

# CITY OF SAINT PAUL PUBLIC WORKS RAIN GARDENS



**The City of Saint Paul in partnership with Capital Region Watershed District offers boulevard garden installations to residents in street reconstruction project areas.**

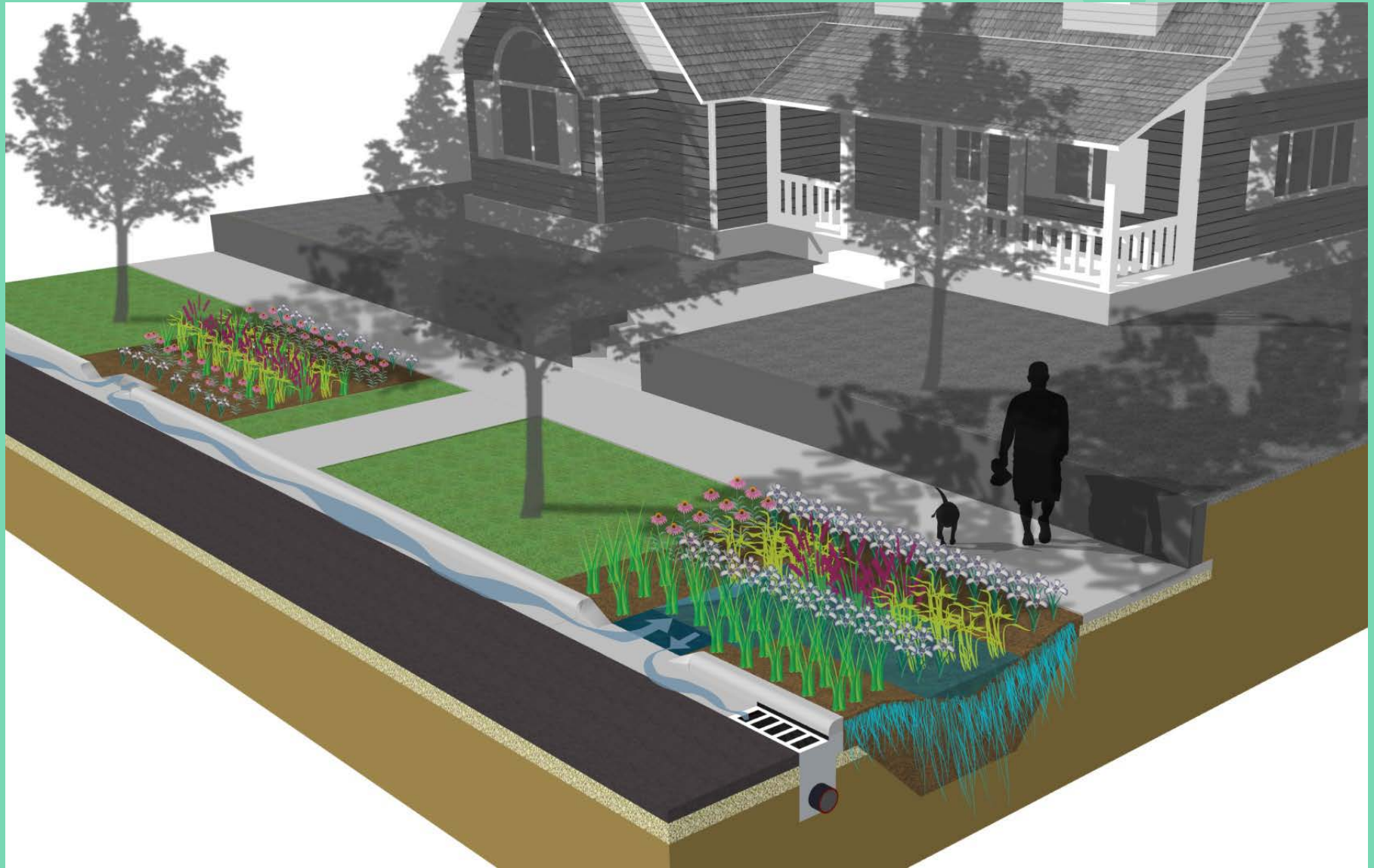


- **The City excavates the gardens, installs the curb cuts and provides topsoil and mulch for the rain gardens.**
- **Capital Region Watershed District supplies the plants, garden design and does much of the public outreach.**

# Accomplishments

- Since 2008, the City of Saint Paul Public Works has installed 222 boulevard rain gardens.
- Estimated treatment = 22,000 cu. ft. of storm water off the streets.
- Estimated cost = \$8 per foot of storage





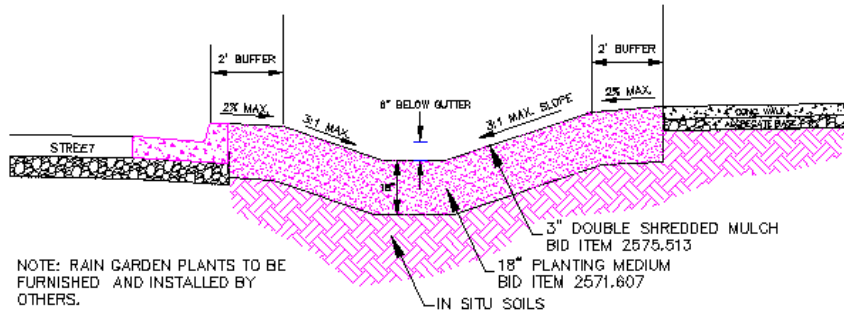
Graphic courtesy of Capital Region Watershed District

# Details

- **18” of rain garden soil.**

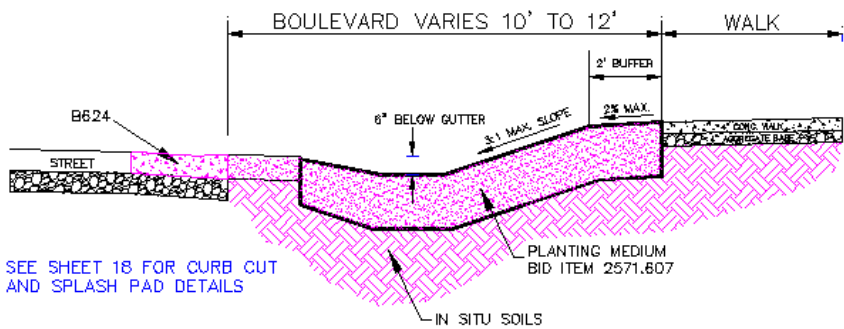
Material (Mn/DOT Specification)	Composition by Weight
Sand Cover (3149.2 J)	60%
Compost, Grade 2 (3890.2 B)	40%

- **3” layer of double shredded hardwood mulch**
- **Concrete splash pads at the curb cut slow water flow and provide ease for homeowners to remove sediment.**
- **2’ Buffer from curb and sidewalk**
- **Do Not excavate within the drip line of an existing boulevard tree.**



NOTE: RAIN GARDEN PLANTS TO BE FURNISHED AND INSTALLED BY OTHERS.

RAIN GARDEN TYPICAL SECTION

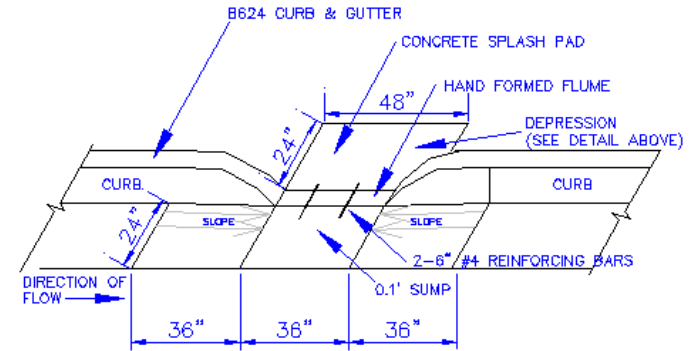


SEE SHEET 18 FOR CURB CUT AND SPLASH PAD DETAILS

CURB CUT WITH SPLASH PAD

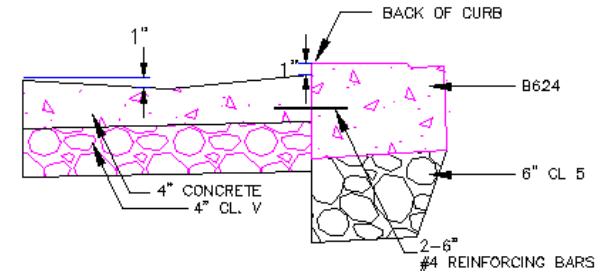
NOTES:

1. RAIN GARDEN DIMENSIONS AND LOCATIONS TO BE DETERMINED BY THE ENGINEER.
2. EXCAVATE RAIN GARDEN TO 6" BELOW GUTTER. BEFORE BACKFILLING WITH PLANTING MEDIUM, THE EXISTING SUB-SOILS MUST BE THOROUGHLY SCARIFIED TO A DEPTH OF 6".
3. THE PLANTING MEDIUM AND MULCH SHALL BE PLACED IN SUCH A WAY AS TO LIMIT THE AMOUNT OF COMPACTION OF THE SUB-SOILS.



CURB CUT DETAIL FOR RAIN GARDEN  
 BID ITEM 2531.602 "CONCRETE CURB CUT FOR RAIN GARDEN"

SPLASH PAD DETAIL



BOULEVARD RAIN GARDEN DETAILS

# Side Boulevard Rain Garden planted in 2012



# Construction



Excavation



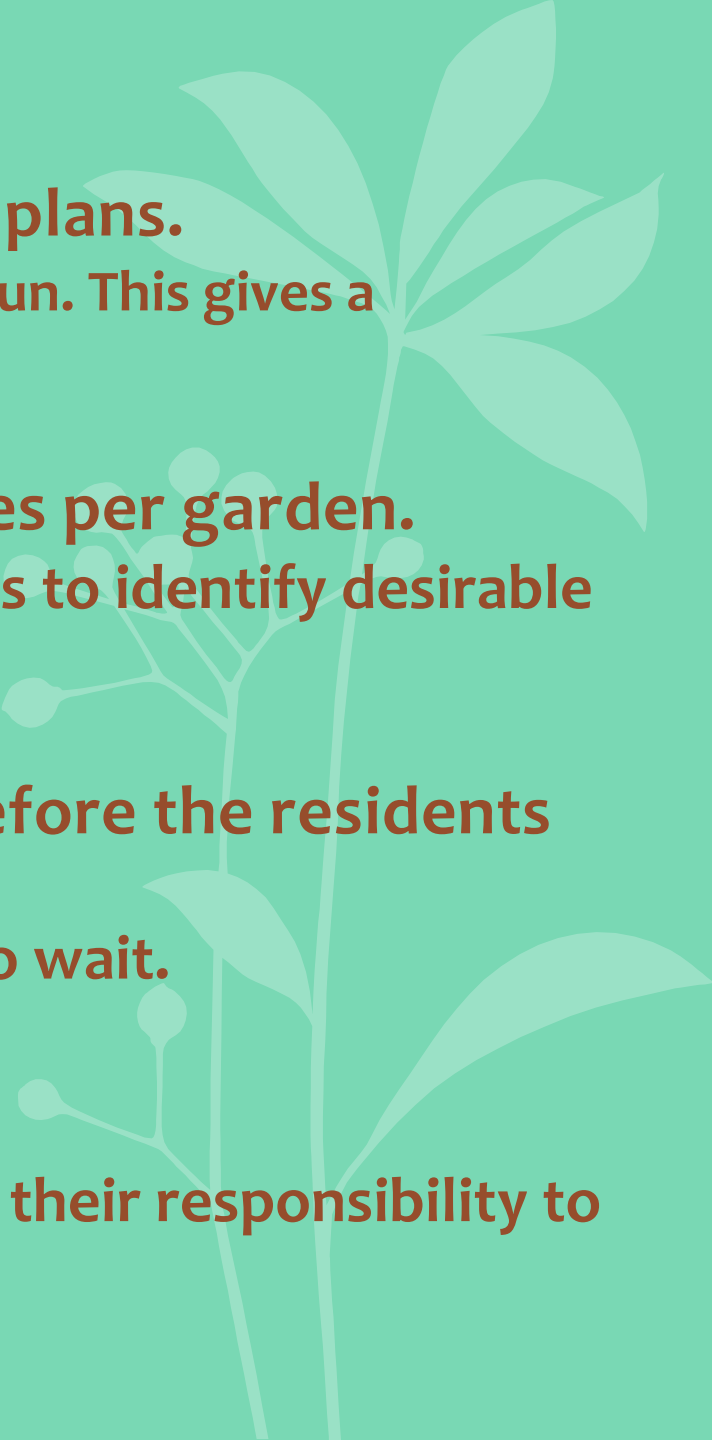
Curb Cut



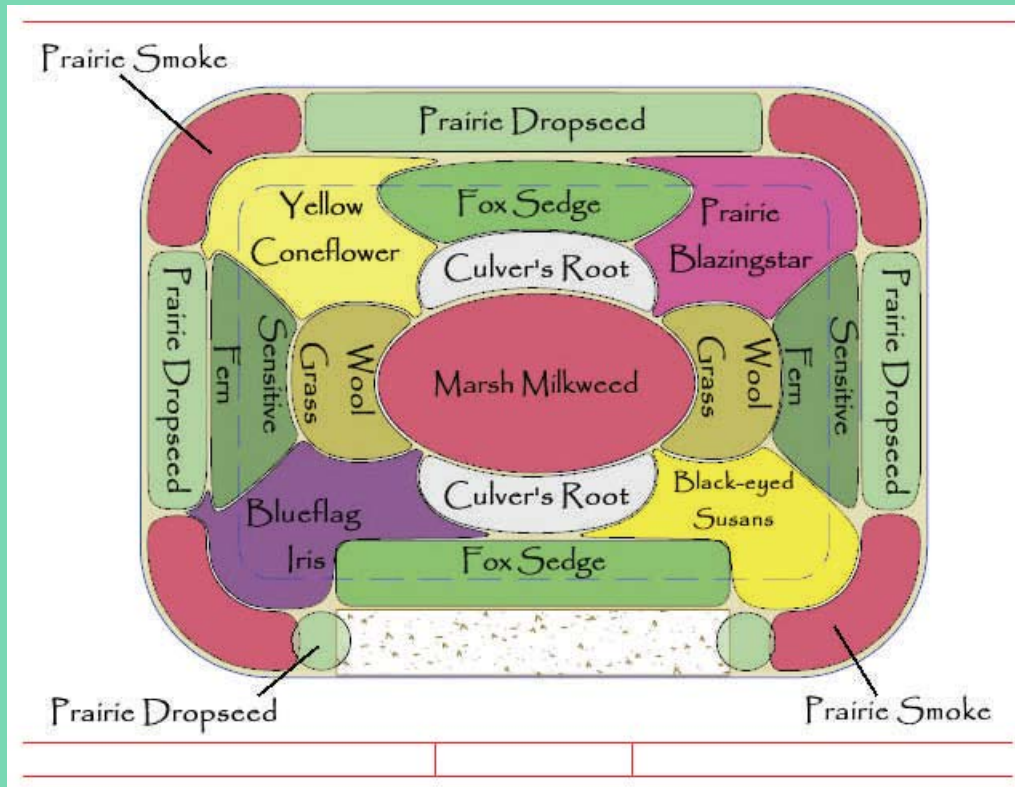
Planting Day



# Lessons Learned

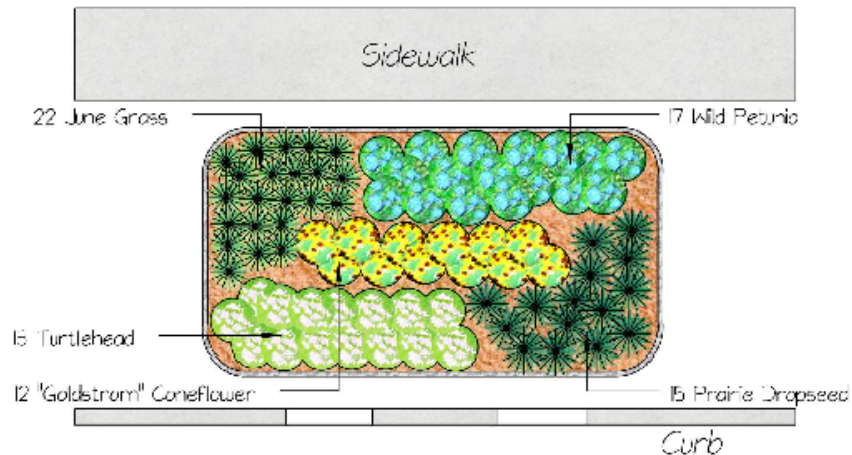
- **Offer limited options for planting plans.**
    - Offer one plan for shade and one for sun. This gives a cohesiveness to the neighborhood.
  - **Constrain Plant list to 5 or 6 species per garden.**
    - This makes it easier for home owners to identify desirable plants.
  - **Sort the plants for each garden before the residents arrive on planting day.**
    - People get cranky when they have to wait.
  - **Manage expectations.**
    - Make sure homeowners understand their responsibility to maintain the garden up front.
- 

# Too many plant species!



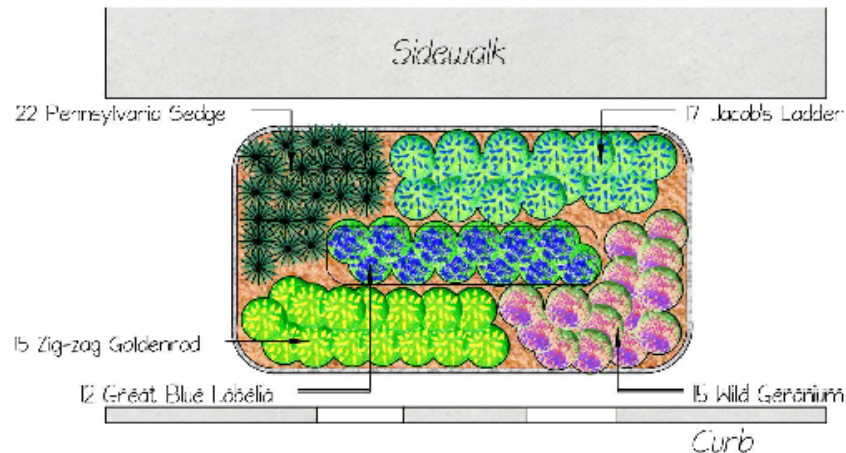
# Example of Preferred Planting Plans

## SUNNY RAINGARDEN: 8' X 15' (120 SQ-FT)



Qty	Common Name
Perennials and Annuals	
12	"Goldstrom" Coneflower
22	June Grass
15	Prairie Dropseed
15	Turtlehead
17	Wild Petunia

## SHADY RAINGARDEN: 8' X 15' (120 SQ-FT)



Qty	Common Name
Perennials and Annuals	
12	Great Blue Lobelia
17	Jacob's Ladder
22	Pennsylvania Sedge
15	Wild Geranium
15	Zig-zag Goldenrod

# Typical Sun Plants



Prairie Dropseed



Turtlehead



Wild Petunia



Goldstrom Coneflower



June Grass

# Typical Shade Plants



Great Blue Lobelia



Pennsylvania Sedge



Jacob's Ladder



ZigZag Goldenrod



Wild Geranium



## Homeowner Responsibilities

A rain garden does require some extra maintenance initially, including extra watering and weeding for the first 2-3 years

# Volunteers are out there



Science Area Teen Network

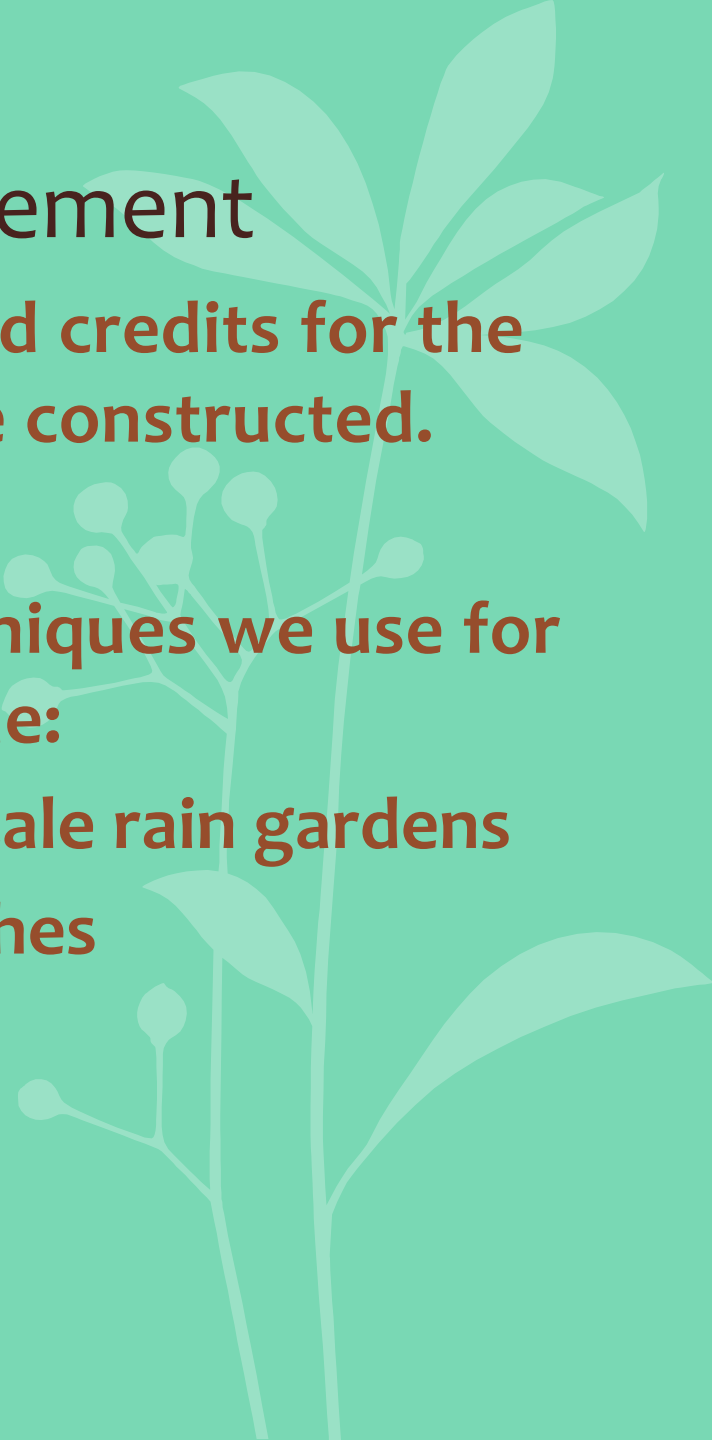


# Rain gardens and Public Art





# Other Storm water Management

- **We have not received Watershed credits for the boulevard rain gardens we have constructed.**
  - **Storm water management techniques we use for meeting watershed goals include:**
    - **Bio-infiltration Basins – large scale rain gardens**
    - **Underground Infiltration Trenches**
    - **Tree Trenches**
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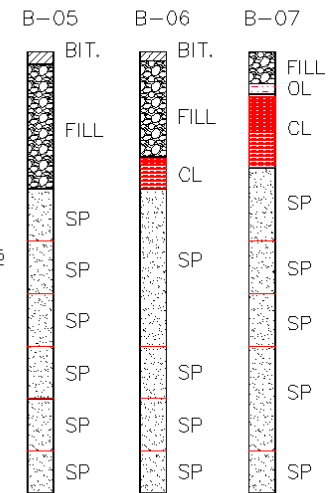
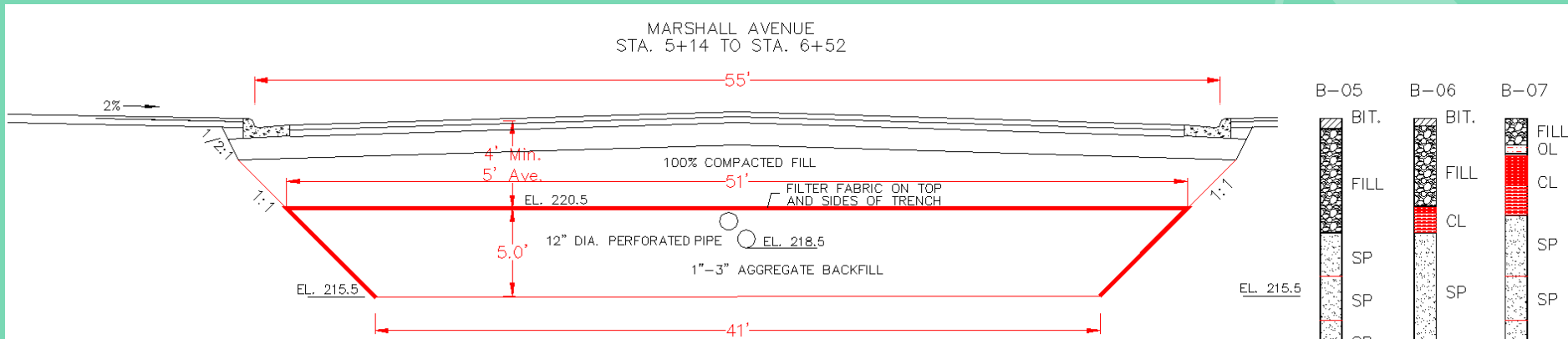
# Bio-Infiltration Basin in created ROW



# Underground Infiltration Trenches



# Underground Infiltration Trenches



SOILS = SAND = INFILTRATION RATE = 0.6 IN./HOUR  
 MAXIMUM DEPTH FOR 48 HOUR DRAW DOWN TIME =  
 $(48 \text{ HR.} \times 0.6 \text{ IN./HR.} \times 1 \text{ FT./12 IN.}) / 40\% = 6 \text{ FT.}$

TOTAL VOLUME (TRENCH CAPACITY) =  
 $((6004 + 4281) / 2) \times 5' \times 40\% = 10,285 \text{ C.F.}$

VOLUME OF WATER FROM SUBWATERSHED = 1.64 ACRES  
 $1.64 \text{ AC.} \times 43560 \text{ S.F./AC} \times .9 \times 1/12 \times 2 = 10,716 \text{ C.F.}$

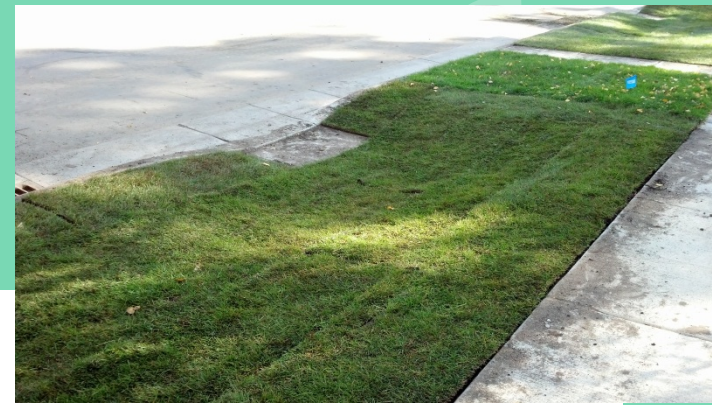
PROPOSED IMPERVIOUS = 149,102 S.F. = 3.4 ACRES

REQUIRED INFILTRATION =  $149,102 \times .9 / 12 = 11,183 \text{ C.F.}$

# Overflow Manhole and Pipes for Infiltration Trench

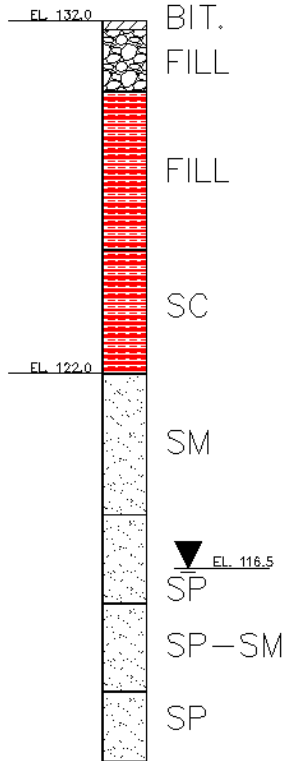
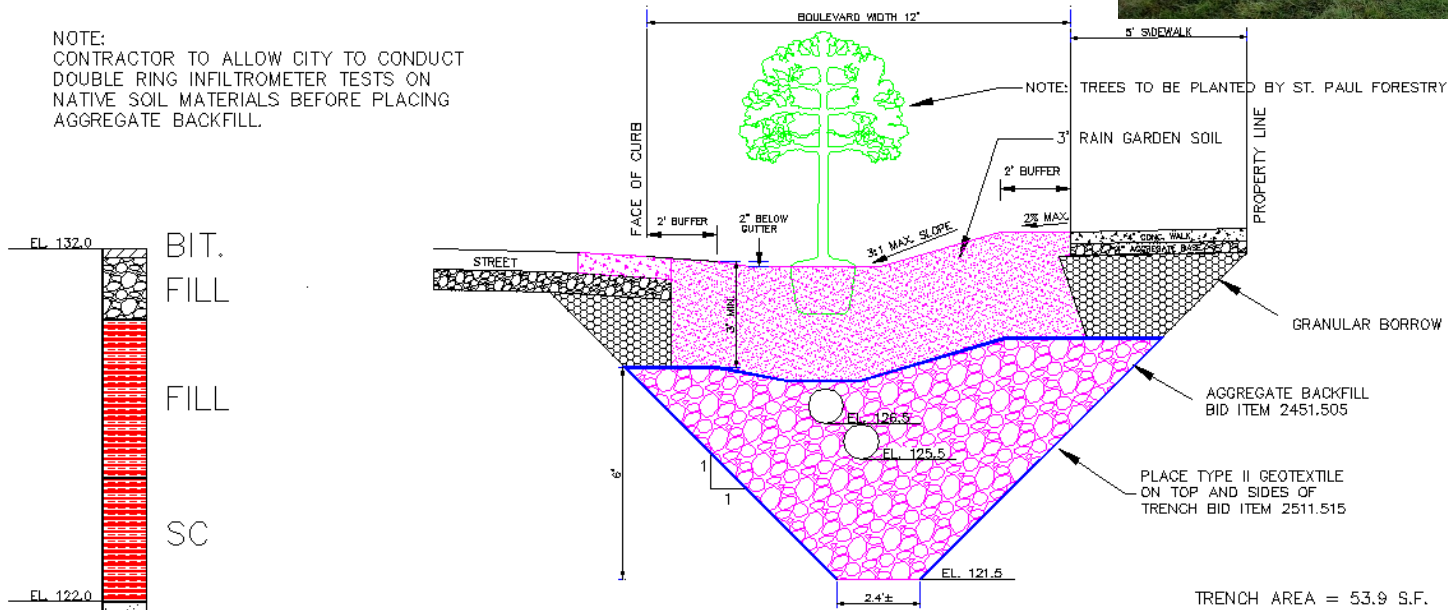


# Modified Tree Trench



TRENCH #2 TYPICAL SECTION  
ON WORDSWORTH – SUE TO EDGCUMBE  
STA. 9+81 TO STA. 12+56

NOTE:  
CONTRACTOR TO ALLOW CITY TO CONDUCT  
DOUBLE RING INFILTROMETER TESTS ON  
NATIVE SOIL MATERIALS BEFORE PLACING  
AGGREGATE BACKFILL.



TRENCH AREA = 53.9 S.F.  
AREA OF 2 -12" PIPES = 1.57 S.F.  
LENGTH = 275'  
TRENCH CAPACITY=  
 $((53.9 \text{ S.F.} - 1.57) \times 275' \times 40\%) + (1.57 \times 275') = 6,189 \text{ C.F.}$

SOIL AREA = 30.9 S.F.  
LENGTH = 275'  
VOLUME =  $275 \times 30.9 = 8,498 \text{ C.F.}$   
STORAGE CAPACITY =  $8,498 \times 25\% = 2,124 \text{ C.F.}$

DEPRESSED AREA (BIORETENTION)  
LENGTH = 275'  
WIDTH = 8'  
VOLUME =  $275' \times 8' \times .166' = 365$

TOTAL VOLUME = TRENCH + SOIL + BIORETENTION  
 $= 8,189 \text{ C.F.} + 2,124 \text{ C.F.} + 365 \text{ C.F.} = 8,678 \text{ C.F.}$

IMPERVIOUS = 261,360 S.F. = 6 ACRES  
REQUIRED INFILTRATION =  $261,360 \text{ S.F.} \times .9/12 = 19,602 \text{ C.F.}$

SOILS = SAND = INFILTRATION RATE = 0.6 IN./HOUR  
MAXIMUM DEPTH FOR 48 HOUR DRAW DOWN TIME =  
 $(48 \text{ HR.} \times 0.6 \text{ IN./HR.} \times 1 \text{ FT./12 IN.})/40\% = 6 \text{ FT.}$

VOLUME OF WATER FROM SUBWATERSHED = 4.23 ACRES  
 $4.23 \text{ AC.} \times 43560 \text{ S.F./AC} \times .9 \times 1/12 \times 2 \times 50\% = 13,819 \text{ C.F.}$

# Public Works Achievements

- Since 2006, Public Works Street Engineering has constructed storm water management devices, treating over 450,000 cu. ft. of water per rain event.

