

**IAFSM Annual Conference**

# **Stormwater BMPs**

**As Part of a Strategy to Reduce Private Property I/I**

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# Agenda

- Inflow/Infiltration Causes and Results
- Eliminating I/I Sources
- Private Property I/I Removal Case Study
- Stormwater BMPs



## What is it?

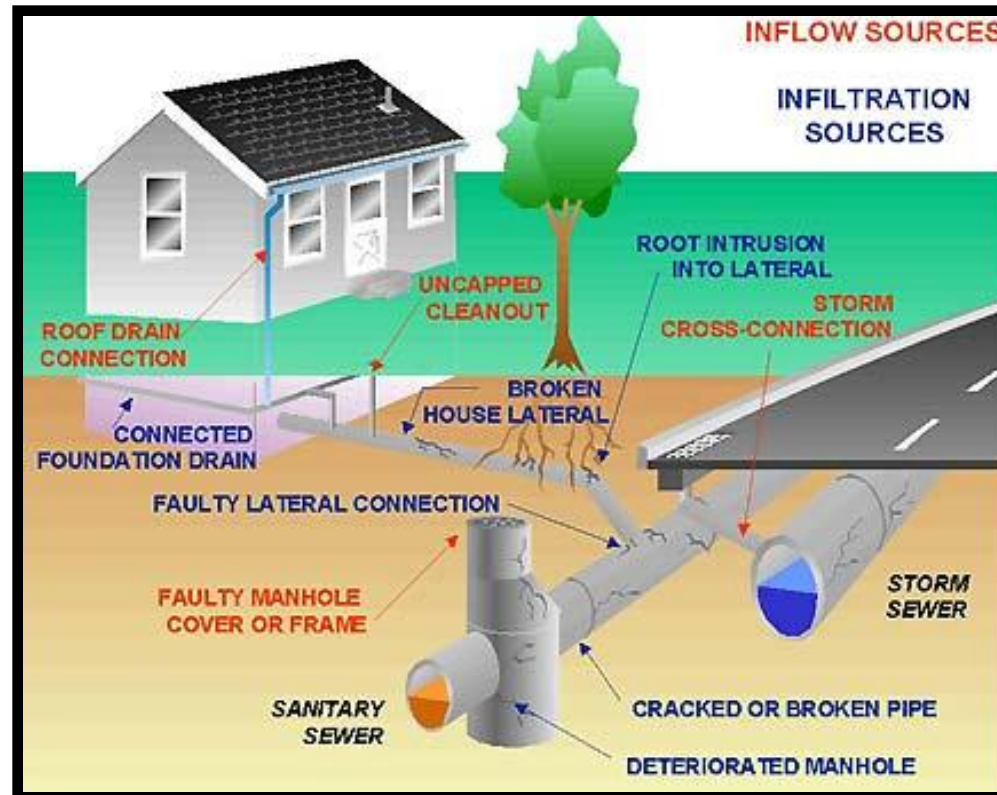
**Clear water that enters the sanitary sewer system**

- Stormwater runoff
- Groundwater





## Where does I/I get into the sanitary sewer system?

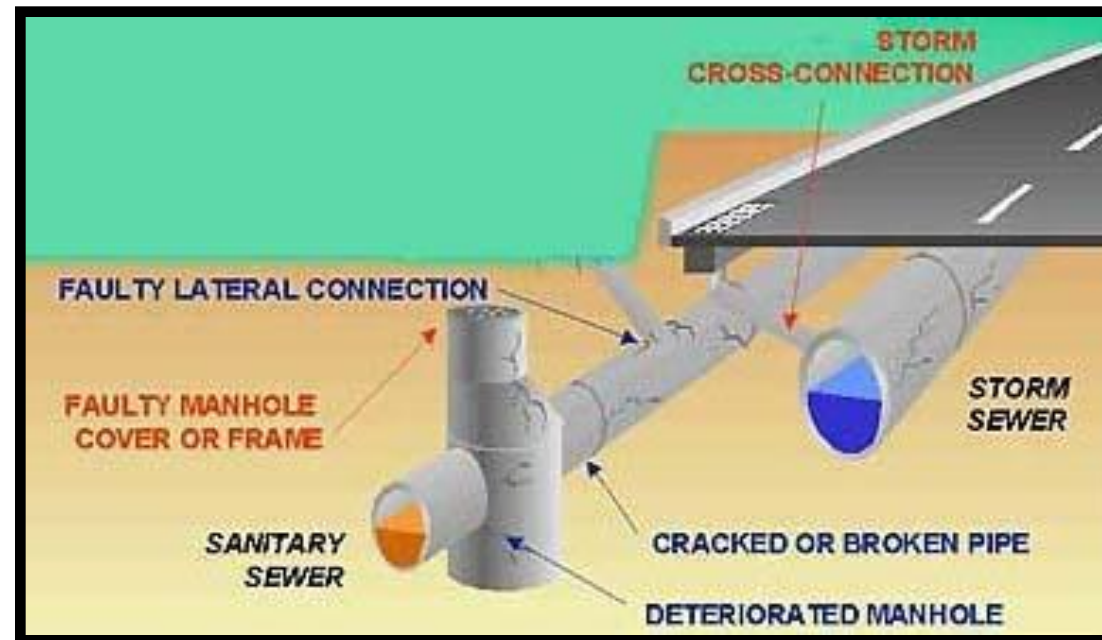


# Infiltration & Inflow (I/I)



## Public Sources

- Pipe defects and joints
- Manhole defects and lids
- Cross connections (direct connection)

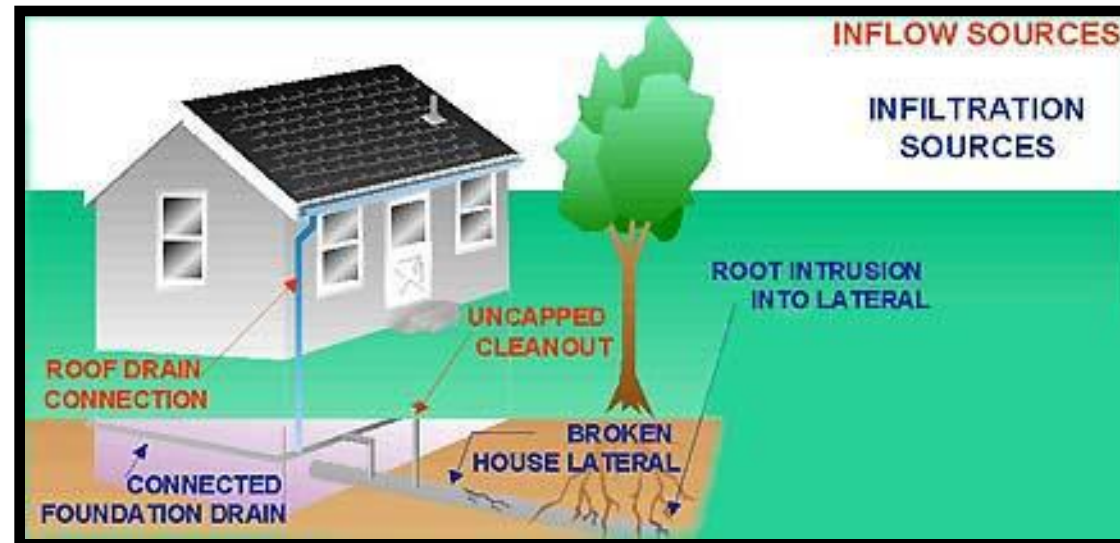


# Infiltration & Inflow (I/I)



## Private Sources

- Damaged service laterals
- Illegally connected sump pumps, foundation drains and downspouts (direct connections)
- Uncapped cleanouts





## Results

- Basement Backups
- Sanitary Sewer Overflows
- Reduces Reserve Capacity



## Regulations

- CMOM | NPDES
- MWRD | WMO

# Eliminating Sources of I/I on Public Property



- Find sources
  - Flow monitoring
  - Cleaning & Televising
  - Manhole inspections
  - Smoke testing
  - Dye testing
- Prioritize source removal
- Tools
  - Sewer lining
  - Manhole lining
  - Point repair
  - Grouting
  - Disconnect Illicit Connections



# Eliminating Sources of I/I on Private Property



- A typical 8 inch sanitary sewer, which can serve over 300 residences without overflows or basement back-ups, if only sewage is connected to the pipe, can serve only 10 residences without overflows or basement back-ups if sewage is combined with 10 sump pumps or foundation drains
- Removing 30 private sump pumps (~ \$150K) has the same system-wide benefit as rehabilitating 40K ft of sanitary sewer (~\$2M)
- Require source removal
  - Increases sanitary sewer capacity
  - Causes local drainage problems

# Downers Grove Sanitary District Background

- Special unit of local government
- Responsible for wastewater collection and treatment
- Operates 237 miles of public sewers
- Operates 9 pumping stations
- Operates one WWTF rated at 11 MGD
- 20 square mile service area
- Western suburbs of Chicago, Illinois
- 21,062 building connections
- Serves approximately 62,000 people



# DGSD Programs: I/I Removal



## I-H-9 Flow Basin

- 188 Building connections
- Approx. 8,300 LF of sewer and 32 manholes

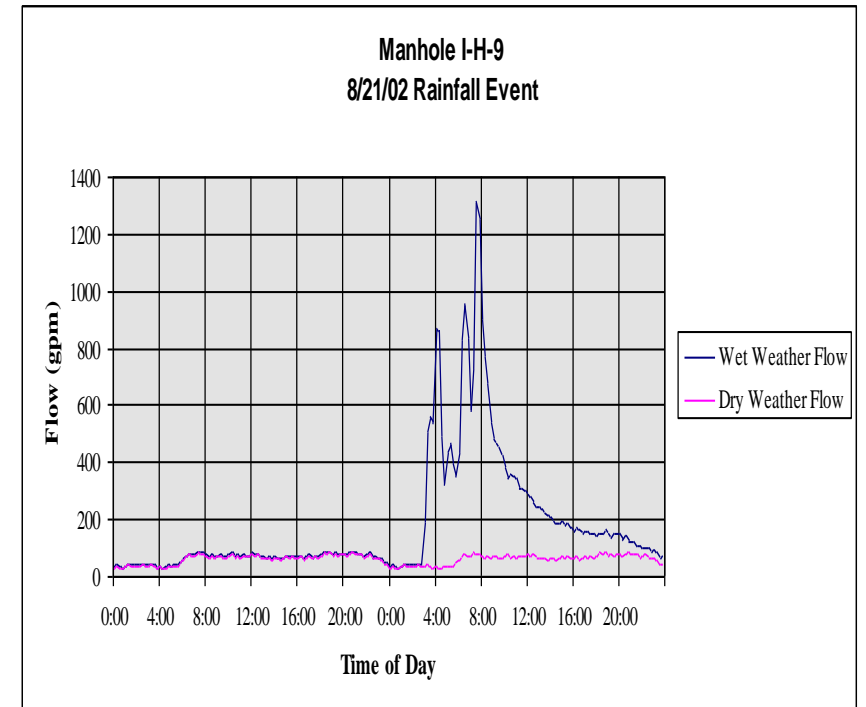
## Flow Data

- 60 gpm ADF to 1,200 gpm peak

## Preliminary SSES work and results

- Smoke testing
- Flood testing
- Small amount of I/I identified

Inadequate storm drainage



# DGSD Programs: I/I Removal

- I-H-9 Flow Basin
- Private Property I/I
- Notice to Homeowners
- Schedule inspection
- Identify defects in sanitary service
- Identify I/I sources
- Videos
- Inspection form

**BUILDING INSPECTION FORM**

INSPECTOR NAME \_\_\_\_\_ COMPLETED \_\_\_\_\_  
 ADDRESS \_\_\_\_\_ MET. HOUSE \_\_\_\_\_  
 PHONE NUMBER \_\_\_\_\_ PERMITS ENTRY \_\_\_\_\_  
 OWNER NAME (IF DIFFERENT) \_\_\_\_\_ SUCRANT \_\_\_\_\_  
 OWNER PHONE (IF DIFFERENT) \_\_\_\_\_ OTHER \_\_\_\_\_

DATE \_\_\_\_\_ TIME \_\_\_\_\_

INFESTION CREW  
 BUILDING TYPE (GARAGE) (BAY) (PICKUP) (TRUCK) (MTR) (COMM) (INDUST) (SCHOOL) (CHURCH)  
 UPSTREAM MANHOLE # \_\_\_\_\_ DOWNSTREAM MANHOLE \_\_\_\_\_

**INDOOR INSPECTION**

**A Sewer Sump Pump**  
 1 Sump Pump Exists \_\_\_\_\_ Y N  
 2 Number of Pipes Entering Pit \_\_\_\_\_  
 3 Discharge Location \_\_\_\_\_  
 4 Sump not sealed \_\_\_\_\_  
 5 Sump oil separator \_\_\_\_\_  
 6 Drain/Overflow on sump pit \_\_\_\_\_

**B Sanitary Sump Pump**  
 1 Sump Pump Exists \_\_\_\_\_ Y N  
 2 Number of Pipes Entering Pit \_\_\_\_\_  
 3 Foundation Drain Connected \_\_\_\_\_  
 4 Pipe Material \_\_\_\_\_  
 5 Pit Material \_\_\_\_\_  
 6 Condition of Pit \_\_\_\_\_  
 7 Lat Plumbing/Patients Draining to Sump \_\_\_\_\_  
 8 Other \_\_\_\_\_

**C Floor Drain**  
 1 Number of Drains \_\_\_\_\_  
 2 Drain Material \_\_\_\_\_  
 3 Drain Condition \_\_\_\_\_  
 4 Evidence of Leakage \_\_\_\_\_  
 5 Other \_\_\_\_\_

**D Down Service Date (Check One)**  
 1 Service Lines Basement Floor \_\_\_\_\_ Y N  
 2 Overhead Sewer \_\_\_\_\_ Y N  
 3 Part Basement/Service / Part Overhead Sewer \_\_\_\_\_ Y N

**E Foundation Data**  
 1 Seal on Grout \_\_\_\_\_ Y N  
 2 Crack Space \_\_\_\_\_ Y N  
 3 Full Earth Basement \_\_\_\_\_ Y N  
 4 Drains Drain Basement (Less than 4") \_\_\_\_\_ Y N  
 5 Combination - specify type \_\_\_\_\_

**F Outside Cleanout**  
 1 Outside Cleanout Exists \_\_\_\_\_ Y N  
 2 Location \_\_\_\_\_  
 3 Height above ground surface \_\_\_\_\_  
 4 Condition \_\_\_\_\_  
 5 Evidence of Leakage \_\_\_\_\_

**G Catch Basins**  
 1 Catch Basin Exists \_\_\_\_\_ Y N  
 2 Discharge Location \_\_\_\_\_  
 3 Purpose \_\_\_\_\_

**H Yard Drain**  
 1 Yard Drain Exists \_\_\_\_\_ Y N  
 2 Discharge Location \_\_\_\_\_

**I Sewer depth at nearest manhole \_\_\_\_\_  
 J Other \_\_\_\_\_**

**INTERVIEW**  
 A Hours of Past or Present Backflow \_\_\_\_\_  
 B How long have they lived in the home \_\_\_\_\_  
 C Have they ever experienced a sanitary sewer backup? \_\_\_\_\_  
 If yes, answer to question C, if no, proceed to question D.

**Sanitary Service**  
 D Does the water clear and odorless? \_\_\_\_\_  
 E When did the water come from? \_\_\_\_\_  
 F How often do the sanitary fixtures back up? \_\_\_\_\_  
 G How long did the backup last? \_\_\_\_\_  
 H Did it rain on the sanitary fixture or during the backup? \_\_\_\_\_  
 I How deep was the backup? \_\_\_\_\_  
 J How much of the basement was flooded? \_\_\_\_\_  
 K Do they call the DSD to report the backup? \_\_\_\_\_

**Roofwater Drainage**  
 L Have they ever experienced basement flooding (interior)? \_\_\_\_\_ Y N  
 M Average Number of times per year \_\_\_\_\_  
 N Also? \_\_\_\_\_  
 O Source of flooding \_\_\_\_\_  
 P How often do sump pumps run? \_\_\_\_\_

**HOUSE DIAGRAM**

Items to Label:  
 1 Sump Pump Pit Location  
 2 Sanitary Sump Pump Location  
 3 Location and Distance of Water and Sanitary Services  
 4 Location and Distance of Storm Sump Pump Discharge





# DGSD Programs: I/I Removal

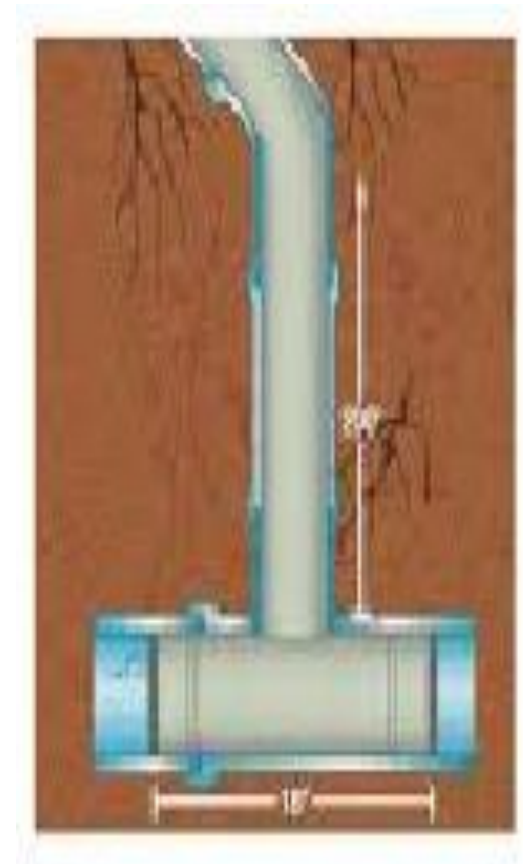
- I-H-9 Flow Basin
- Line all mains
- All liners passed an air-test before the laterals were reinstated
- Steam cured liners failed air-test, had to be re-lined
- Water cured liners passed the air test the first time



# DGSD Programs: I/I Removal



- **I-H-9 Flow Basin**
- Private Property Rehab
- Selection of service rehab process
  - Non-leaking connection at main
  - Minimize disruption
  - Ability to air test
  - Rehab from main to transition at the building
- Awarded to Performance Pipelining (T-liner)





## I-H-9 Flow Basin

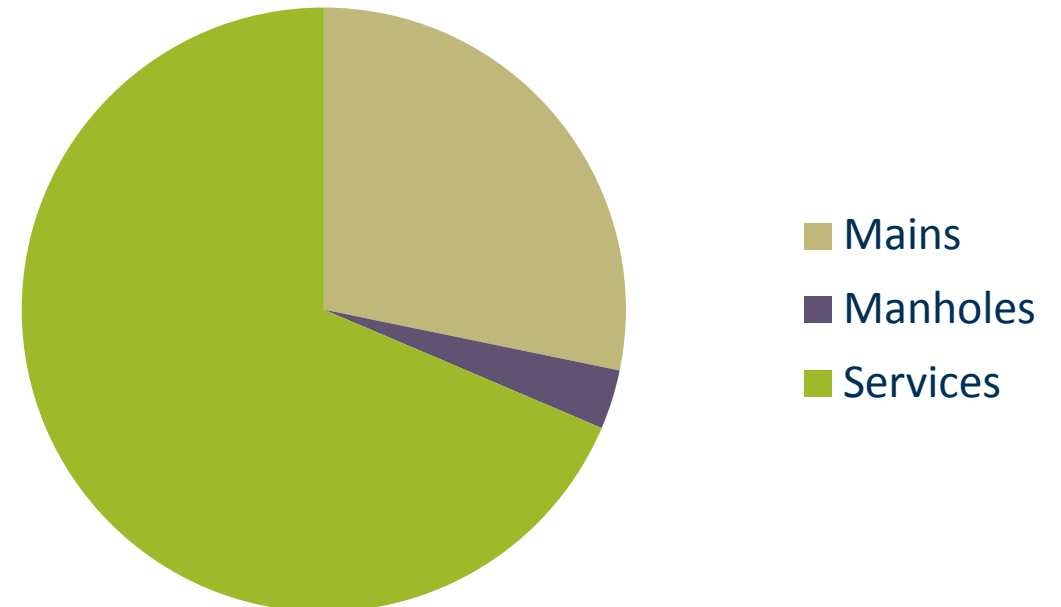
Total Cost - *Approx.* \$1,500,000

– Mains - \$418,000

– Manholes - \$47,000

– Services - \$1,013,000

Rehab costs

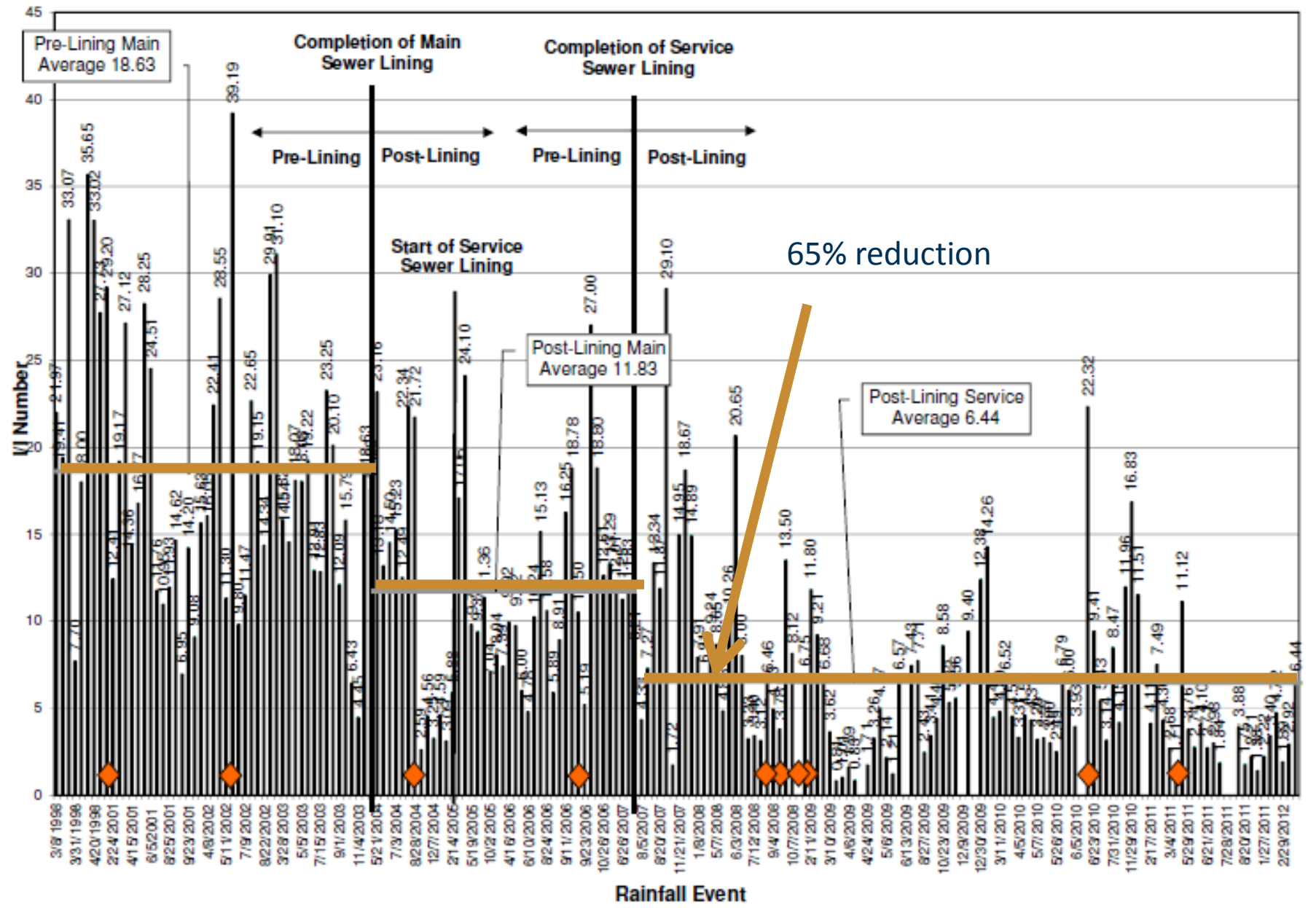




# Results

## Downers Grove Sanitary District Flow Meter Data Summary - 1-H-9 Flow Basin I/I Comparison

◆ Overflow Occurred



# DGSD Programs: I/I Removal



- **I-H-9 Flow Basin**
- 65% I/I Removal
- Reduce SSOs from 1.4/yr to 0.5/yr
- Reduce peak by 2,100 gpm - \$679/ gpm





# **Stormwater Best Management Practices (BMPs)**



# Stormwater BMPs for Private Property



**Rain Gardens**

**Native Landscaping**

**Rain Barrels**

**Permeable Pavement**



# Other Types of Stormwater BMPs



- Infiltration Basins**
- Green Roofs**
- Stream Buffers**
- Manufactured Filters**



# Types of BMP Incentive Programs



- 1. Financial Incentive**
- 2. Distribution**
- 3. Awards and Recognition**
- 4. Regulatory**

# 1. Financial Incentive Programs



## Sustainable Backyards Program – City of Chicago

### Resident Rebates

- Trees ( $\leq$ \$100)
- Native Plants ( $\leq$ \$60)
- Compost Bins ( $\leq$ \$50)
- Rain Barrels ( $\leq$ \$40)

### I&M Workshops



# 1. Financial Incentive Programs



## Rain Garden Cost Share – Village of Glenview, IL

- Reimburse 50% ( $\leq$ \$1000)
- Village Guidelines
- Drainage Benefit





# 1. Financial Incentive Programs



## Local Drainage Inspections – Village of Glenview, IL

- Residents Pay 50% of \$800
- Engineer Site Visit
- Report
  - Recommendations
  - Cost Estimates
- List of Contractors
- Permit Voucher



## 2. Distribution Programs



### Rain Barrel Program – MWRDGC

- Resident Cost = \$0-\$52
- Includes Delivery
- Available from MWRDGC or Participating Cities
- Installation Instructions on MWRDGC Website



## 2. Distribution Programs



### Rain Garden Program – City of Woodstock, IL

- Installation Guidelines for Residents
- Demonstration Sites



# 3. Awards and Recognition Programs



## Conservation@Home – The Conservation Foundation

### Free Site Specific Advice

- Native Landscaping
- Rain Barrels
- Organic Fertilizers
- Invasive Plants

### Landscape Certification



## 4. Regulatory Programs



### BMP Ordinance – Village of Lakewood, IL

- BMPs Required
  - R-2 Zoning District
  - $\geq 500$  sf New Impervious Surface
- Hierarchy
- FAQ
- BMP Profiles
- Maintenance Agreements



# Questions?

Sean O'Dell, PE

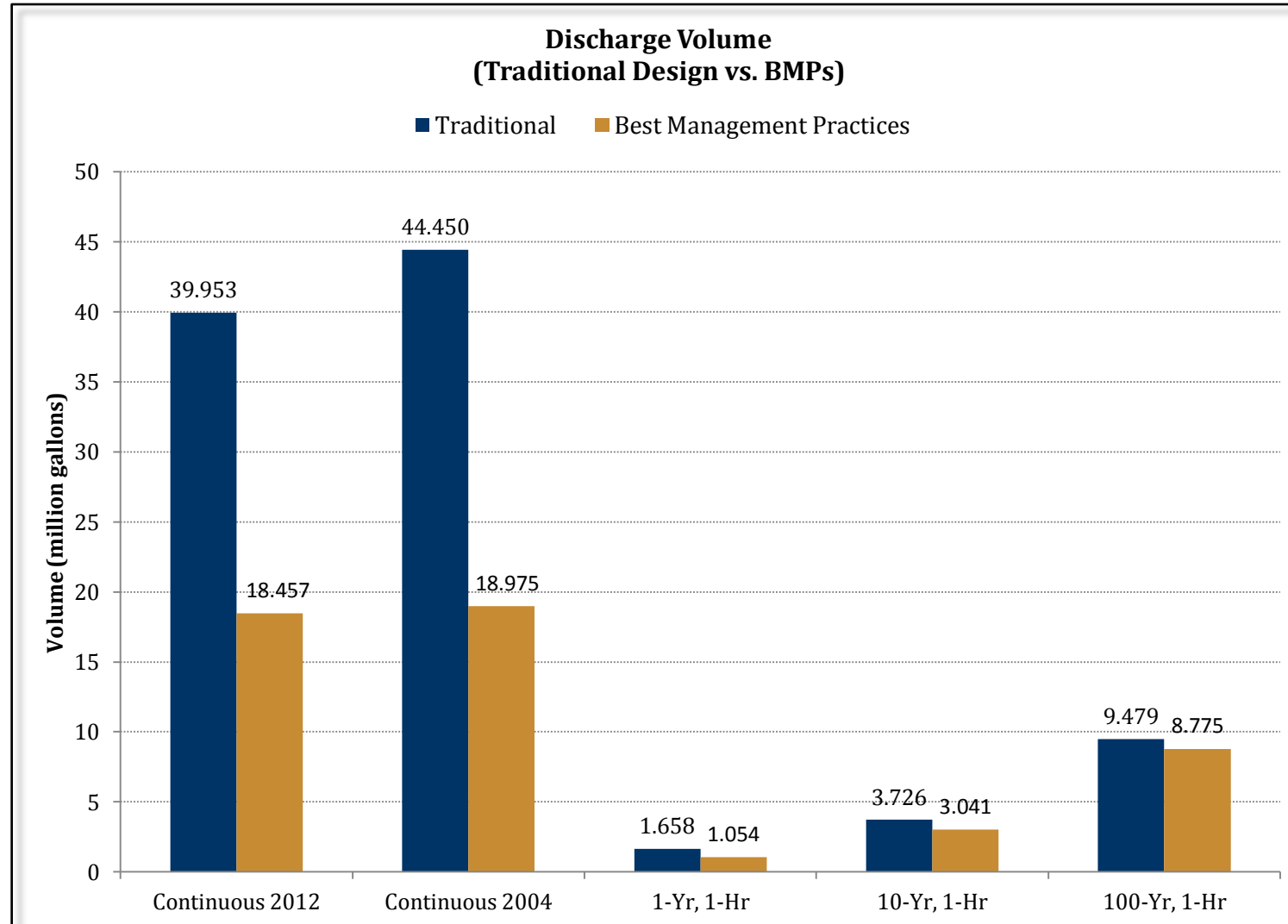
[sodell@baxterwoodman.com](mailto:sodell@baxterwoodman.com)

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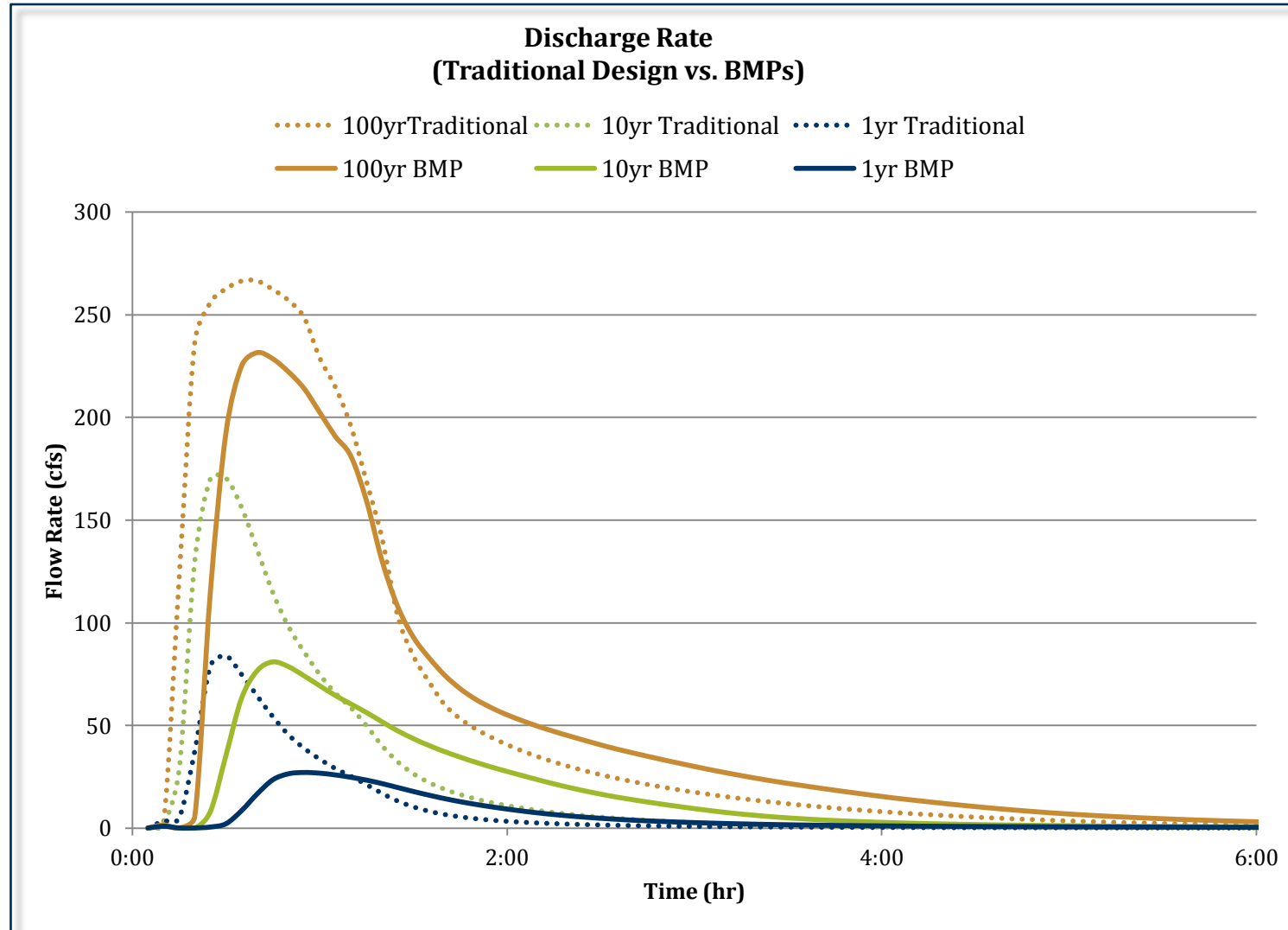
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# Expected Benefits of BMPs

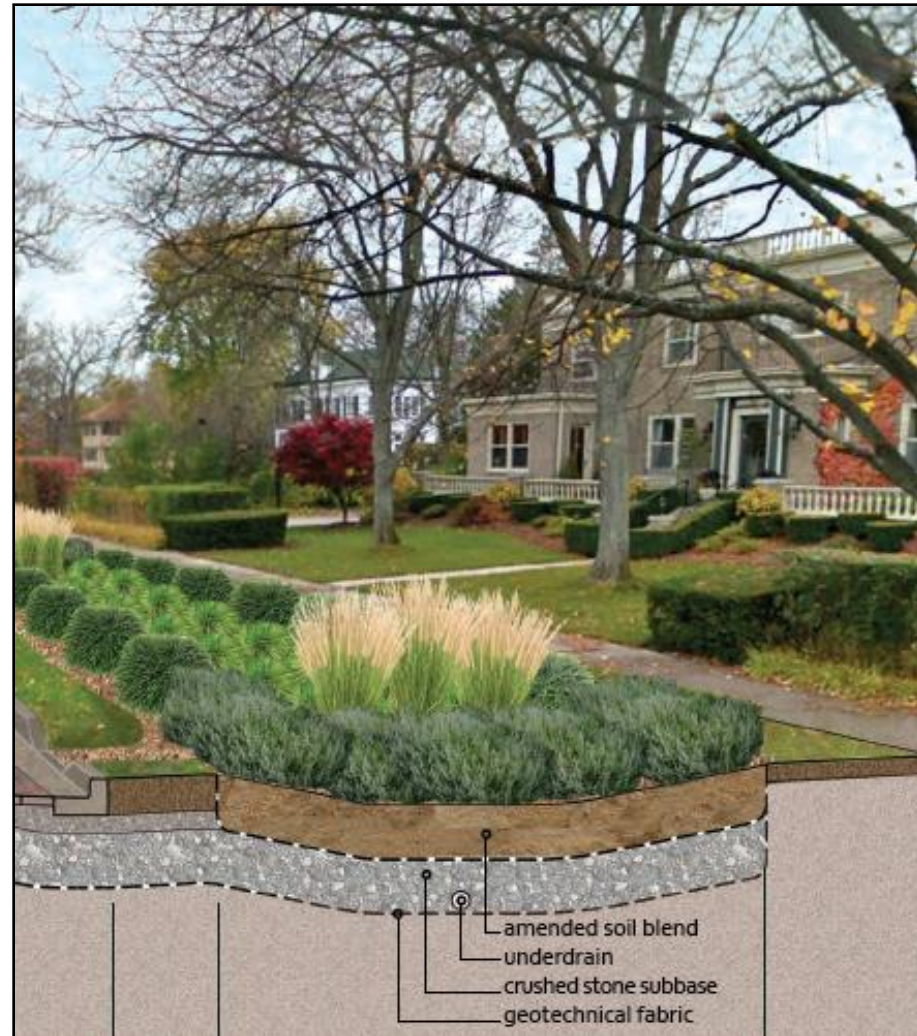
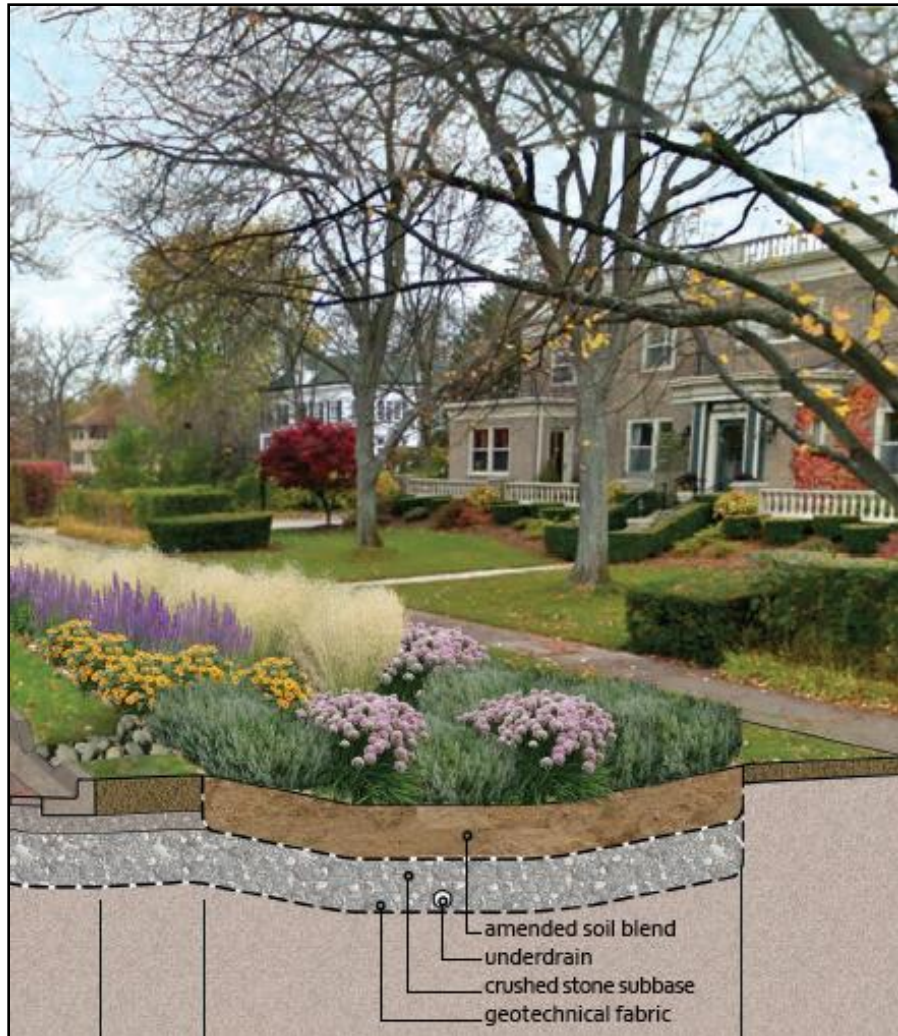


# Expected Benefits of BMPs

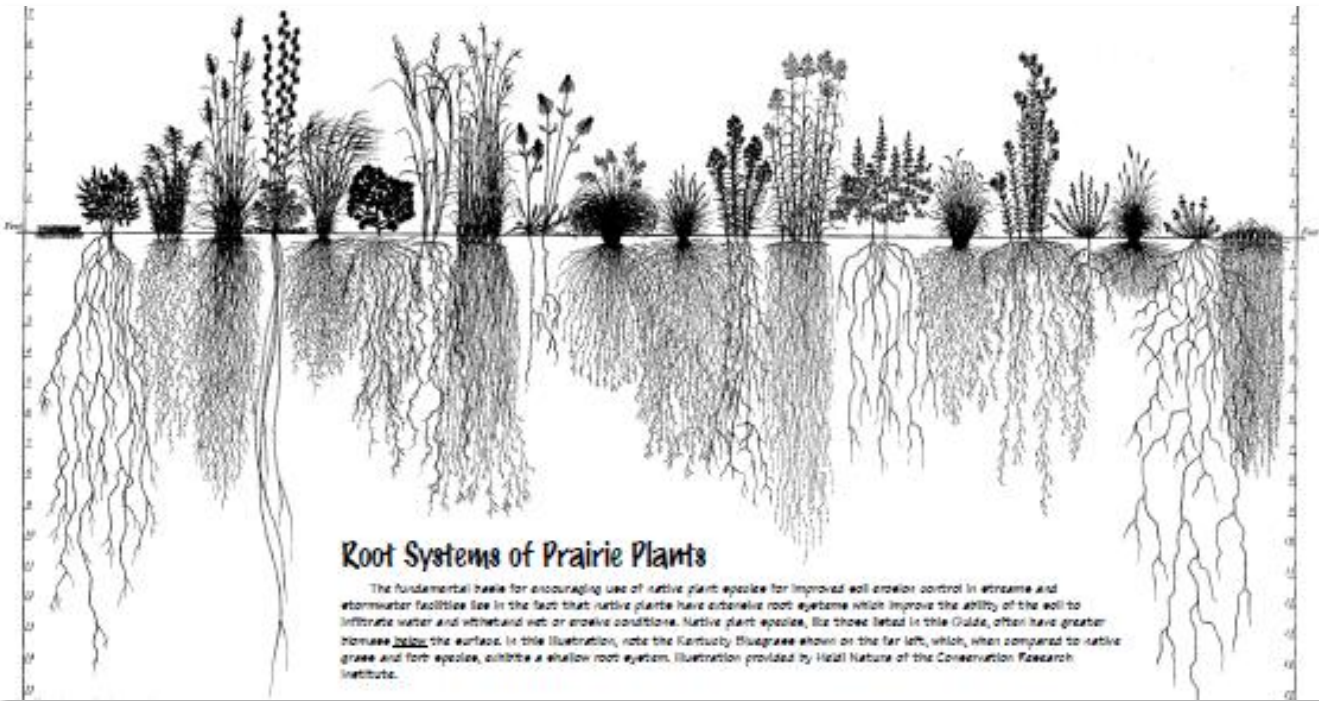




# Rain Gardens



# Native Landscaping



# Permeable Pavement

