

# Satisfying Montgomery County's MS4 Requirements Utilizing ESD & LID Design Techniques

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October 15, 2015

# Regulatory Requirements

- Federal Clean Water Act permit program
- **MS4 = Municipal Separate Storm Sewer System**
  - Provide SWM for 20% of Impervious Surfaces (approximately 5.9 square miles)

Progress Towards Restoration Requirement (Acres)

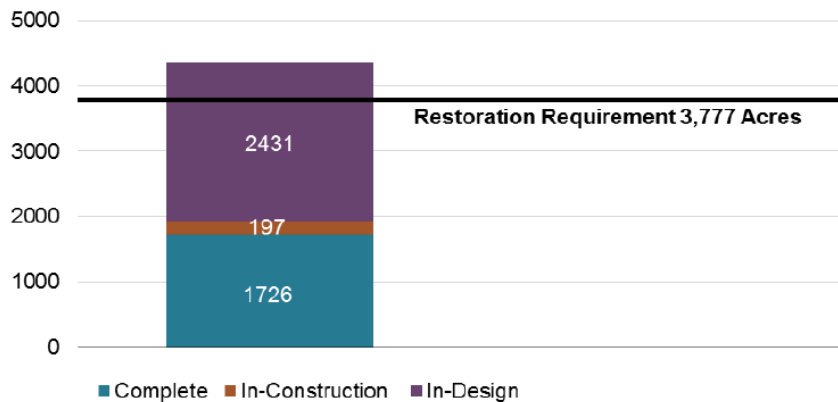
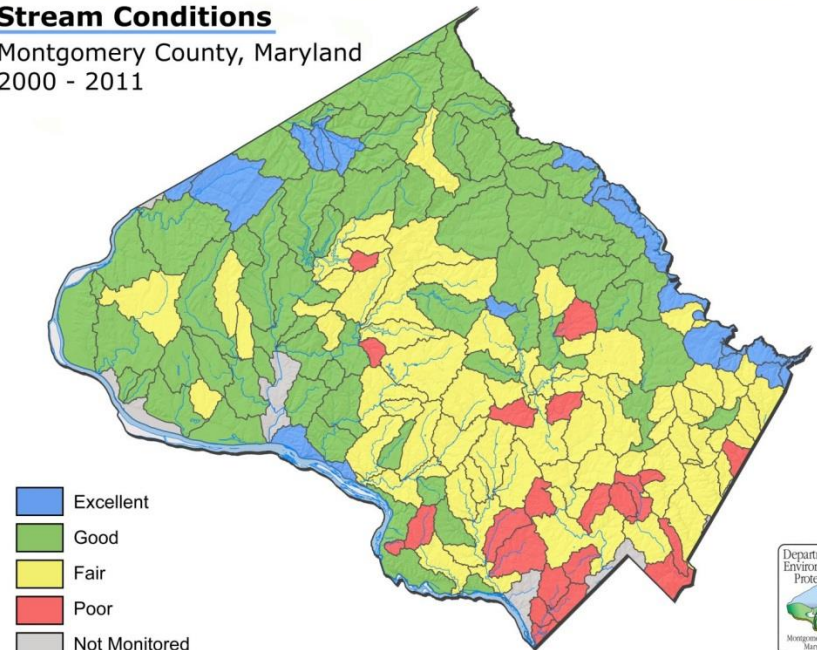


Figure 1 Montgomery County Progress towards the MS4 Permit Watershed Restoration Requirement

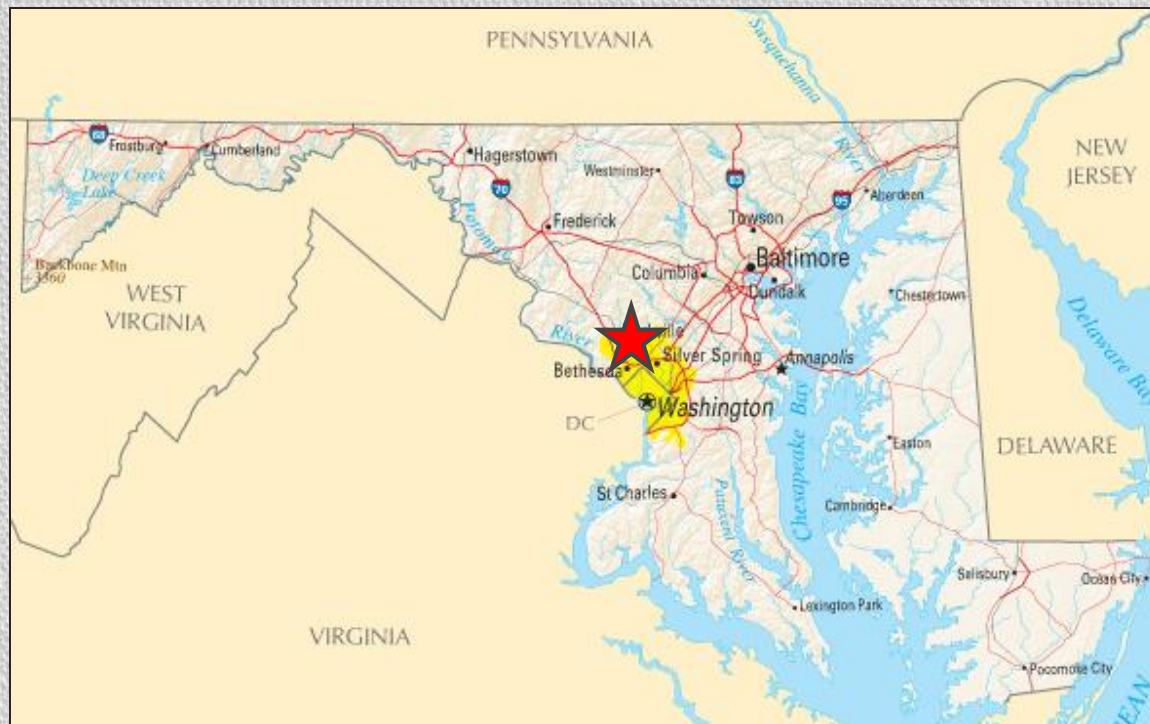
## Stream Conditions

Montgomery County, Maryland  
2000 - 2011



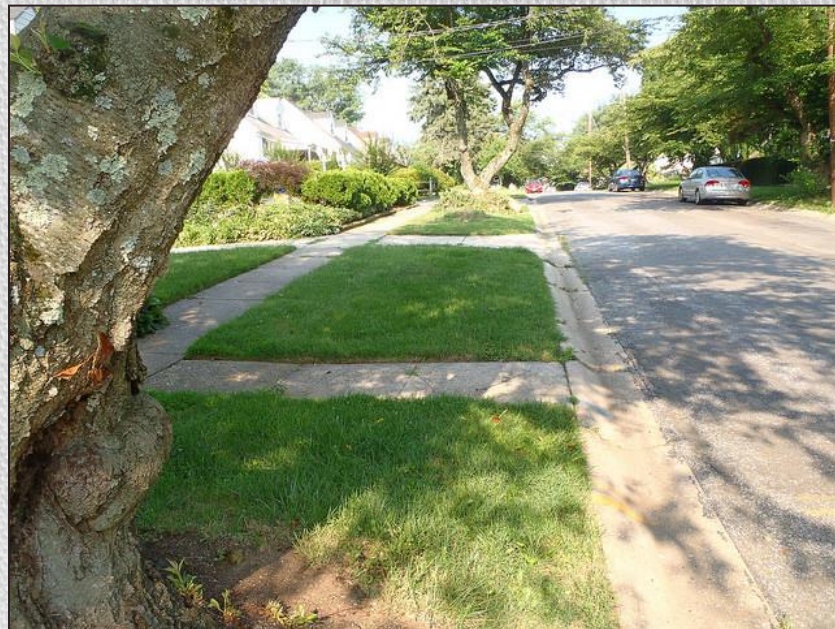
# ESD & LID Projects

- Forest Estates – 33 acres
- Franklin Knolls (4 Phases) – 147 acres
- Wheaton Woods – 270 acres



# Neighborhood Demographics

- Neighborhoods built in the late 1950's & early 1960's
  - Single family detached residential housing
  - Curb & gutter with sidewalks
  - Mature trees
  - Utilities
- No existing SWM facilities



# Preliminary Watershed Assessment

(32)

**Roadway LID Field Data Sheet**

Data Collector: KS, WC 1/10/11

Opportunity ID#: \_\_\_\_\_

Proposed Site Location (Address or street): 10300 Inwood Ave (along Woodman N.)  
See site 11

Photographs:

Site Photo Documented? Photo #: 62  
Note where photo was taken and direction on map

Verify Mapped Data is Accurate (if not, note any inconsistencies on map):

Storm Drain System

Contours (Drainage Area)

Utilities

Paving/impervious areas

Other:

SWM Practice Proposed:

Bioretention/Rain Garden  Curb Extension

Bio-swale  Tree Box Filter

Other:

Possible Conflicts:

Utilities (list type): water

Vegetation/Trees tree removal

Other:

Notes:  
possibly remove walkway between curb + sidewalk too  
locate tree box ups of inlet a bit to avoid conflicts

- GIS Desktop Analysis
- Field Walk
- Summary Tables and Mapping
- Assessment of Opportunities
  - Feasibility
  - Aesthetics
  - Constructability
  - Maintenance

**BMP # 5**Location: **8901 Miles St**  
**Franklin Knolls Neighborhood - Phase 1**Inspection Date: **4/14/2011****Hydrology Summary**

Land Use	Area (ac)	Percentage
Impervious Area	0.30	31%
Forest	0.01	1%
Open Space	0.66	68%
<b>Total Drainage Area =</b>	<b>0.97</b>	<b>100%</b>

**Impervious Area Breakdown**

Area Type	Area (ac)	Percentage
ROW - Road & Driveways	0.15	50%
ROW - Sidewalk	0.00	0%
On-Lot Impervious	0.15	50%
<b>Total Impervious =</b>	<b>0.30</b>	<b>100%</b>

**SWM Volume Summary (ft<sup>3</sup>)**

Target Treatment		Treatment Provided	% ESD <sub>v</sub> Treated
WQ <sub>v</sub>	ESD <sub>v</sub>		
<b>1,156</b>	<b>2,081</b>	<b>857</b>	<b>41%</b>

<b>Study Area/Outfall</b>	<b>A</b>
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**Possible Construction Conflicts**

Utilities: sanitary  
Vegetation: brush  
Other:

**Site Notes:**

- Existing storm drain system and inlet available to tie facility underdrain into
- Sanitary is located within the roadway - possible house connections
- Water line is located within the roadway - possible house connections
- Could remove pavement at dead end of Langley Drive for pavement removal credit, could be combined with curb extension
- Good area for bioremediation or tree box on corner of 8901 Miles
- Past pavement on either side of stream channel (8901 Miles and 924 Heron,) has room for rain garden

**Potential LID Retrofit Type****Bioretention & Pavement Removal**

Looking towards end of Langley Drive and 924 Heron from intersection of Miles St. and Langley Dr.



Looking towards corner of 8901 Miles St. from intersection of Langley Dr. and Heron Dr.

**Over 600 sites initially identified as part of the Preliminary Assessments**

# Supporting Information

- Topographic Survey
- Utility Designation and SUE
- Geotechnical Analysis - Soil Borings and Infiltration Tests
- Environmental Features



# Roadway Design Constraints

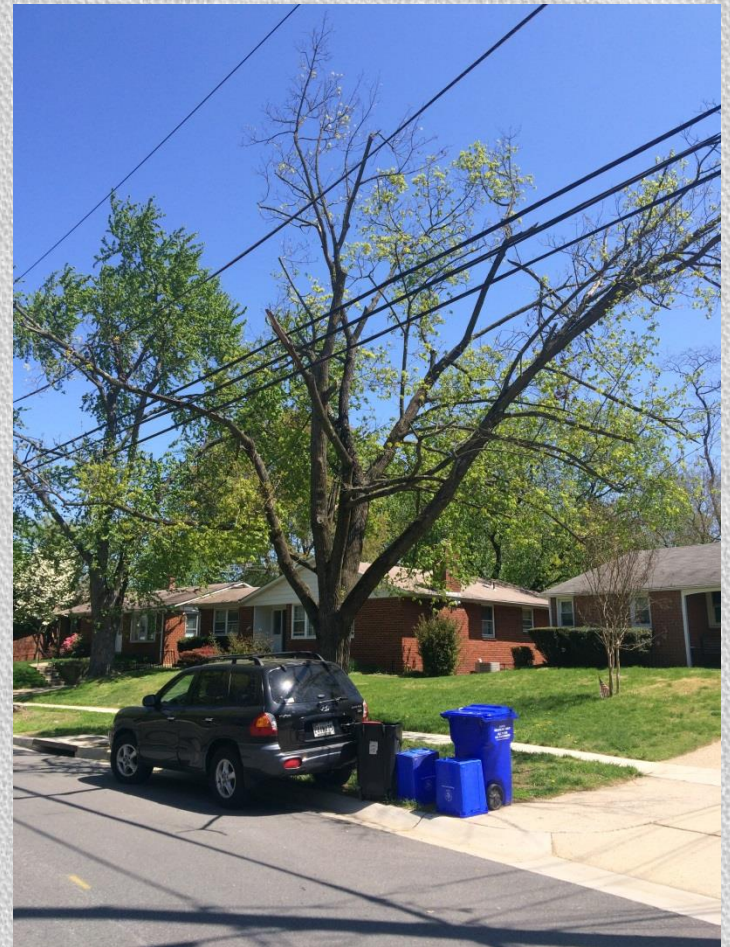
- Width of County ROW (curb to sidewalk)
- DOT setbacks/clear space requirements
- Driveway/Leadwalk Locations
- On-street parking
- Slope of roadway





# Additional Design Constraints

- Existing Trees/Roadside Tree Permit
- Underground and Overhead Utilities
- Existing Soils/Infiltration Rates
- Property Owner Complaints and Preferences



# Final Designs

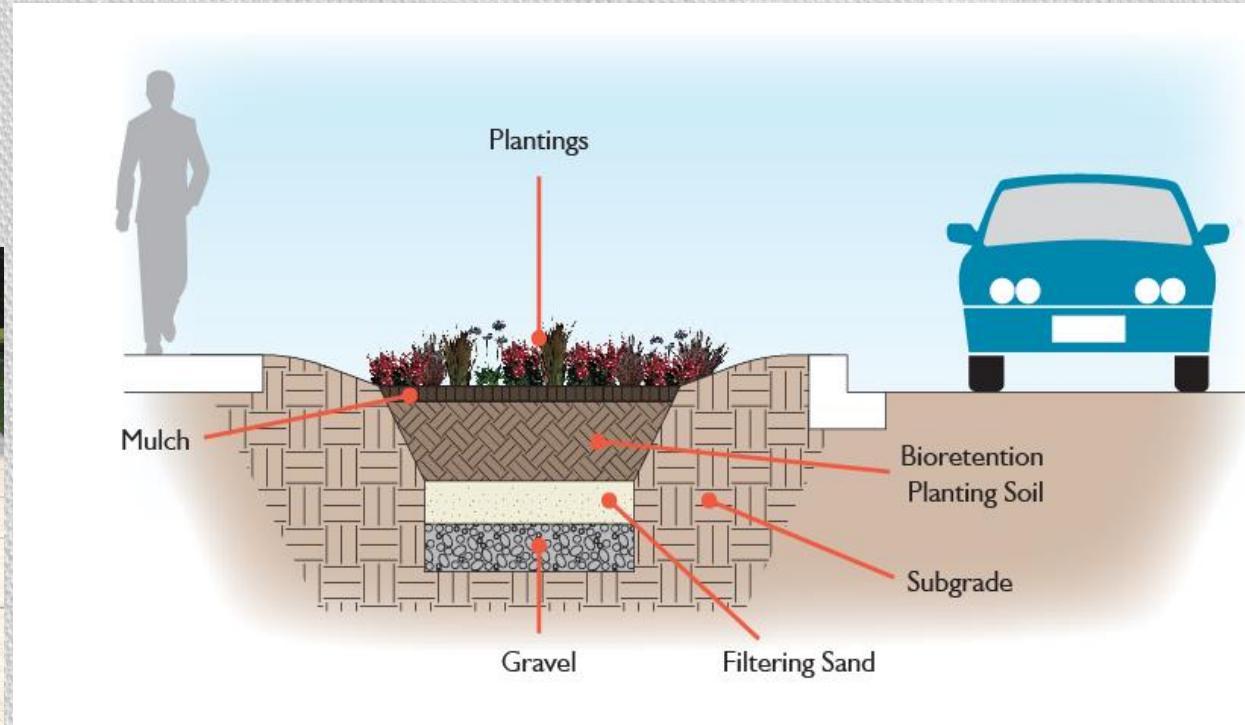
- Forest Estates - 24 facilities constructed
- Franklin Knolls (4 Phases) – 31 facilities constructed and 89 under construction
- Wheaton Woods – 200+ facilities under design



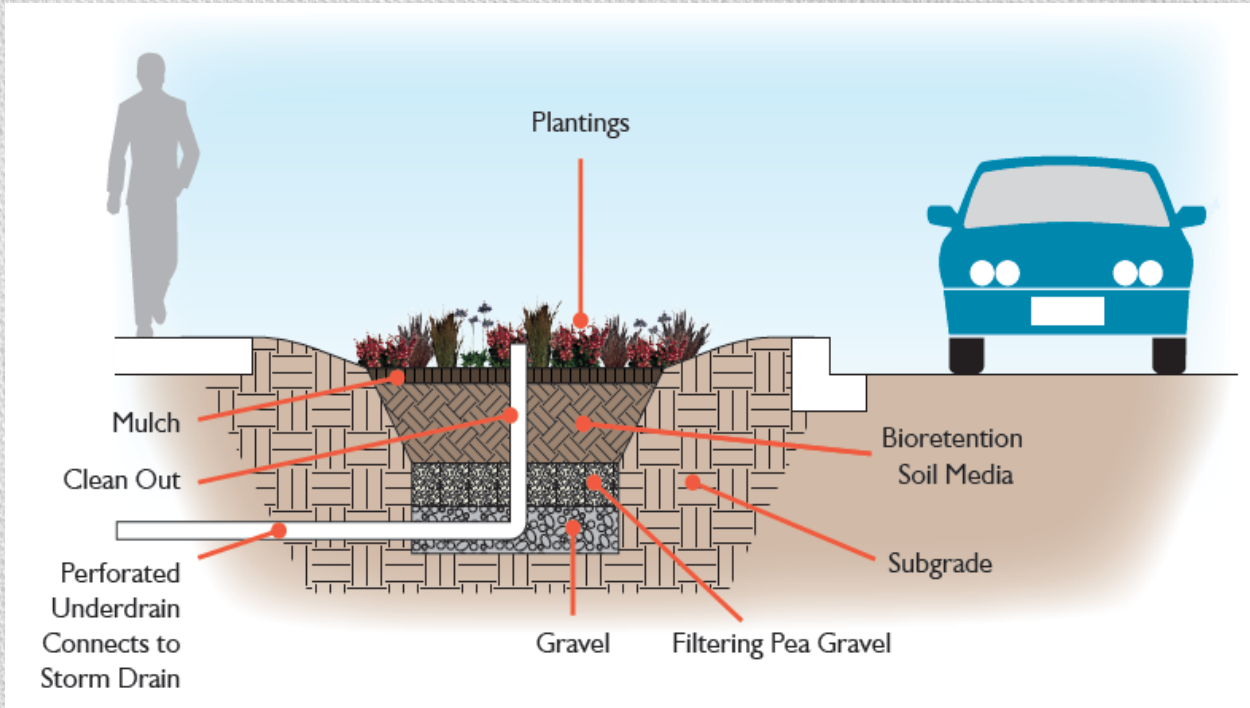
# Types of ESD/LID Facilities



# Rain Garden



# Bioretention



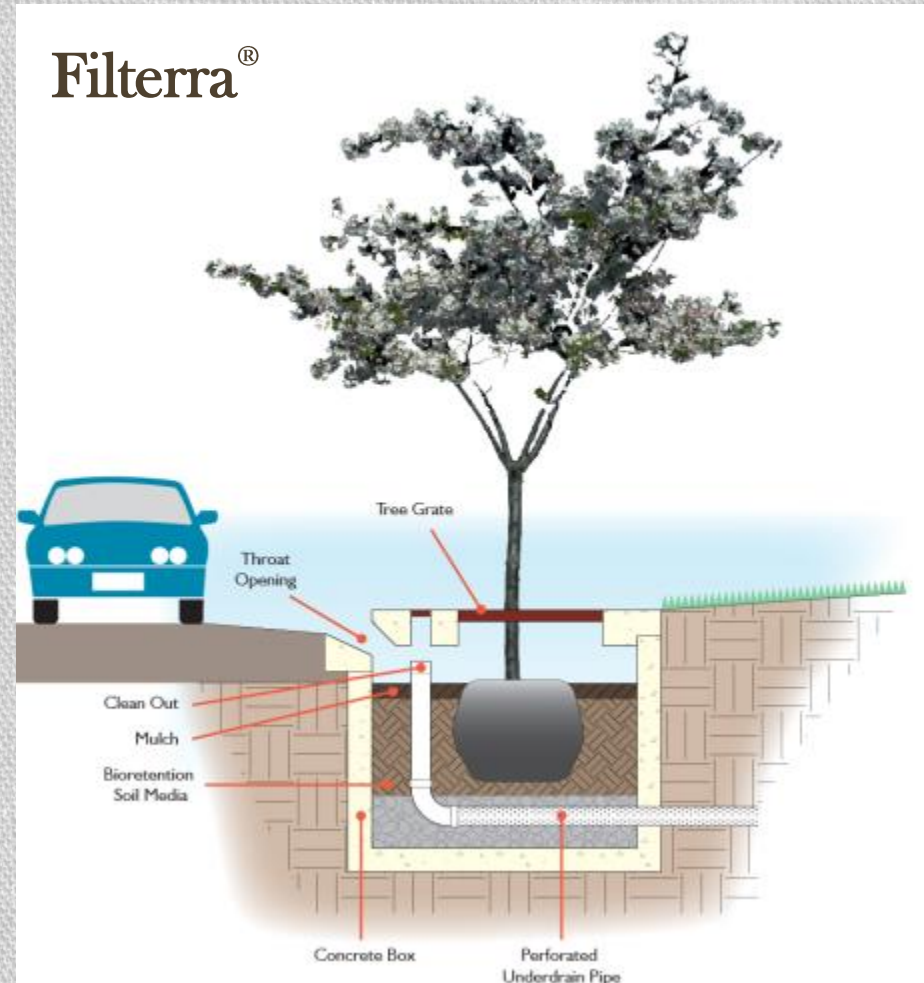
# Curb Extension



# Bioswales

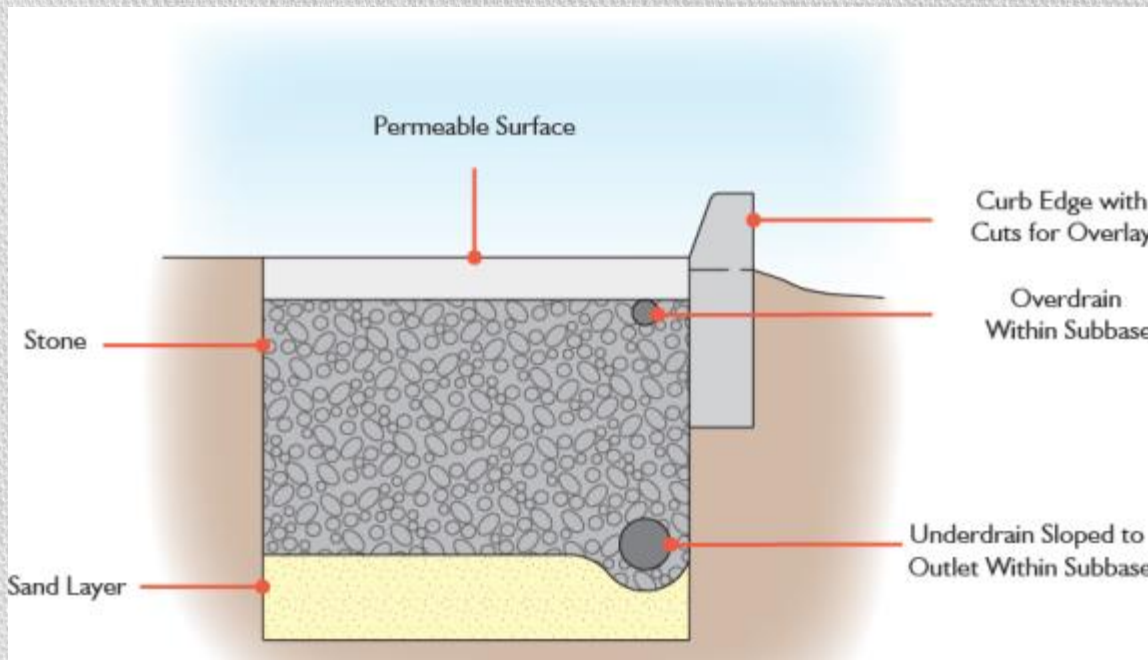


# Tree Box Filter



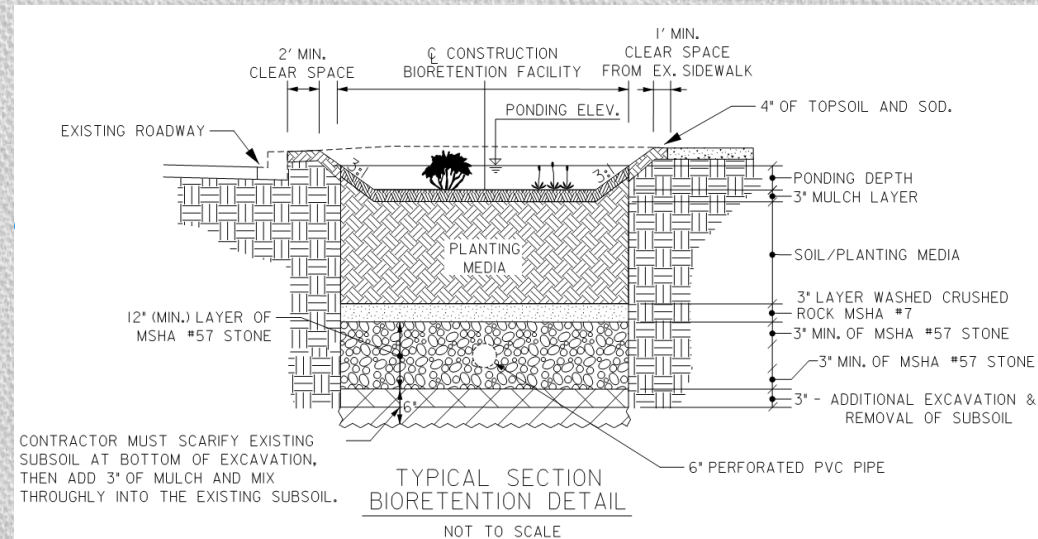


# Permeable Sidewalk



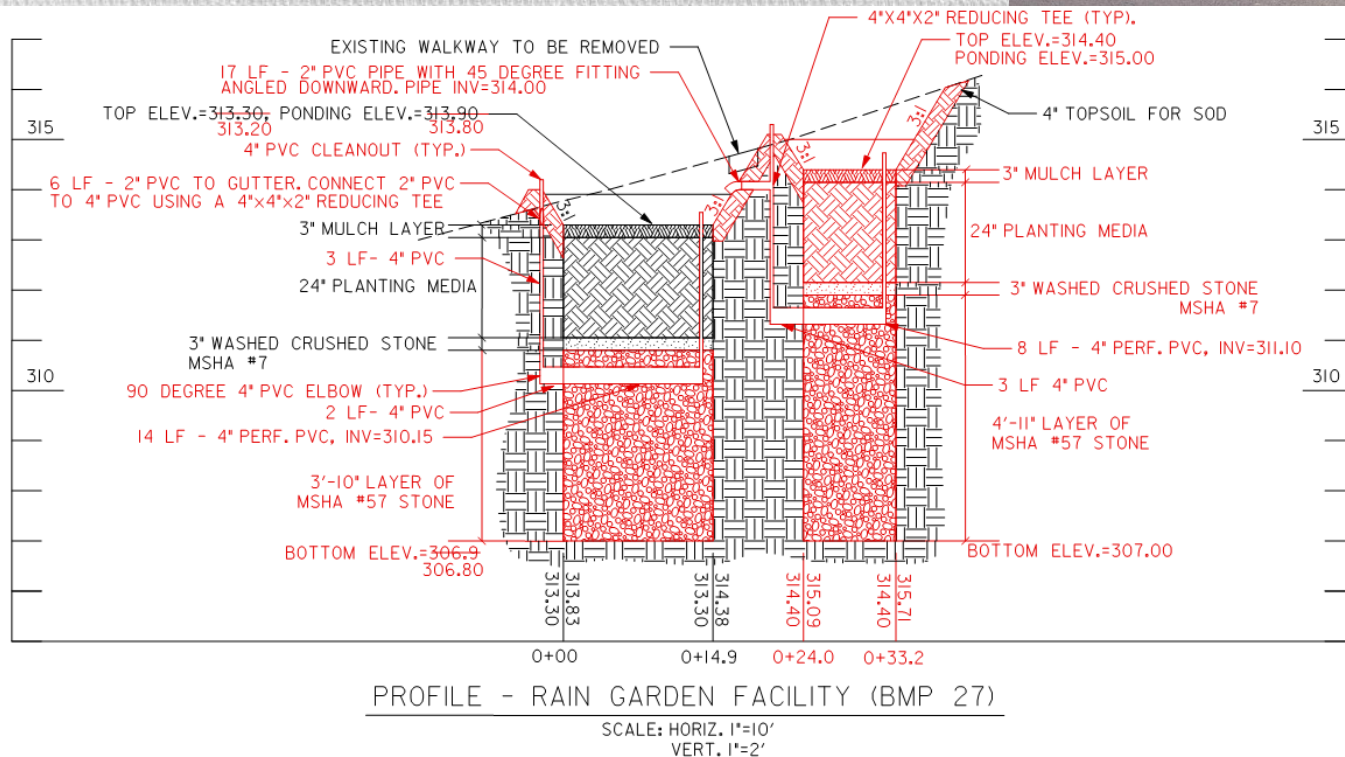
# Project Specific Design Modifications

- Modified Inlets
- Scarify existing subsoil & till in mulch
- Widened filter media & stone



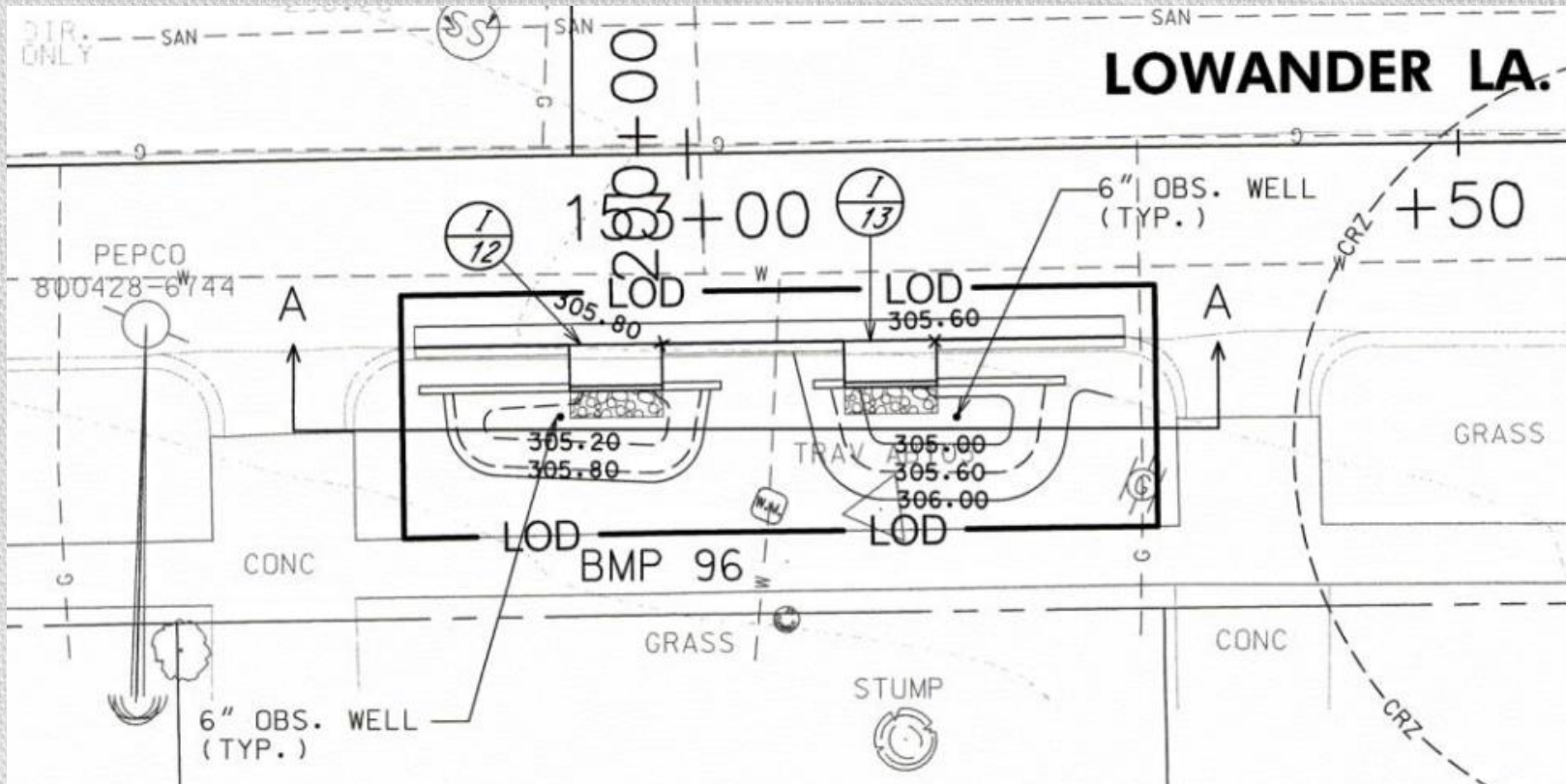
# Project Specific Design Modifications

- Reverse underdrains



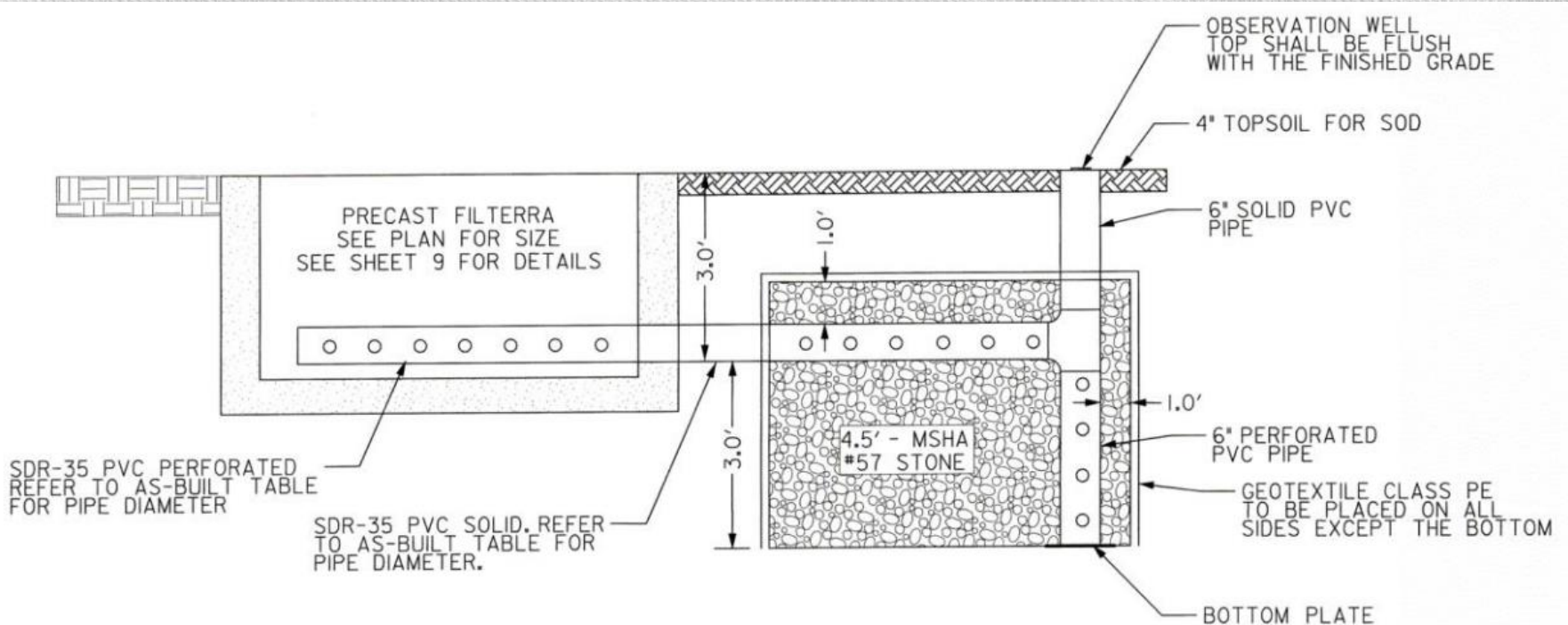
# Project Specific Design Modifications

- Bridge over existing utility house connections
- Concrete edging along front side of facility



# Project Specific Design Modifications

- Filterra draining into stone reservoir



TYPICAL FILTERRA AND STONE TRENCH DETAIL

NOT TO SCALE

# Community Outreach

- Public Meetings
- Community Walks




**ROADWAY LOW IMPACT DEVELOPMENT: FOREST ESTATES**

**McCormick Taylor**  
 Engineers & Planners Since 1946  
**CONCEPT DESIGN**



ID	Assessment Address	2014 Project Proposal
1	1700 Imperial Dr	Tree Box Filter or Stormwater
2	1702 Imperial Dr	Rain Garden
3	1606 Imperial Dr	Tree Box Filter
4	1600 Imperial Dr	Tree Box Filter
5	1602 Woodman Ave S, along Imperial	Tree Box Filter
6	1504 Woodman Ave S	Stormwater or Rain Garden
7	1708 Woodman Ave S	Rain Garden
8	1702/1704 Woodman Ave S	Rain Garden
9	1602 Woodman Ave S	Rain Garden
10	1600 Woodman Ave S, along Woodman	Tree Box Filter or Stormwater
11	1600 Woodman Ave S, along Woodman	Tree Box Filter or Stormwater
12	1500 Woodman Ave N, across	Tree Box Filter or Stormwater
13	1502 Woodman Ave N, across	Tree Box Filter or Stormwater
14	1612 Woodman Ave N	Tree Box Filter
15	1608 Woodman Ave N	Tree Box Filter
16	1604 Woodman Ave N	Tree Box Filter
17	1616-1618 of Woodman Ave N	Rain Garden and Stormwater Retention
18	1610/1612 Woodman Ave N, along	Tree Box Filter or Stormwater
19	1602 Woodman Ave N, crosswalk	Tree Box Filter
20	1601 Second Ave (along Falk Street)	Stormwater
21	1615 Woodman Ave N, along Falk	Tree Box Filter
22	1600 Jolly Ave	Tree Box Filter or Stormwater
23	1600 Falk Street	Rain Garden
24	Falk Street Cul-de-Sac	Rain Garden
25	1601 Jolly Ave (along Falk Street)	Tree Box Filter or Stormwater
26	1609 Jolly Court	Tree Box Filter
27	1607 Falk Street	Tree Box Filter or Rain Garden
28	1604 Dennis Ave (along Woodman Ave)	Stormwater or Tree Box Filter
29	1622 Second Ave	Rain Garden
30	1622 Second Ave	Stormwater
31	1614 Second Ave	Rain Garden
32	1600 Second Ave	Tree Box Filter
33	1601 Second Ave	Stormwater or Tree Box Filter
34	1601 Jolly Ave	Tree Box Filter or Rain Garden
35	1612 Jolly Ave	Rain Garden
36	1615 Jolly Ave	Rain Garden
37	1612 Falk St	Rain Garden
38	1612 Dennis Ave (along Jolly Ave)	Rain Garden
39	1606 Second Ave	Rain Garden
40	1613 Woodman Ave N	Tree Box Filter or Rain Garden

- One-on-one meetings with property owners
- Educational Opportunities

# Construction

- MCDOT Coordination
- Utility Improvement Coordination
- Community Involvement
- Design/Field Modifications



# Contact Info

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