

**July Construction Stormwater Quality Workshop** July 16–19, 2018

# Considerations During Construction for Projects with LID



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## Idea of Low Impact Development

- ❑ Restore or mimic natural hydrology
- ❑ Promote infiltration, evapotranspiration, storage



# Terminology

Control Measures

Green Infrastructure

Low Impact Development

# Terminology

Site Design Strategies

Treatment Control BMPs

Permanent BMP or Post-Construction BMP

## LID Functions

- Infiltration
- Uptake
- Filtration
- Adsorption
- Evapotranspiration
- Biofiltration





## Overview of (a Few) LID Controls

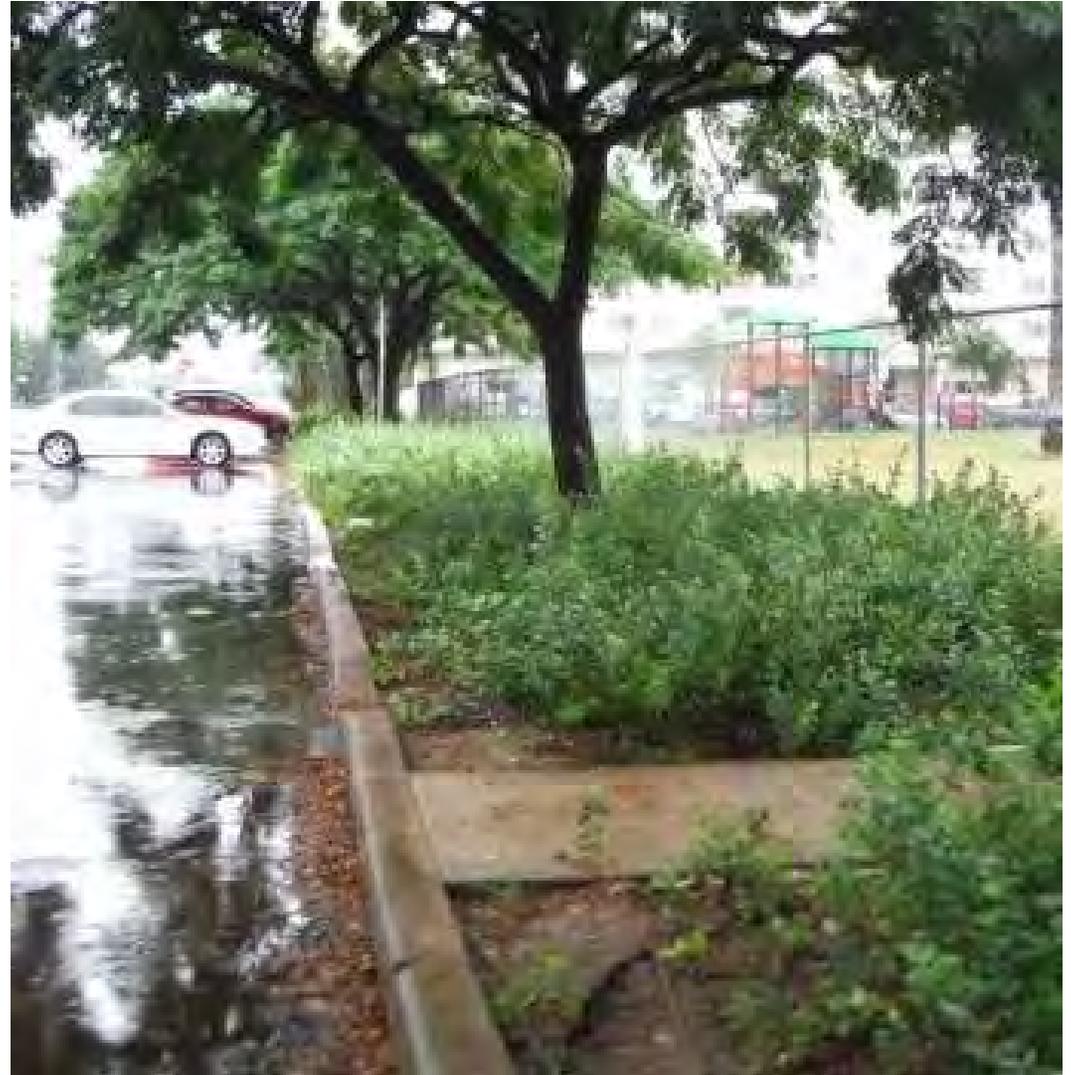
## Infiltration Basin

- ❑ Shallow impoundment that uses the natural filtering ability of the soil to remove pollutants
- ❑ Stores runoff prior to infiltration
- ❑ High pollutant removal efficiency
- ❑ Helps recharge groundwater



## Bioretention

- ❑ Shallow impoundment that uses engineered soil and plants to remove pollutants
- ❑ Stores runoff prior to infiltration
- ❑ High pollutant removal efficiency
- ❑ May help recharge groundwater
- ❑ Consider underdrain in poor soils
- ❑ Consider grading, inlets, overflow, planting



## Vegetated Swale

- ❑ Open, shallow vegetated channels that collect and convey runoff



- ❑ Treats runoff through filtering by the vegetation, filtering through subsoil matrix, and/or infiltration
- ❑ Traps particulate pollutants (suspended solids and trace metals), promotes infiltration, reduces velocity
- ❑ May require high flow bypass
- ❑ Consider O&M, access

## Vegetated Biofilter

- ❑ Similar to vegetated buffer, but with infiltration
- ❑ Filtered runoff discharges through an underdrain system
- ❑ Additional physical and biological processes
- ❑ Consider structural support of pavement





# Construction

# Construction

- Protect subgrade
- Materials
- Installation
- Protection from erosion and sedimentation
- Protect from construction activities
- Staging and sequencing

# Key Points of Construction

- ❑ Protect subgrade



# Key Points of Construction

- ❑ Installation



## Key Points of Construction

- Materials and media
  - Plant health and infiltration
  - Pollutant removal goals
  - Consistency between specs, approved products, and product supplied



# Key Points of Construction

- Protection from erosion and sediment



## Key Points of Construction

- Protect from construction activities
- Staging and sequencing
- Soil conditioning
- Vegetation



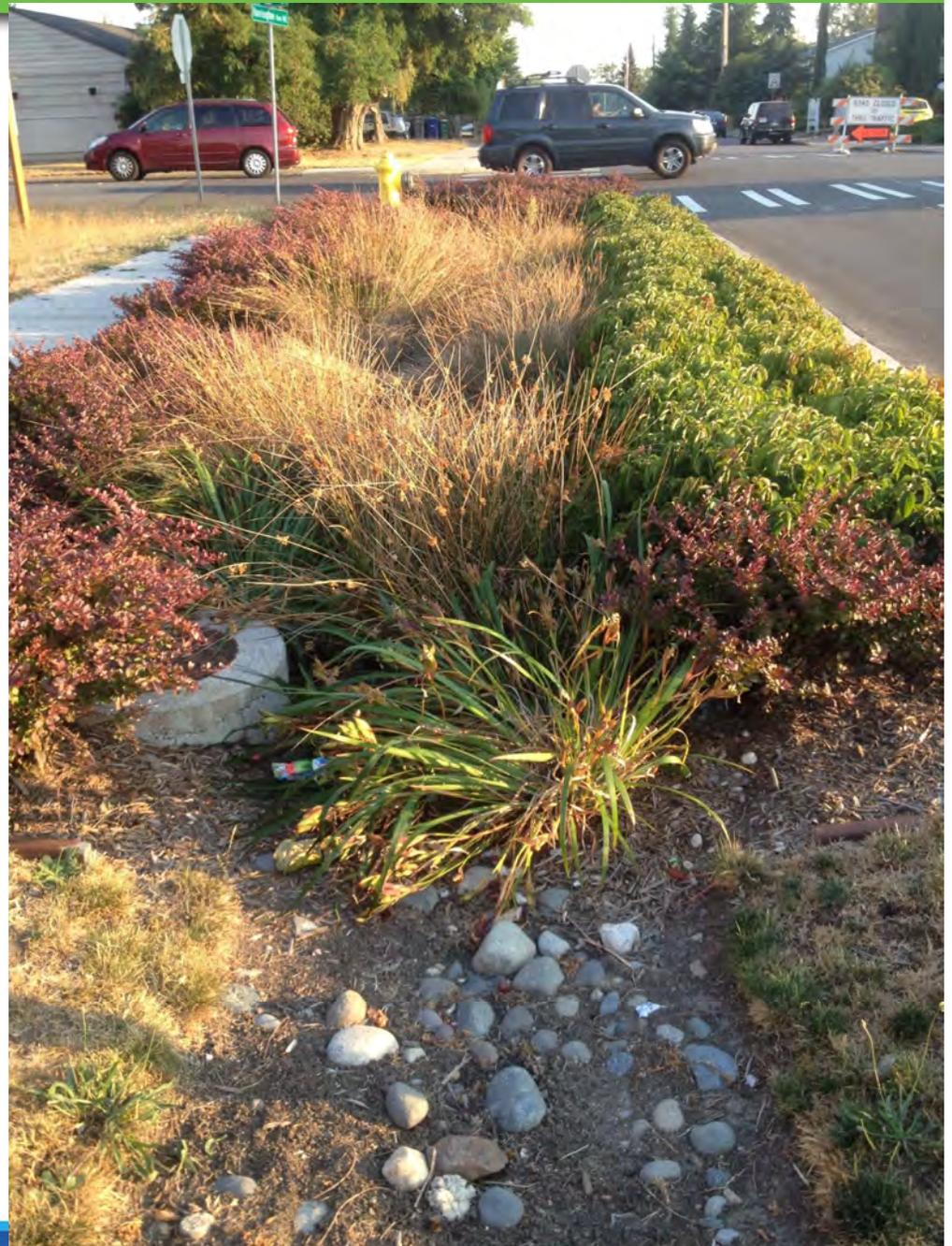
# Construction Closeout

- Protect with BMPs
- Establish vegetation
- Prevent invasive species
- Irrigate where necessary for establishment



## Post-Construction O&M

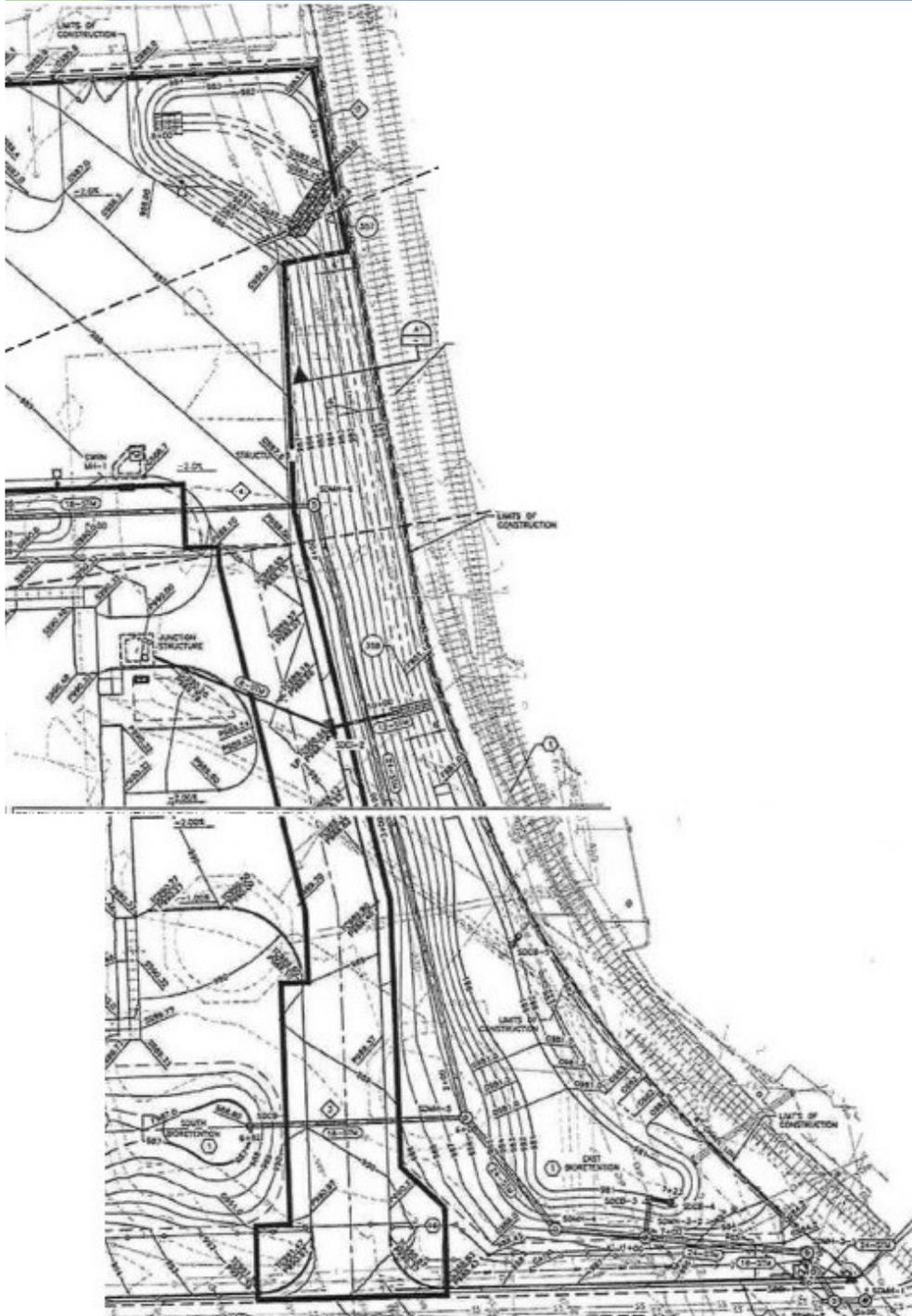
- Manage sediment, trash
- Maintain infiltration (if applicable)
- Maintain vegetation
- Avoid pests, disease vectors
- Maintain Function
- Meet Aesthetic Goals





## Example/Exercise

Temporary Erosion and Sedimentation Control



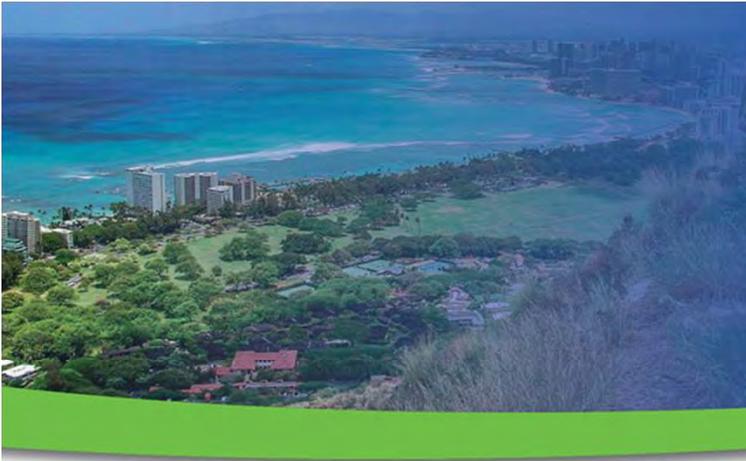
Building

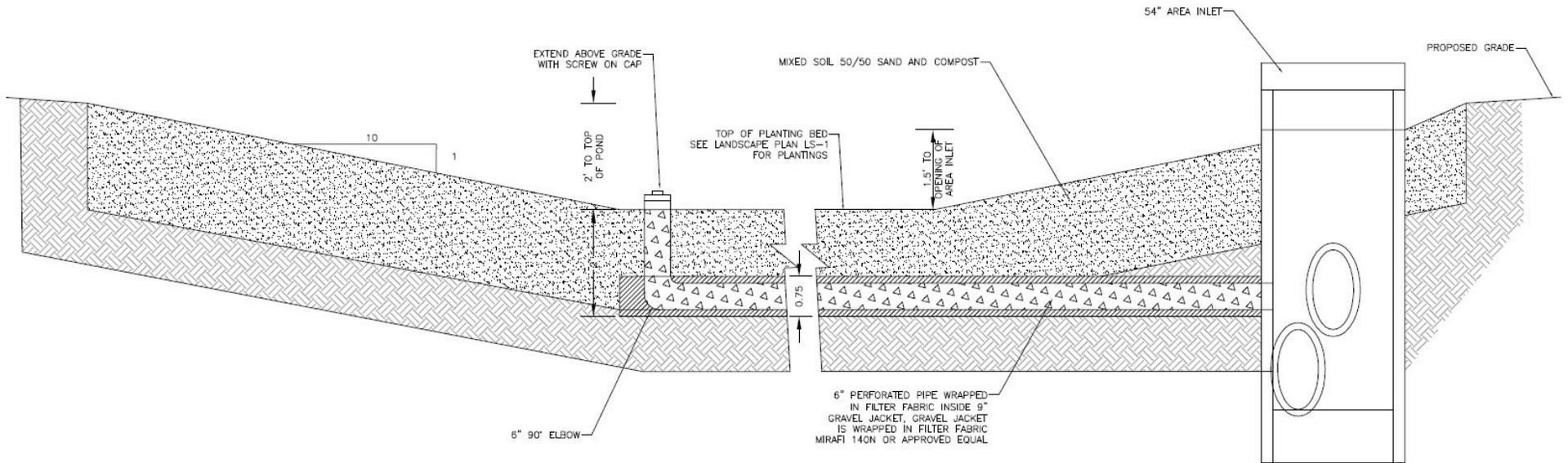
Driveway

Bioretention

1. In what order would you construct these 3 items, to have a successful bioretention?
2. Where would you need BMPs during construction, assuming stormwater falling on the site flows left to right, and north to south, draining to inlets at the southeast corner of the site?

# What Could Go Wrong?





**BIO-RETENTION POND TYPICAL SECTION**











# What Happens in Construction?





## See Note

POST-CONSTRUCTION STORM WATER MANAGEMENT FACILITY. FACILITY IS NOT TO BE USED FOR CONSTRUCTION STORM WATER MANAGEMENT OR SEDIMENT CAPTURE FROM CONSTRUCTION ACTIVITIES. INSTALL SIGN MARKING THESE FACILITIES. ENSURE SEDIMENT FROM CONSTRUCTION SITE DOES NOT ENTER BMPs. IF SEDIMENT/DEBRIS DOES ENTER THESE FACILITIES, REMOVE IT AND RESTORE FACILITIES IMMEDIATELY.









# Rain Garden Example





## See Note

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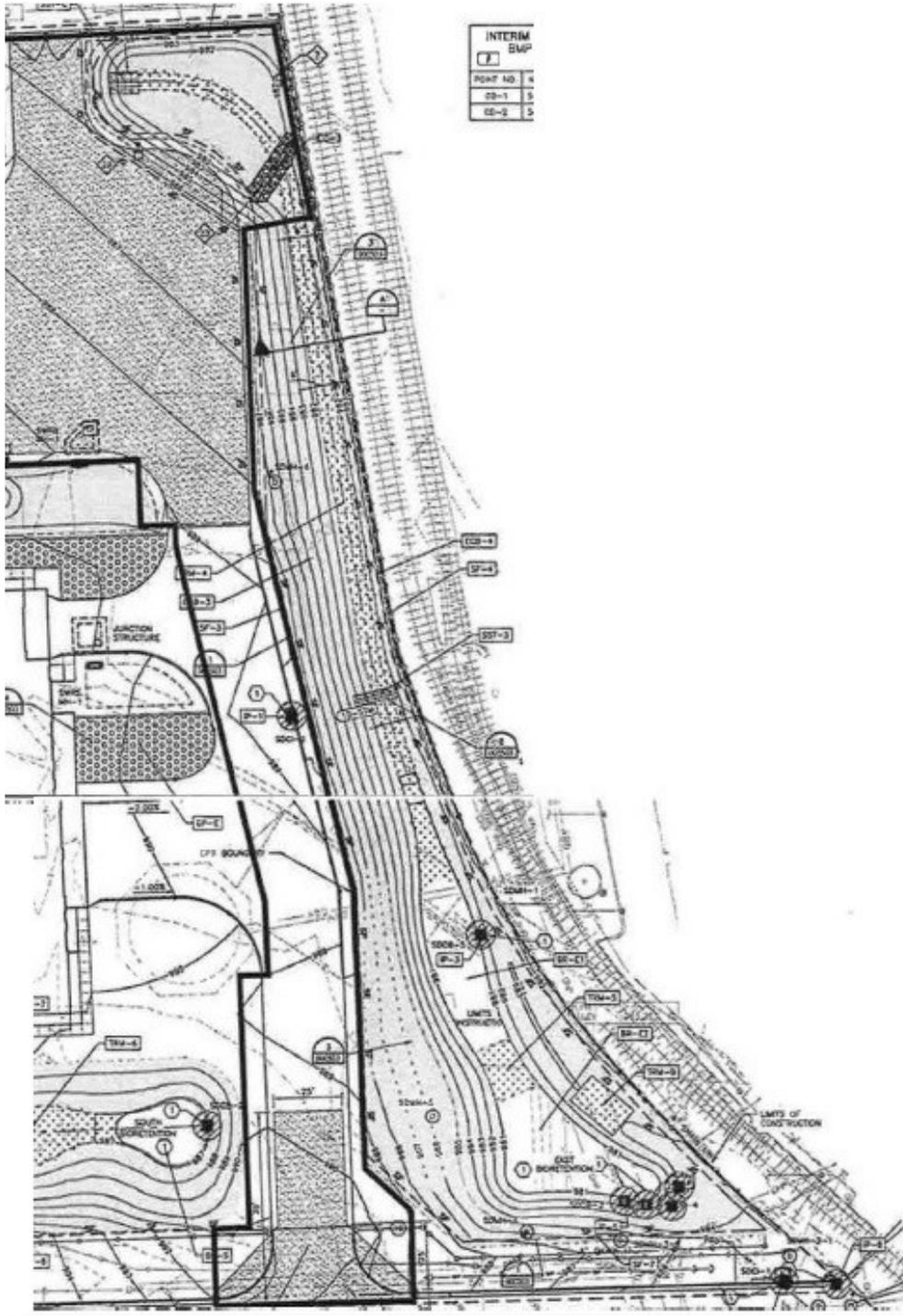


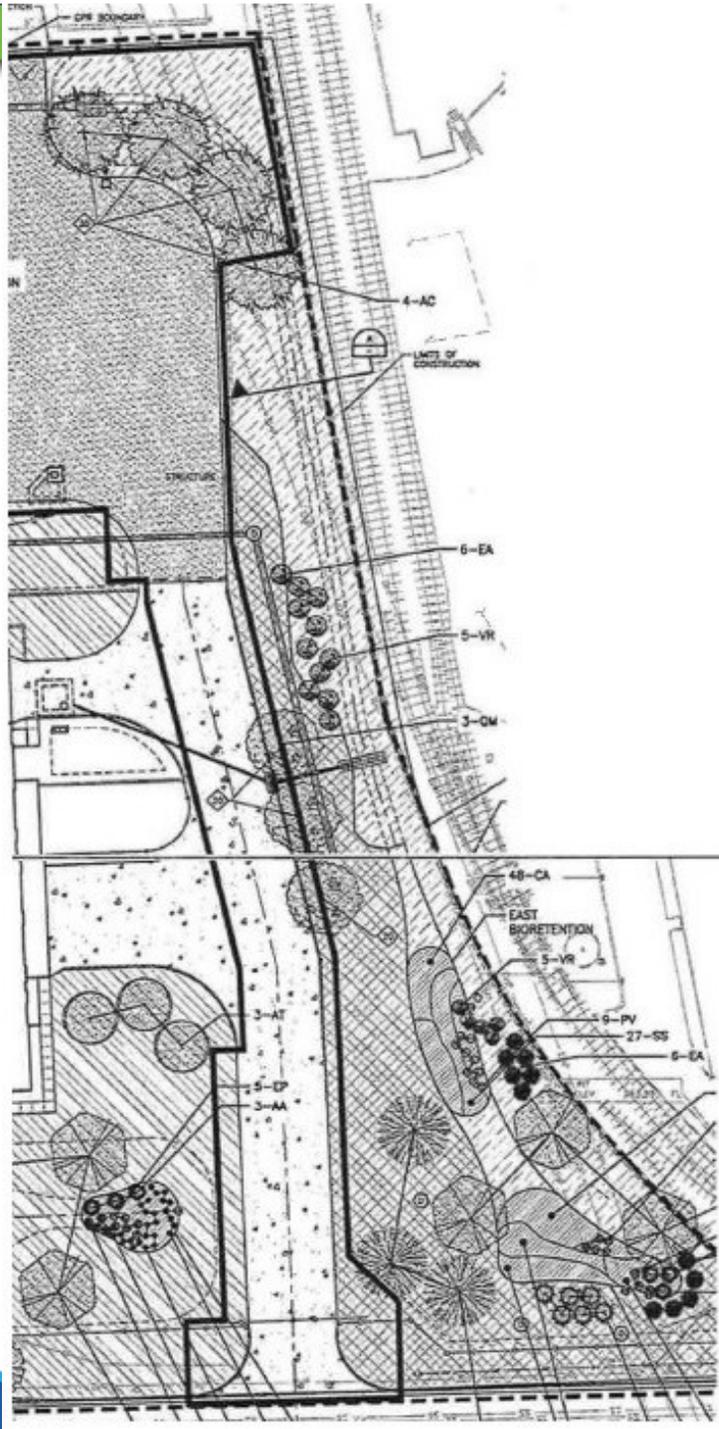




# Bioretention Example















# Protection (and Lack of Protection) of Contributing Areas and Flows













# Another Project on the Bioretention Site

























**Thank you**

Questions?

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