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Getting it Right: Rain Garden Retrofits in Public Spaces



Kate Austin, Green Infrastructure Asset Technician

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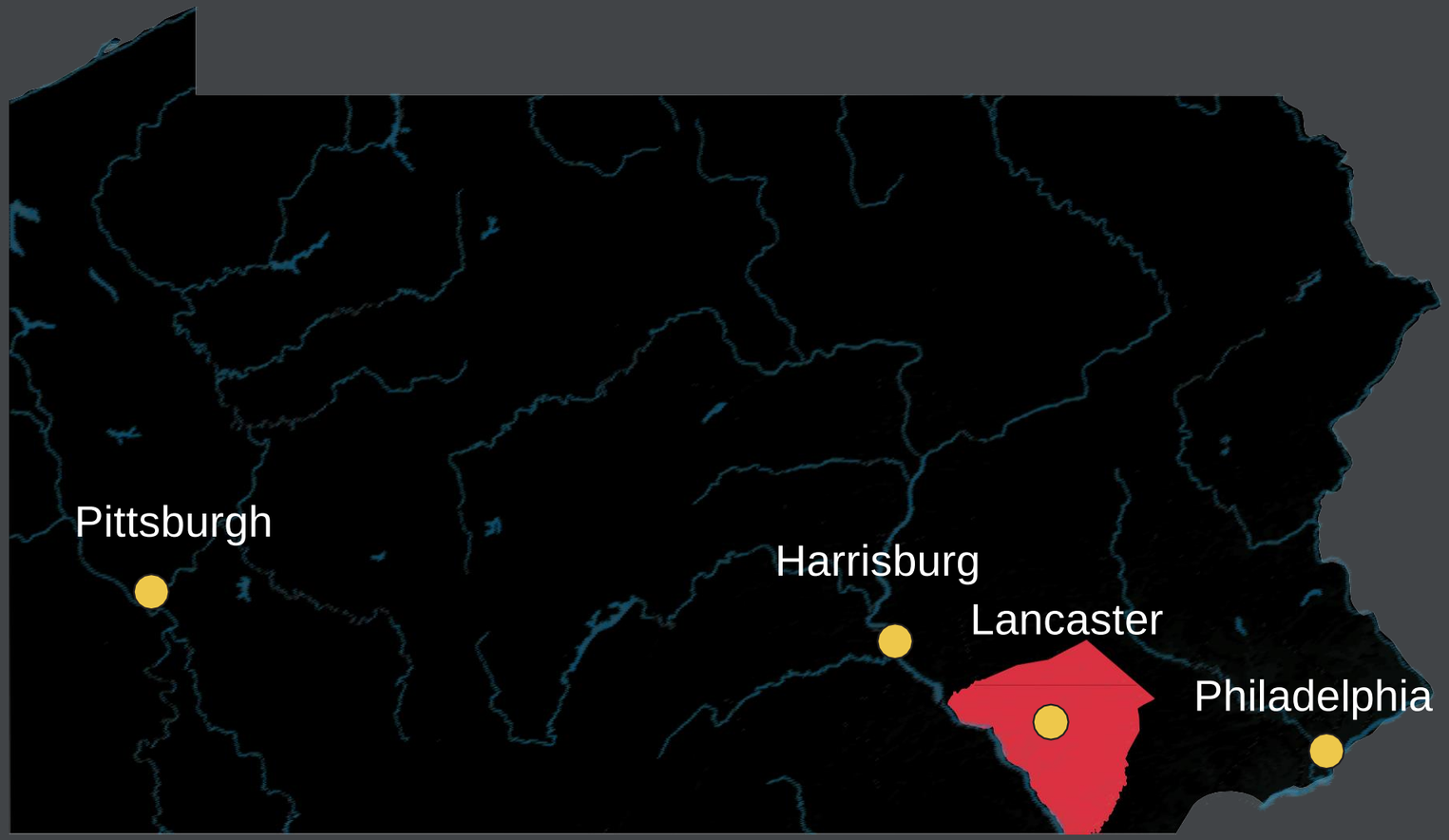
Geographic Context



1742
incorporated

60,000
people

7.4
sqmi

50%
impervious

750 Million
gallons CSO

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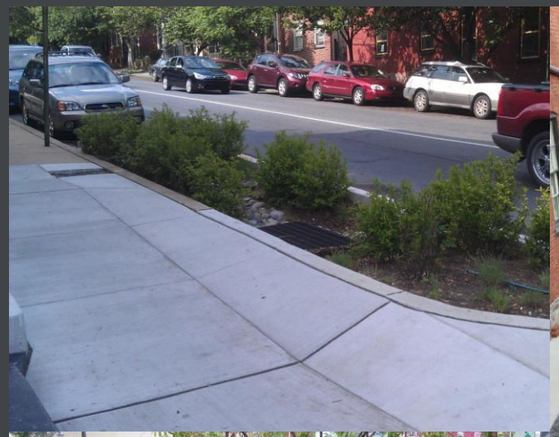
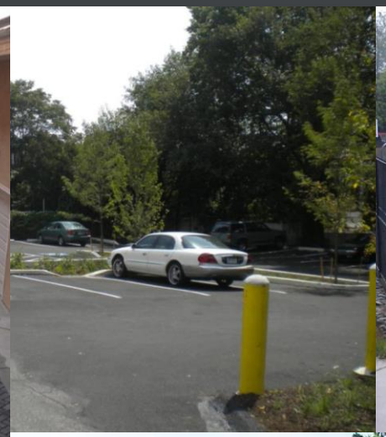
Green Infrastructure is . . .



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SW Program Trajectory

Demonstration Projects, Demonstration Projects...

60+ complete

160+ in design

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Bioretention in the City

The City of Lancaster currently has **75** rain gardens and vegetated curb extensions on public property. These are found:

- In city parks
- In the right of way
- On city properties

All are maintained by City staff.

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Inspection and Performance Monitoring

Metrics

1. Gallons of stormwater managed annually
    A. Gallons of stormwater discharging to combined sewer reduced annually
2. SW permits & credits
3. # of projects completed
4. Pounds of TN, TP, TSS removed
5. Public outreach events & interactions

Inspection & Performance

1. BMP’s installed and maintained properly
2. BMP’s function as intended
3. Functionality maintained over time
4. Reducing maintenance & observation

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Monthly Inspections

City of Lancaster
Rain Garden / Bioretention Bed
Operation & Maintenance Inspection Form

Project # and Name: _____ BMP Location: _____

Project Location: _____

Inspection Date: _____ Time: _____ Weather: _____

Photos: Yes _____ No _____

1 = No Maintenance Required -- 5 = Significant Immediate Maintenance or Repairs Required

Inspection Items	1 - 5	Comments & Required Actions
Inlet Zone		
Inlet obstruction (trash, debris, sediment)		
Erosion, bare spots, & sedimentation		
Pretreatment		
Structural Integrity		
Perimeter Zone		
Surface area- matches design?		
Side slope erosion		
Ponding volume and flow path		
Sinking filter bed (linear sinking?)		
Bed Zone		
Sediment deposition/caking		
Standing water- drains in 24-72 hours		
Ponding depth		
Mulch depth/condition		
Trash		
Bed erosion		
Vegetation Zone		
Vegetative cover		
Vegetative condition		
Vegetative maintenance		
Outlet Zone		
Underdrain (obstruction, sinking, sediment)		

Inspector: Signature: _____ Name (printed): _____

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Regular Maintenance

- Monthly (during growing season) weeding of rain gardens and vegetated curb extensions
- Regular replanting of dead vegetation
- Regular trash and sediment removal
- Regular inlet/structure cleaning

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Beyond Maintenance: Corrective Actions

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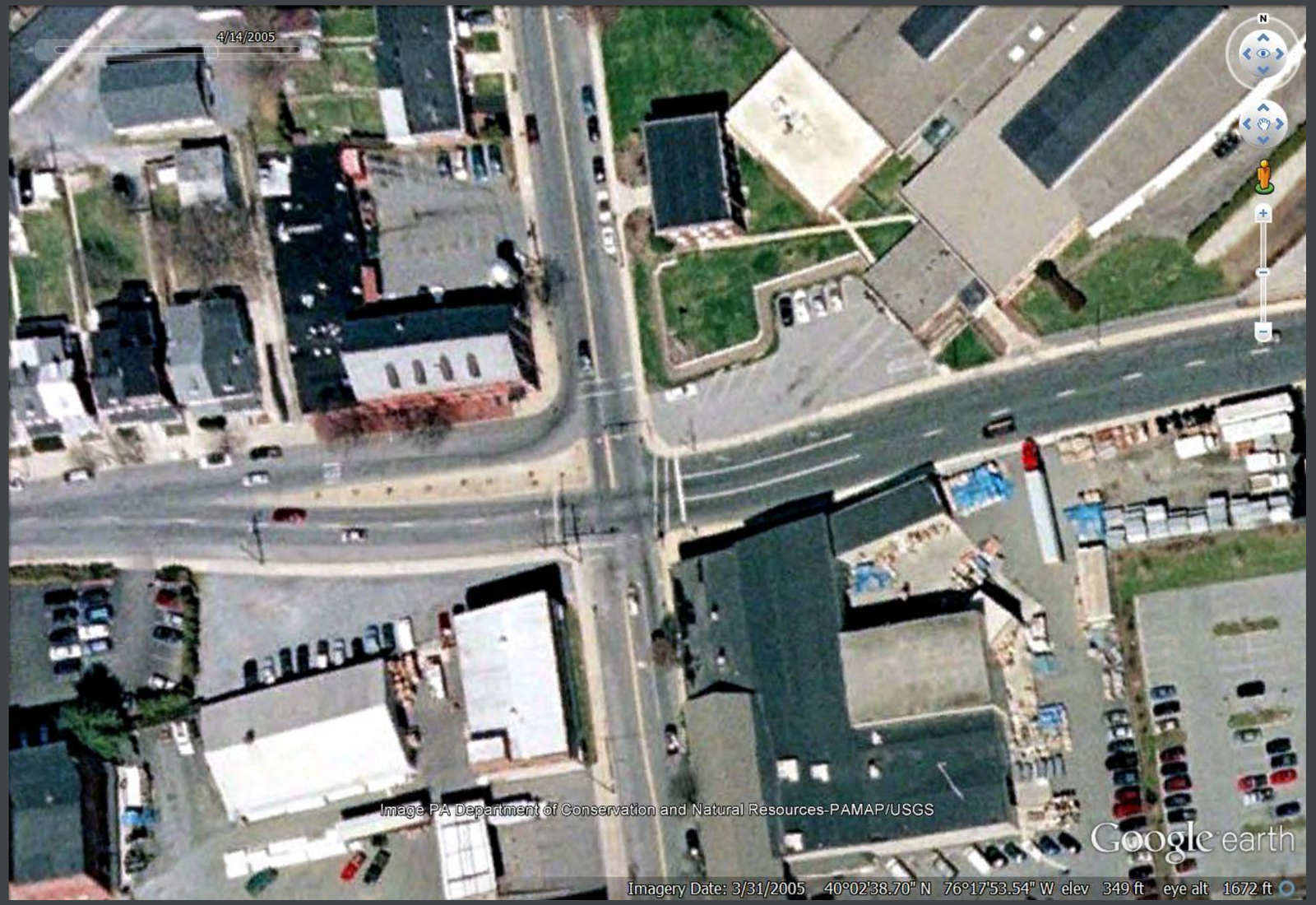
Getting it Right: Plum and Walnut



Intersection reconstructed with 4 large rain gardens and porous pavers in 2013.

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Getting it Right: Plum and Walnut

Planting Palette:

- Primarily shrubs (winterberry) and grasses
- PA natives

End Result:

- Plants mostly died
- Causes
  - Soil media
  - Road salts

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Getting it Right: Plum and Walnut

Planting Palette:

- Replanted in 2014 using coastal Mid-Atlantic species
- Herbaceous plants under 3’
- Denser planting
- No mulch

End Result:

- Plants are thriving in sandy soils and tolerant of salt exposure

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Getting it Right: Plum and Walnut

Impacts from Adjacent Surfaces: Brewery Alley

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Getting it Right: Plum and Walnut

Sediment Forebays:

- Designed using stone cobbles to dissipate the energy of the flow and capture sediment
- Very difficult to maintain- cobbles must be removed and cleaned to remove sediment
- Only weeds grow in sediment accumulation

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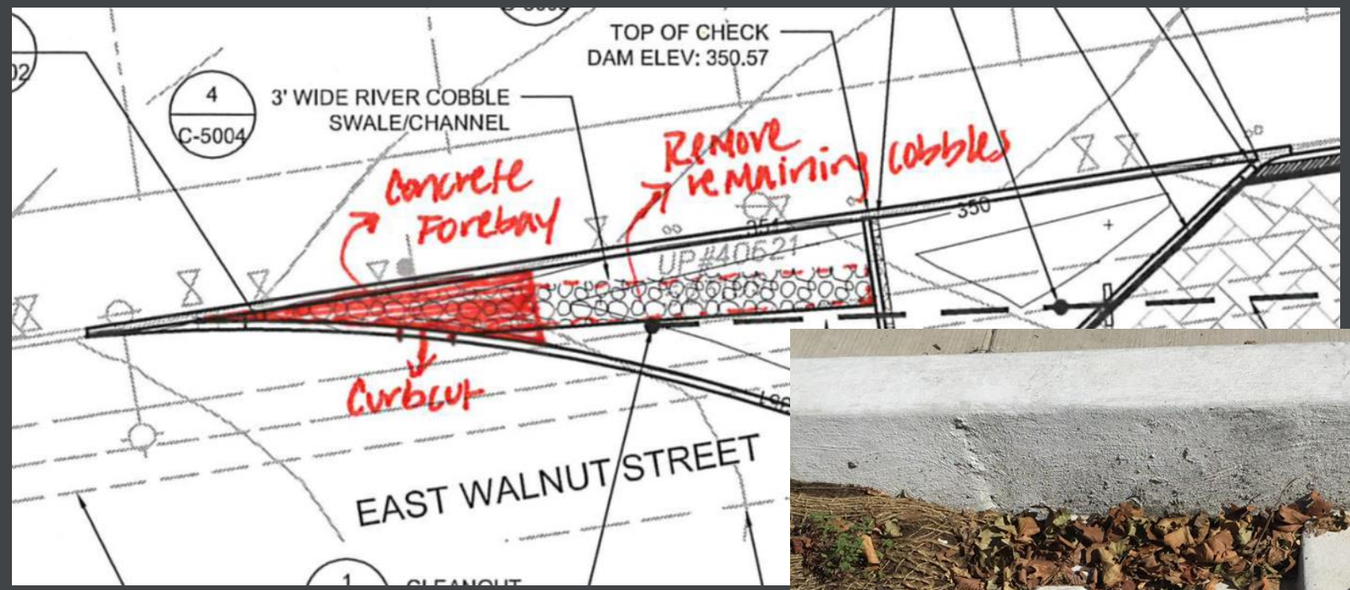
Getting it Right: Plum and Walnut



Remove stone cobbles and replace with poured concrete sediment forebay with energy dissipater

- Sediment can be removed from forebay with a flat-edged shovel
- Build up is highly visible and easy to maintain

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Getting it Right: Sediment Forebays

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Getting it Right: Crystal Park

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Getting it Right: Crystal Park

Problems to address:

- Sedimentation
- Flow path
- Outlet heights
- Geotextile fabric clogging
- Plant failure
- Vandalism

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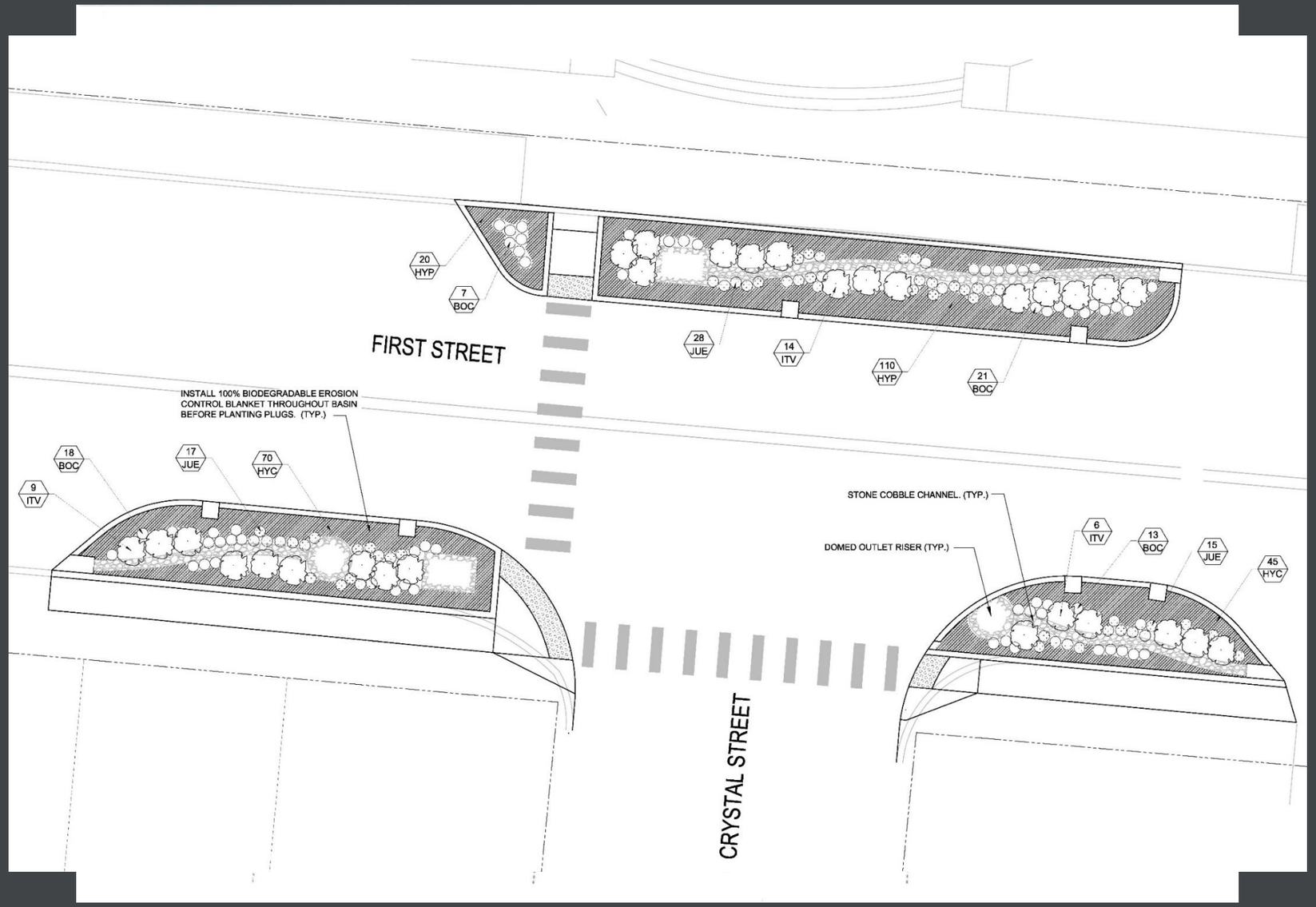
Getting it Right: Crystal Park



Corrective actions:

- Remove geotextile fabric
- Replace soils
- Install concrete sediment forebay
- Install level spreader and pedestrian crossing
- Adjust outlet heights
- New planting
- Engage neighbors

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Lessons Learned

1. Choose appropriate plant material.
2. Consider the impact of surrounding surface areas.
3. Design with maintenance in mind.
4. Inspect regularly.
5. If a system isn’t working, find out why.
6. Finding the $ to fix a problem after installation is often much more difficult than funding it in the first place.

Questions?

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Information:
http://www.cityoflancasterpa.com
http://www.cityoflancasterpa.com/government/stormwater
http://www.cityoflancasterpa.com/resident/city-tree-map
http://www.saveitlancaster.com/

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Thank You!