



THE UNIVERSITY  
OF IOWA

College of Engineering



IOWA  
STORMCREW



# Our Team:



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# Outline:

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Project  
Statement

Area  
Breakdown

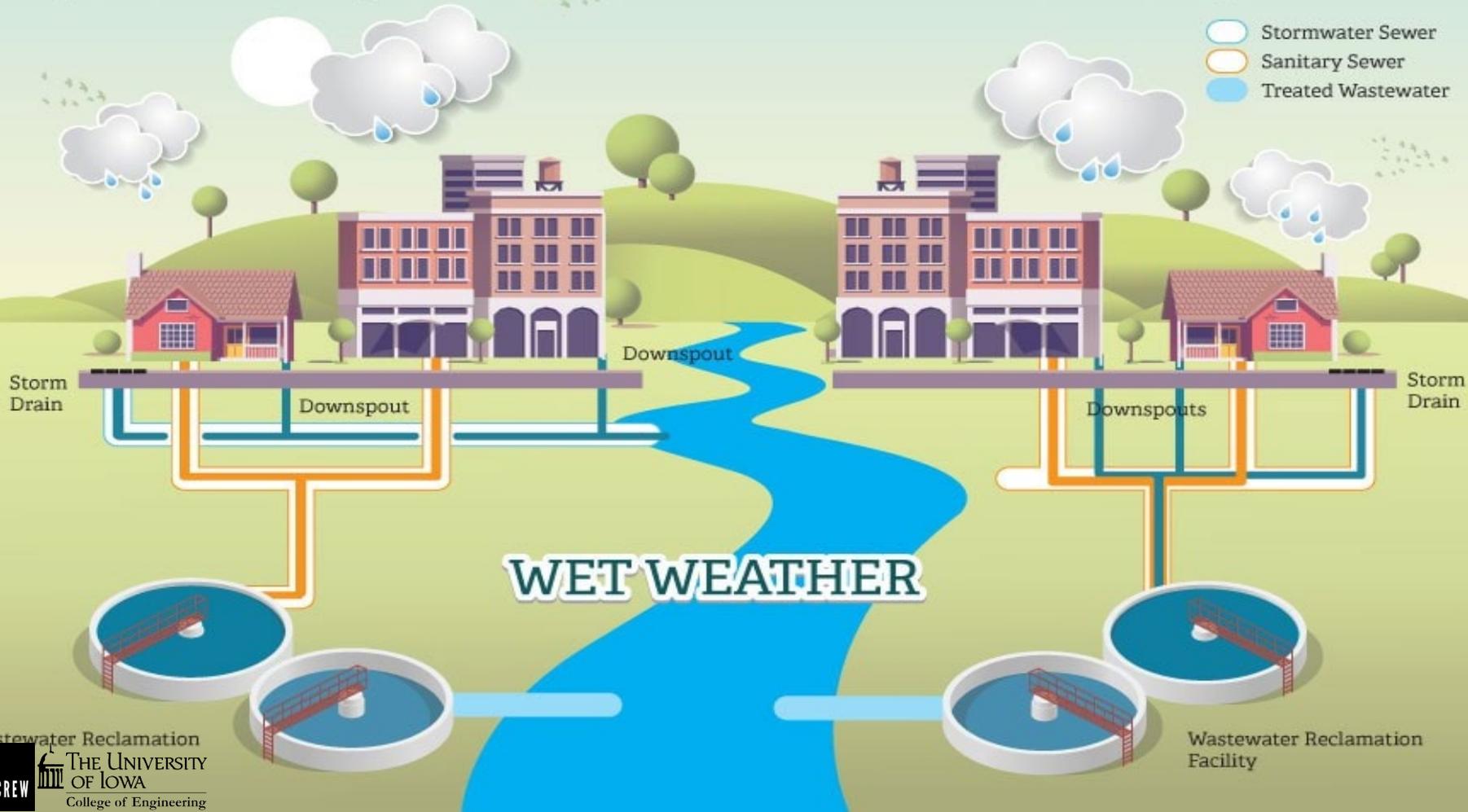
Solution  
Designs &  
Cost  
Estimate

Incentives

# Separate Sewer System

# Combined Sewer System

- Stormwater Sewer
- Sanitary Sewer
- Treated Wastewater



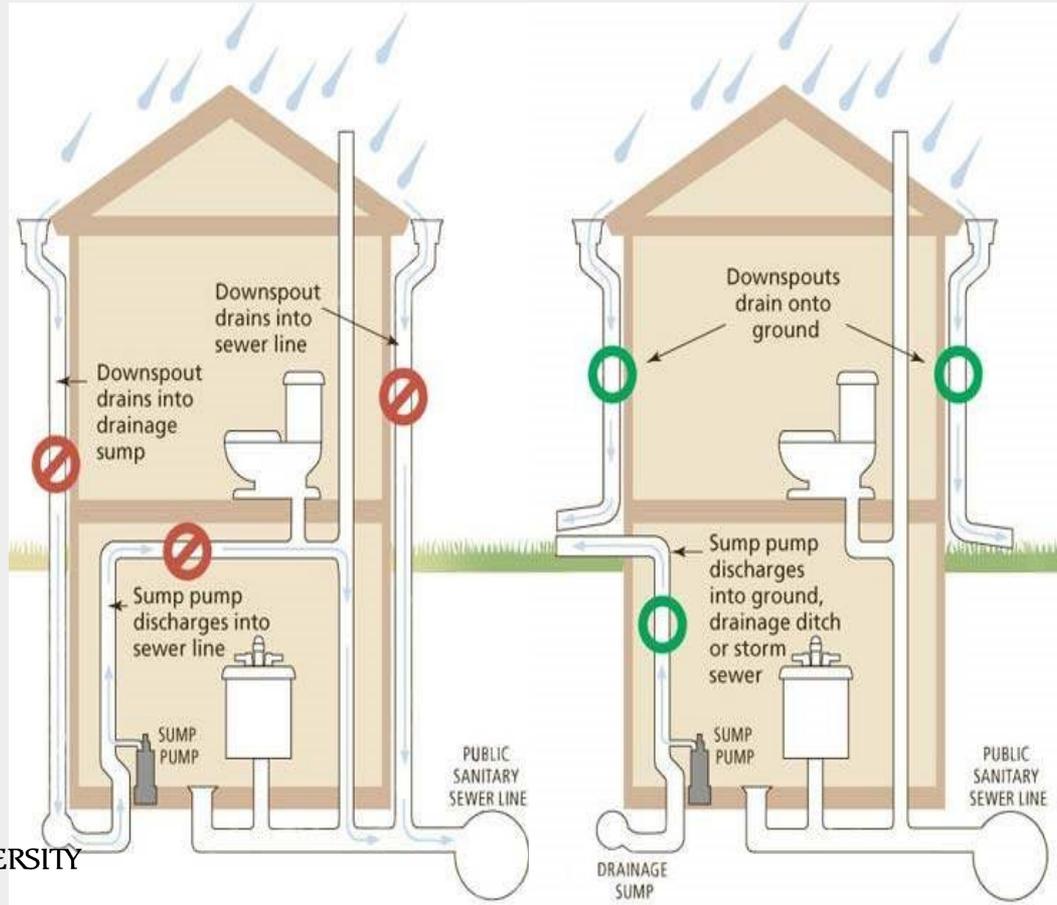
Wastewater Reclamation



THE UNIVERSITY OF IOWA  
College of Engineering

Wastewater Reclamation Facility

# Proper Sump Pump Connection:



# Problem Statement:

## Prevent sewer overflows and backups



# Solutions to Reroute Discharge:



Drainage tile

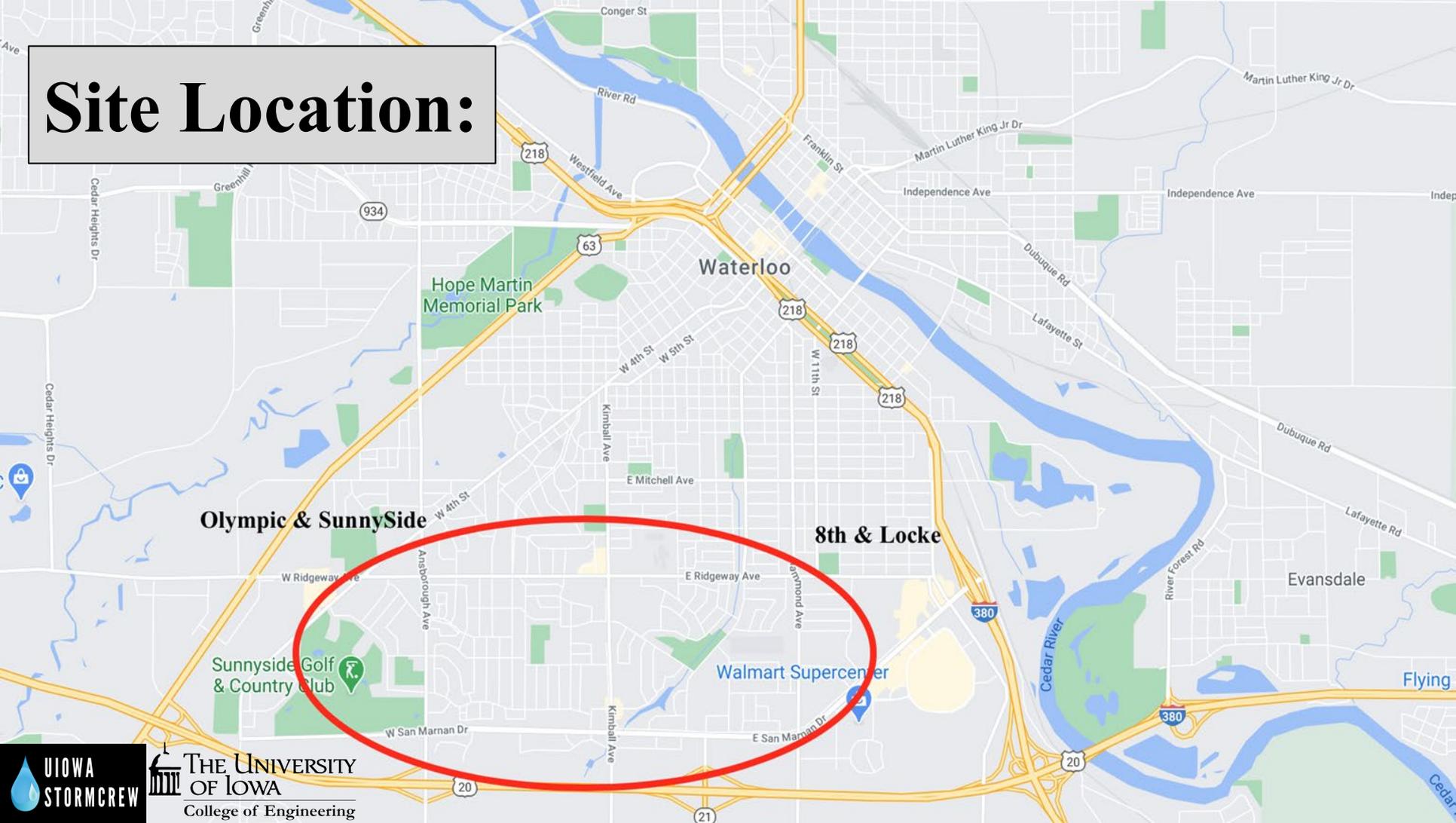


Rain gardens

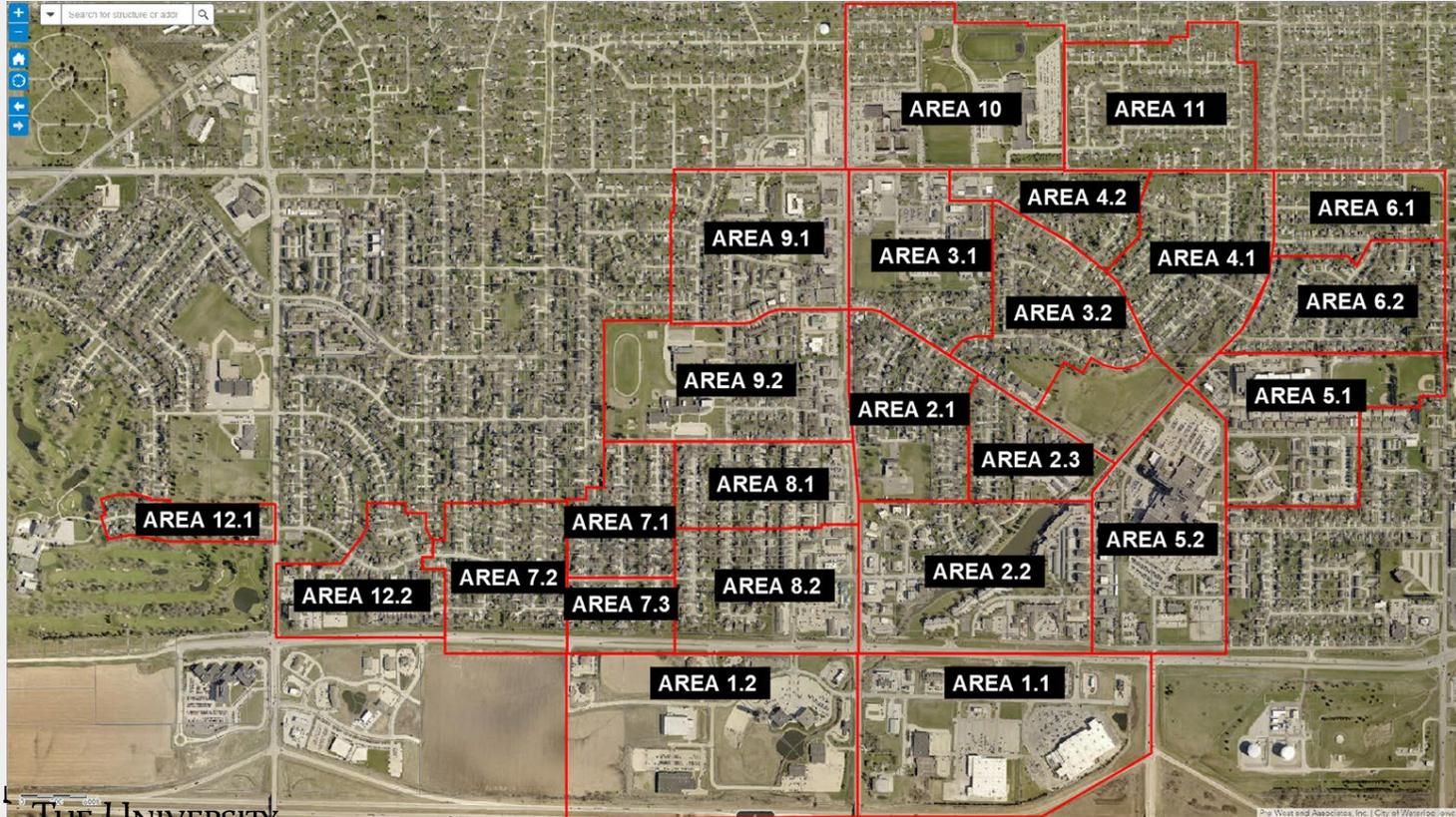


Nearby creek

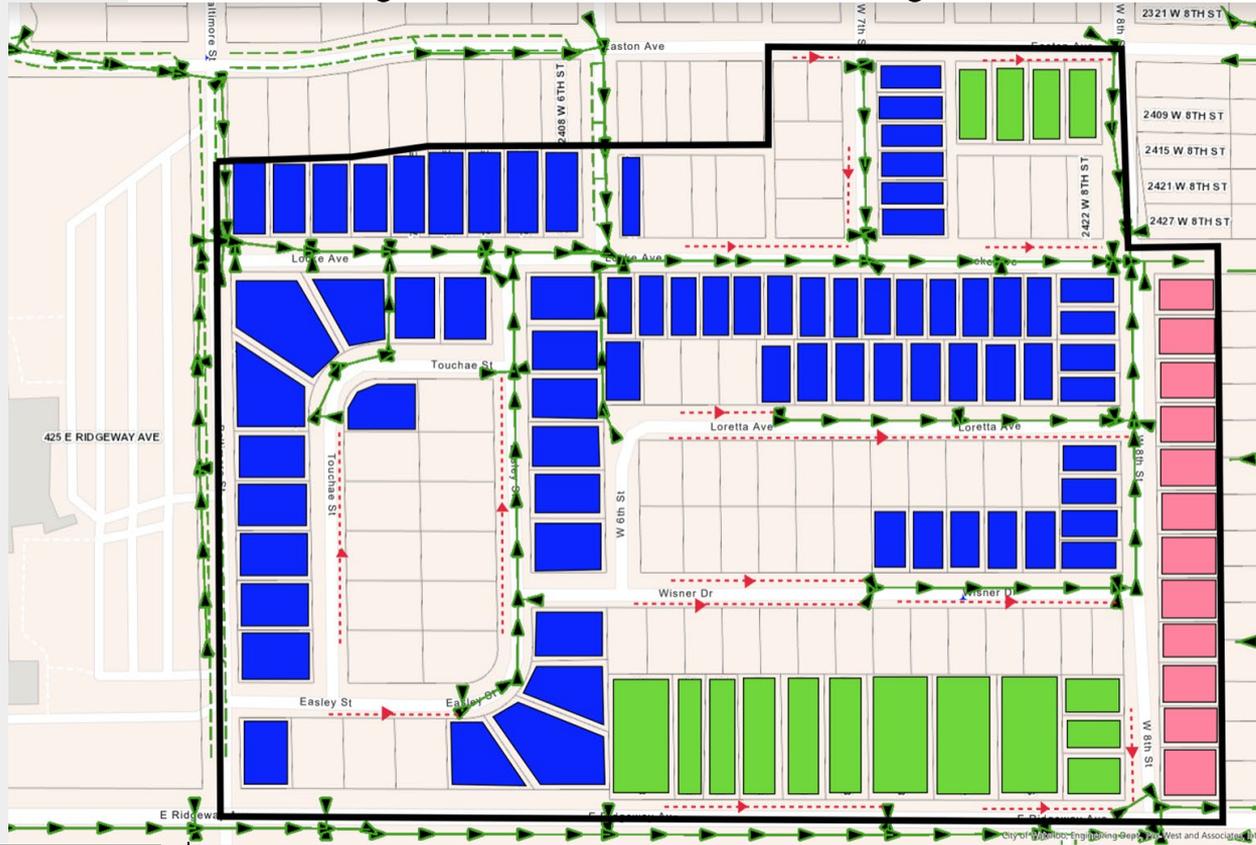
# Site Location:



# Area Breakdown:



# Block by Block Analysis



-  Existing infrastructure
-  Rain garden
-  Existing waterway
-  Drain tile
-  Existing storm sewer

Solution 1:  
Add  
drainage tile



# Drain Tile Design

## Materials:

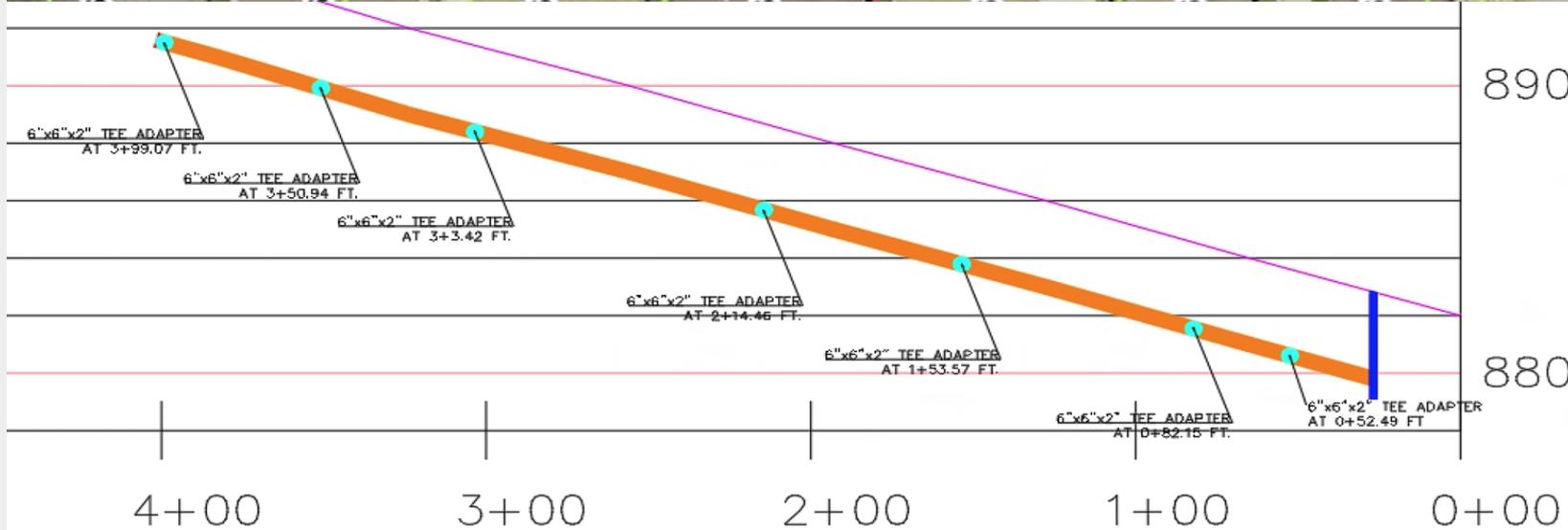
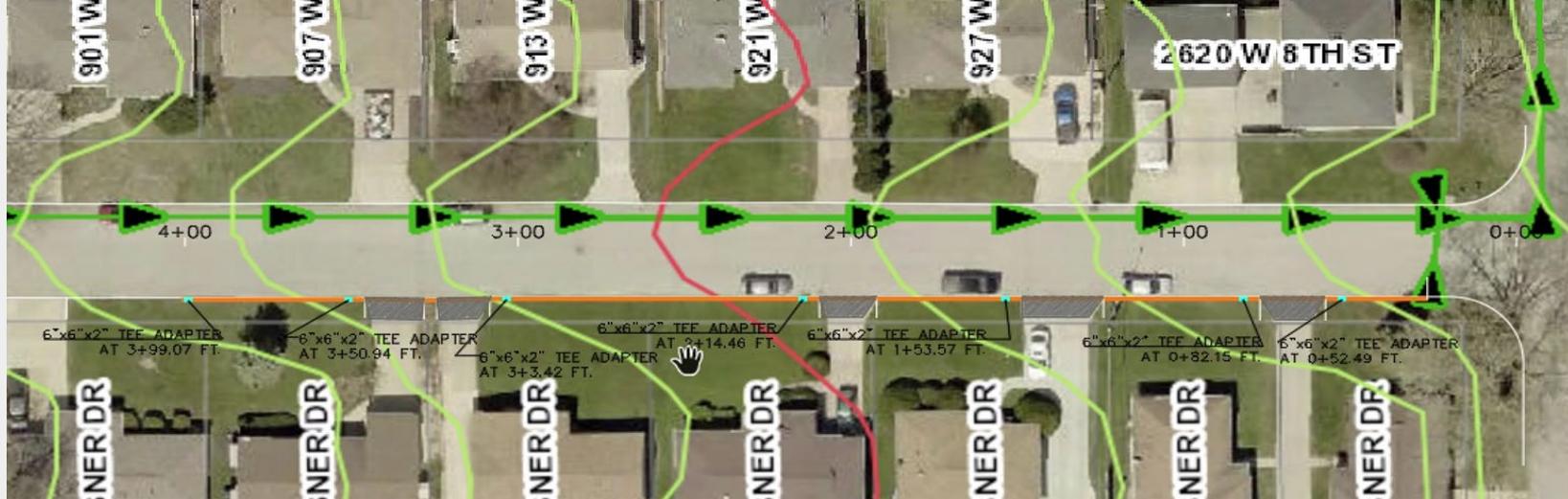
- 6" Dual Wall Corrugated & Perforated Drain Tile
  - ADS N-12, Hancor N-12, or Contech A-2000
- 6" to 2" Drain Tile "Tee" for Sump Pump Connection
- 6" "Tee" and "Wye" Adaptors to connect lines
- 2" Caps for easy property connection
- Rodent Guard / 6" Caps on outlet ends

## Standards:

- Capacity:
  - Sudas 2.B.3: 5 gallons per minute
  - Assuming minimum slope of 0.3%
  - 6" drain tile can handle 60 gpm
  - Drain Tile can handle 12 properties
- Positive slope

## Parameters:

- Drain tile 9" off of curb and 36" below ground level
- Sump Pump taps 5' from driveways or in absence centered on property





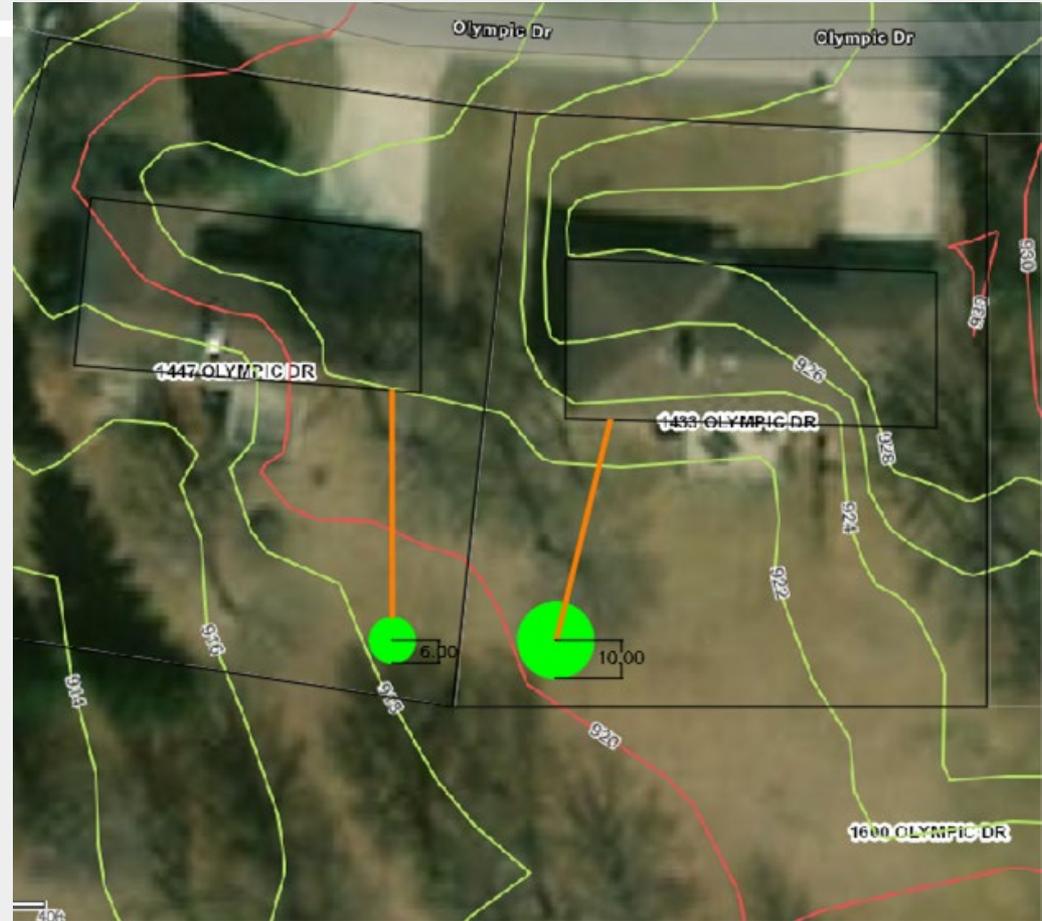
Solution 2:  
Implement  
Rain  
Gardens

# Rain Garden Designs

-Rain garden on the left has an area of 113 ft<sup>2</sup> and will take in about 70 ft<sup>3</sup>

-Rain garden on the right has an area of 314 ft<sup>2</sup> and will take in about 196ft<sup>3</sup>

-Cost \$1-5 per square foot.



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## Standards:

- Must be 10 feet from the home's foundation.
- Minimum of 6 hours of sunlight.
- Slope between 1-12%, draining away from the home.

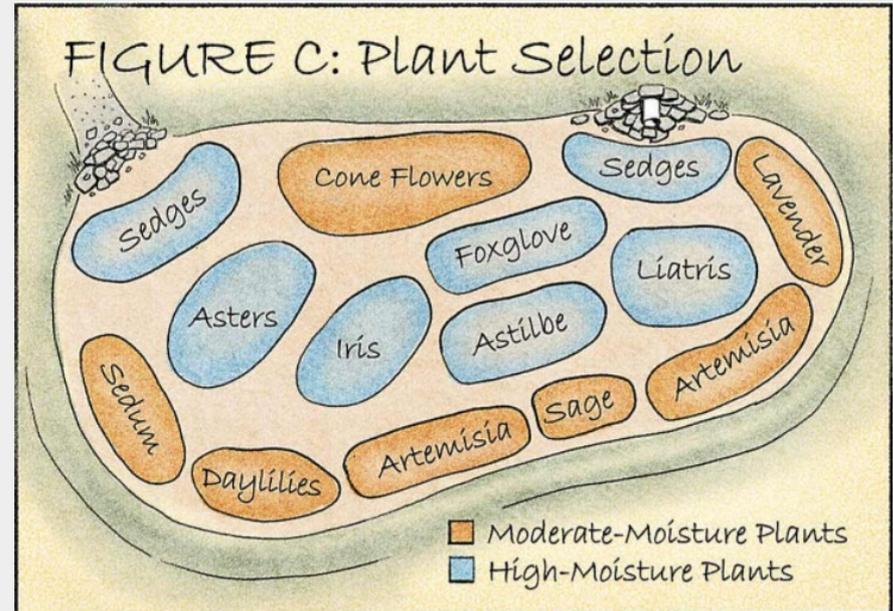
## Recommend:

- An area between 28-78 square feet (3-5 feet in diameter) for only connecting sump pump.
- An area between 78-314 square feet (5-10 feet in diameter) for sump pump and downspout connection.

## Materials:

- Soil and mulch
- Seeds/flowers
- 2" PVC pipe

## Example Outline:

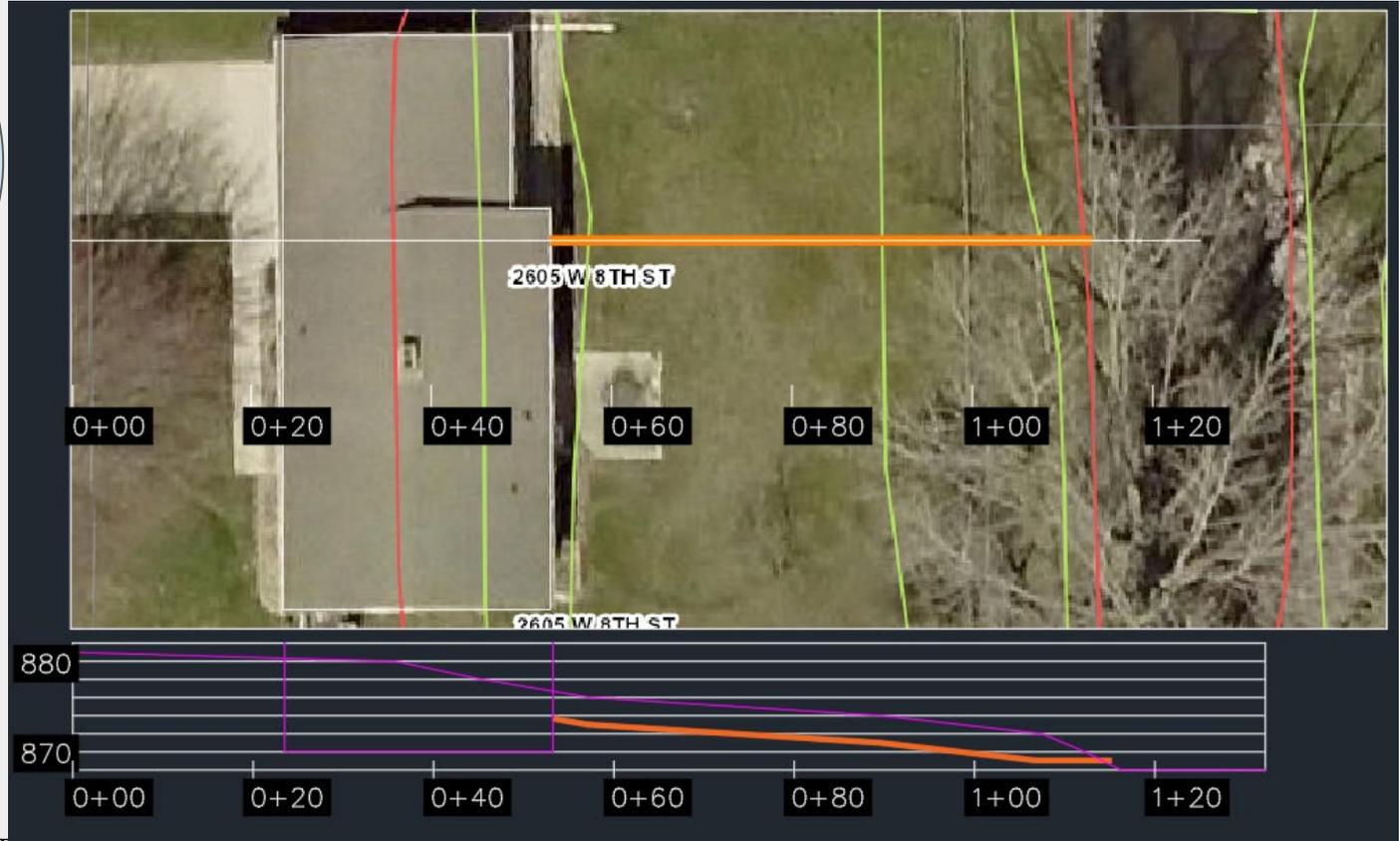




Solution 3:  
Guide  
discharge to  
nearby creek

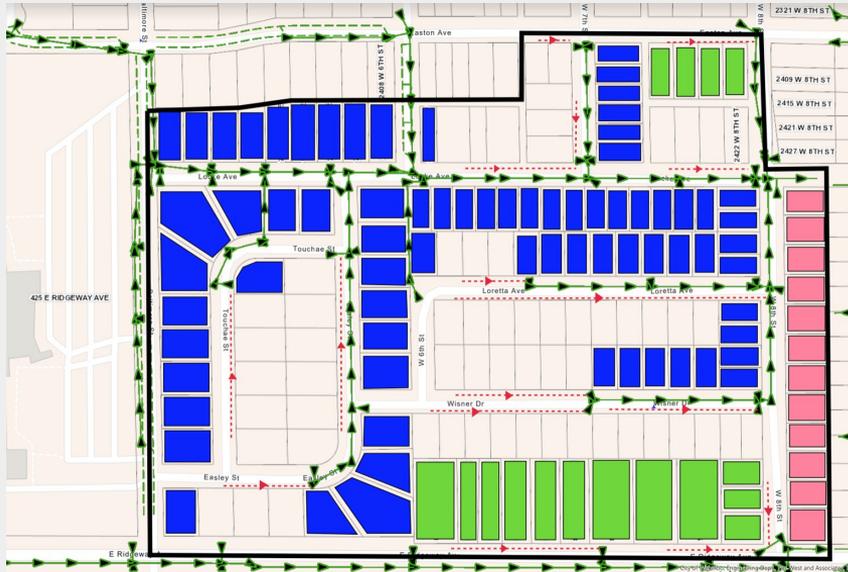
# Discharge to Waterway Design

- 2" PVC Pipe
- Rodent guard
- Positive slope



# Area Prioritization:

Area 11:



Area	Properties able to connect	Total Properties	Properties able to connect immediately
9.2	23	59	38.98%
7.1	28	71	39.44%
11	74	155	47.74%
8.1	35	70	50.00%
5.2	14	27	51.85%
12.2	12	23	52.17%
8.2	40	76	52.63%
5.1	15	28	53.57%
4.1	76	129	58.91%
3.2	63	104	60.58%
4.2	33	52	63.46%
9.1	55	84	65.48%
12.1	29	43	67.44%
7.3	18	26	69.23%
6.1	57	79	72.15%
6.2	91	123	73.98%
7.2	60	67	89.55%
2.1	84	88	95.45%
10	52	54	96.30%
3.1	40	41	97.56%
1.1	1	1	100.00%
1.2	1	1	100.00%
2.3	31	31	100.00%
2.2	46	46	100.00%

# Total Cost Estimate:

Average cost (Boring):  
\$25.85/ft

Average cost (Concrete  
Removal and Replacement):  
\$35.04/ft

Area	Length of Tile (feet)	Cost Per Area	Area	Length of Tile (feet)	Cost Per Area
1.1	0	\$0.00	1.1	0	\$0.00
1.2	0	\$0.00	1.2	0	\$0.00
2.1	369.5	\$9,551.58	2.1	369.5	\$12,947.28
2.2	0	\$0.00	2.2	0	\$0.00
2.3	0	\$0.00	2.3	0	\$0.00
3.1	0	\$0.00	3.1	0	\$0.00
3.2	3125	\$80,781.25	3.2	3125	\$109,500.00
4.1	3295	\$85,175.75	4.1	3295	\$115,456.80
4.2	1410	\$36,448.50	4.2	1410	\$49,406.40
5.1	1810	\$46,788.50	5.1	1810	\$63,422.40
5.2	823	\$21,274.55	5.2	823	\$28,837.92
6.1	1640	\$42,394.00	6.1	1640	\$57,465.60
6.2	1360	\$35,156.00	6.2	1360	\$47,654.40
7.1	4000	\$103,400.00	7.1	4000	\$140,160.00
7.2	730	\$18,870.50	7.2	730	\$25,579.20
7.3	700	\$18,095.00	7.3	700	\$24,528.00
8.1	2160	\$55,836.00	8.1	2160	\$75,686.40
8.2	2790	\$72,121.50	8.2	2790	\$97,761.60
9.1	2366	\$61,161.10	9.1	2366	\$82,904.64
9.2	2533	\$65,478.05	9.2	2533	\$88,756.32
10	130	\$3,360.50	10	130	\$4,555.20
11	4050	\$104,692.50	11	4050	\$141,912.00
12.1	500	\$12,925.00	12.1	500	\$17,520.00
12.2	850	\$21,972.50	12.2	850	\$29,784.00
	Total Cost:	\$895,482.78		Total Cost:	\$1,213,838.16

# Possible Incentives:

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Increase property  
owner's water  
rates until verified  
disconnection

Provide stipends  
for residents to  
disconnect

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**Thank  
you!**



**Questions?**