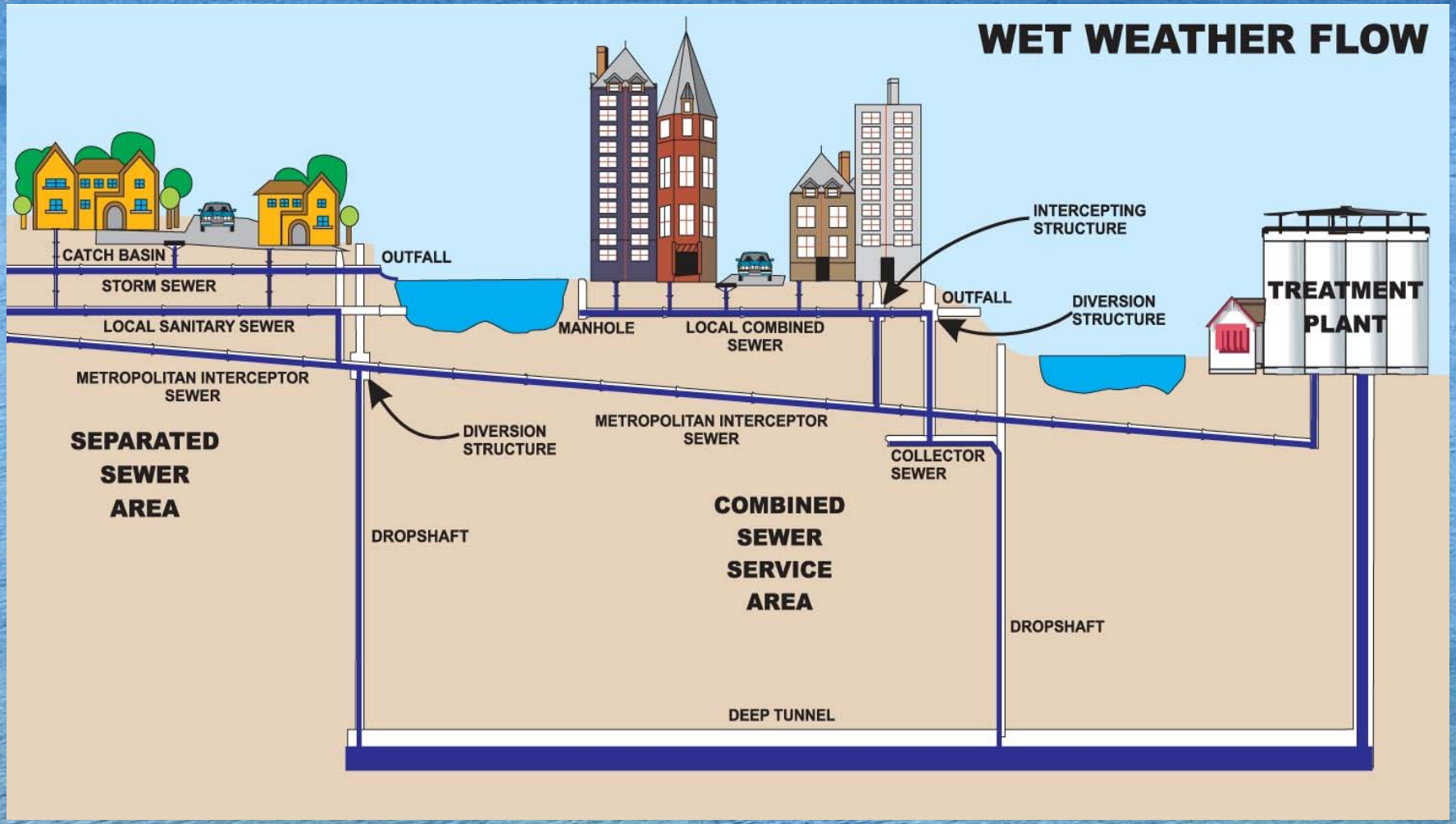
28.5 Miles
Long

17- to 32-feet
In Diameter

Designed to minimize basement backups and for 1-2 overflows per year.

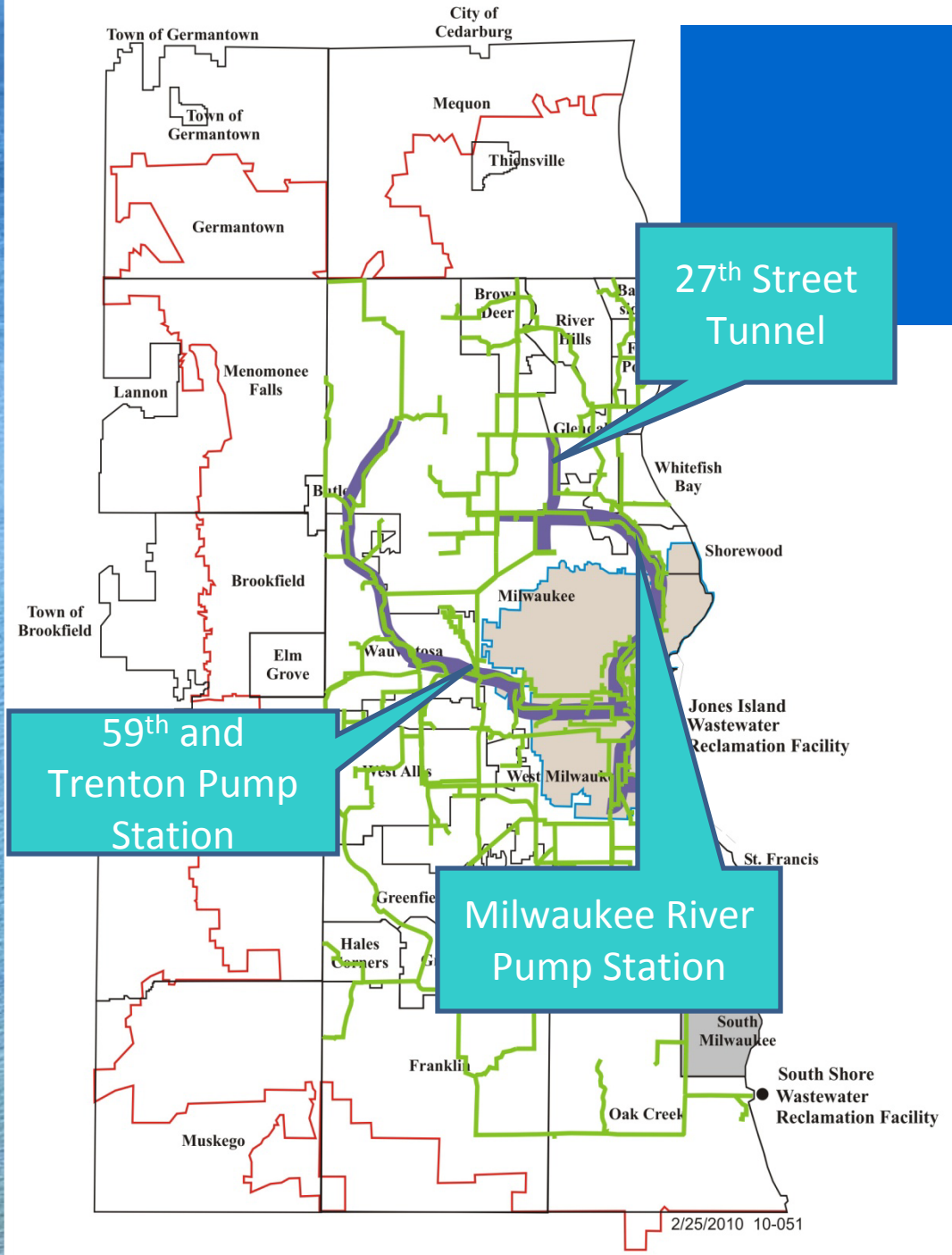
And it is working!




WET WEATHER FLOW
CATCH BASIN
OUTFALL
STORM SEWER
LOCAL SANITARY SEWER
METROPOLITAN INTERCEPTOR SEWER
SEPARATED SEWER AREA
DIVERSION STRUCTURE
MANHOLE
LOCAL COMBINED SEWER
METROPOLITAN INTERCEPTOR SEWER
INTERCEPTING STRUCTURE
OUTFALL
DIVERSION STRUCTURE
TREATMENT PLANT
COLLECTOR SEWER
COMBINED SEWER SERVICE AREA
DROPSHAFT
DROPSHAFT
DEEP TUNNEL

North Side Projects

- 27th Street Tunnel
- Two Overflow Pump Stations
  - 59th and Trenton
  - Milwaukee River Pump Station



Questions?