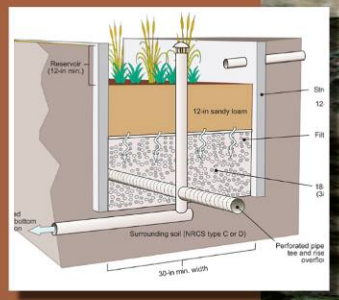
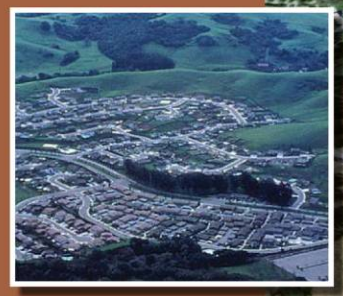
Sizing Stormwater Control Facilities to Address Stream-Bank Erosion Control





Anthony M. Dubin, PE
Brown and Caldwell
tdubin@brwncald.com

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Environmental Engineers & Consultants

Major Topics to Address

1. Why Hydrograph Modification Management is important
2. How Low Impact Development controls work
3. Describing the technical analysis that generated the set of pre-sized IMPs

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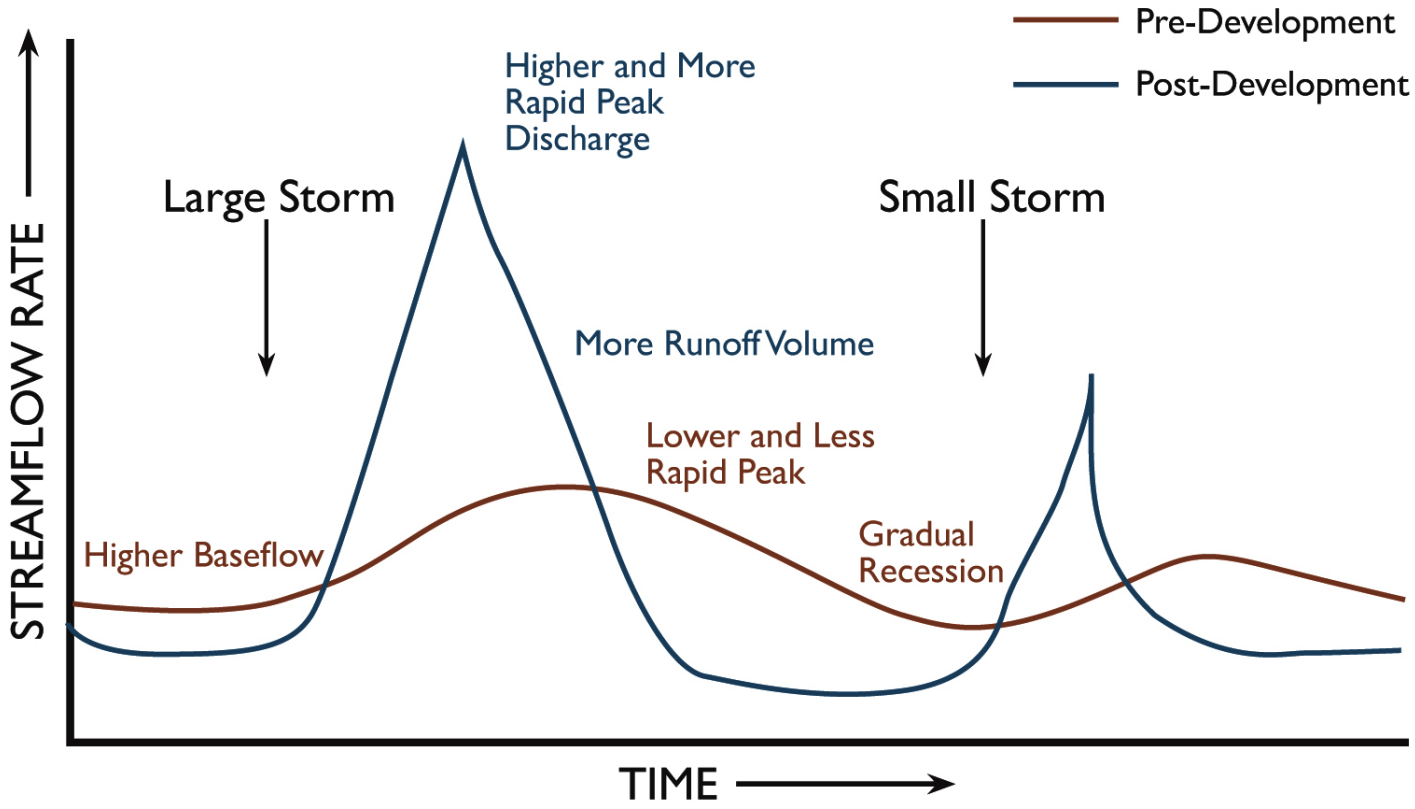
Effects of Urbanization

- **Impervious surfaces produce higher runoff rates, volume and duration of large flows**



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Effects within the Watershed

- Urbanization alters the watershed
- Channels respond with incision and/or armoring

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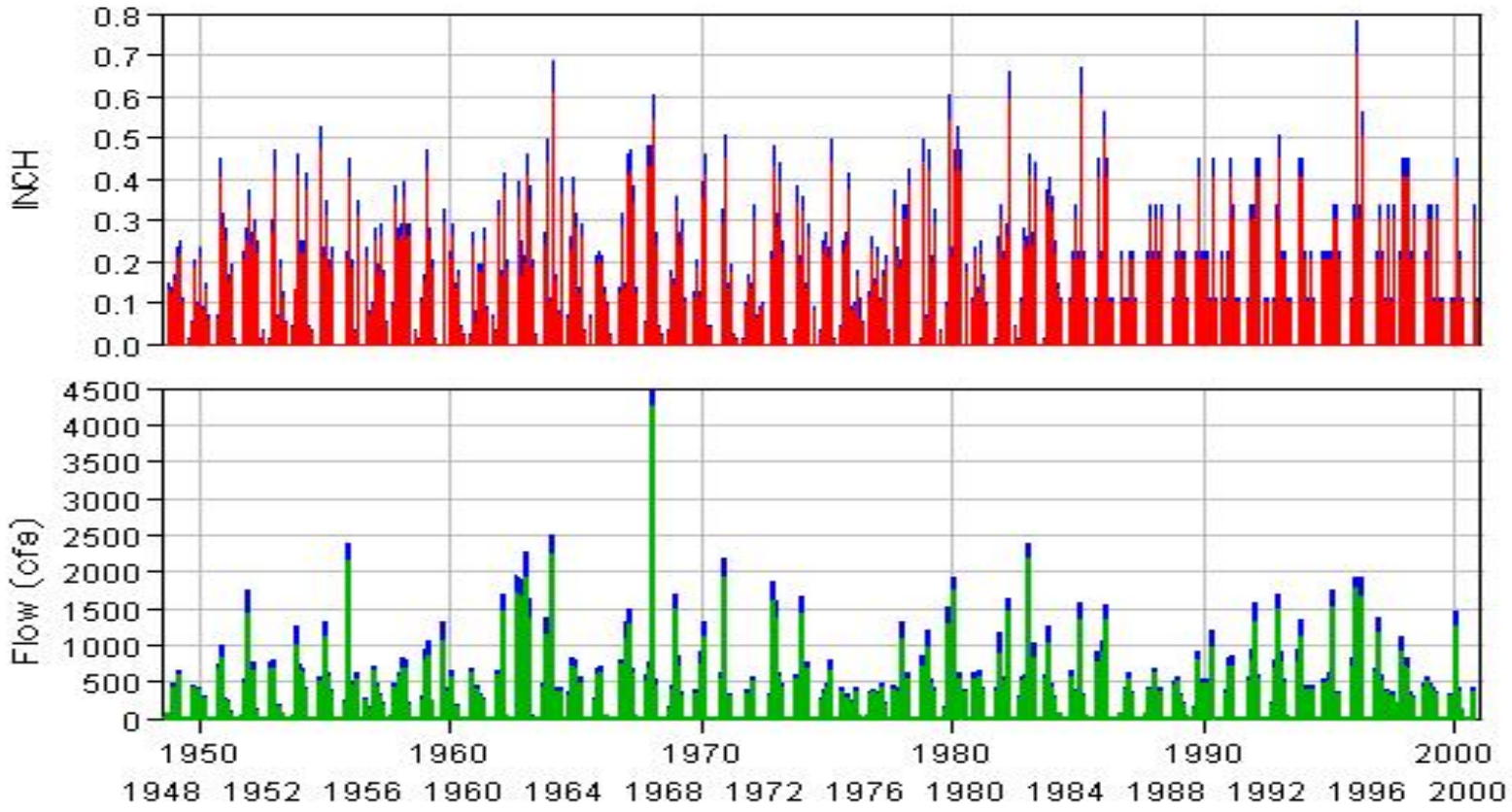
Continuous Hydrologic Modeling Examines Full Range of Local Conditions



- **Sizing to one 'design storm' is not enough**

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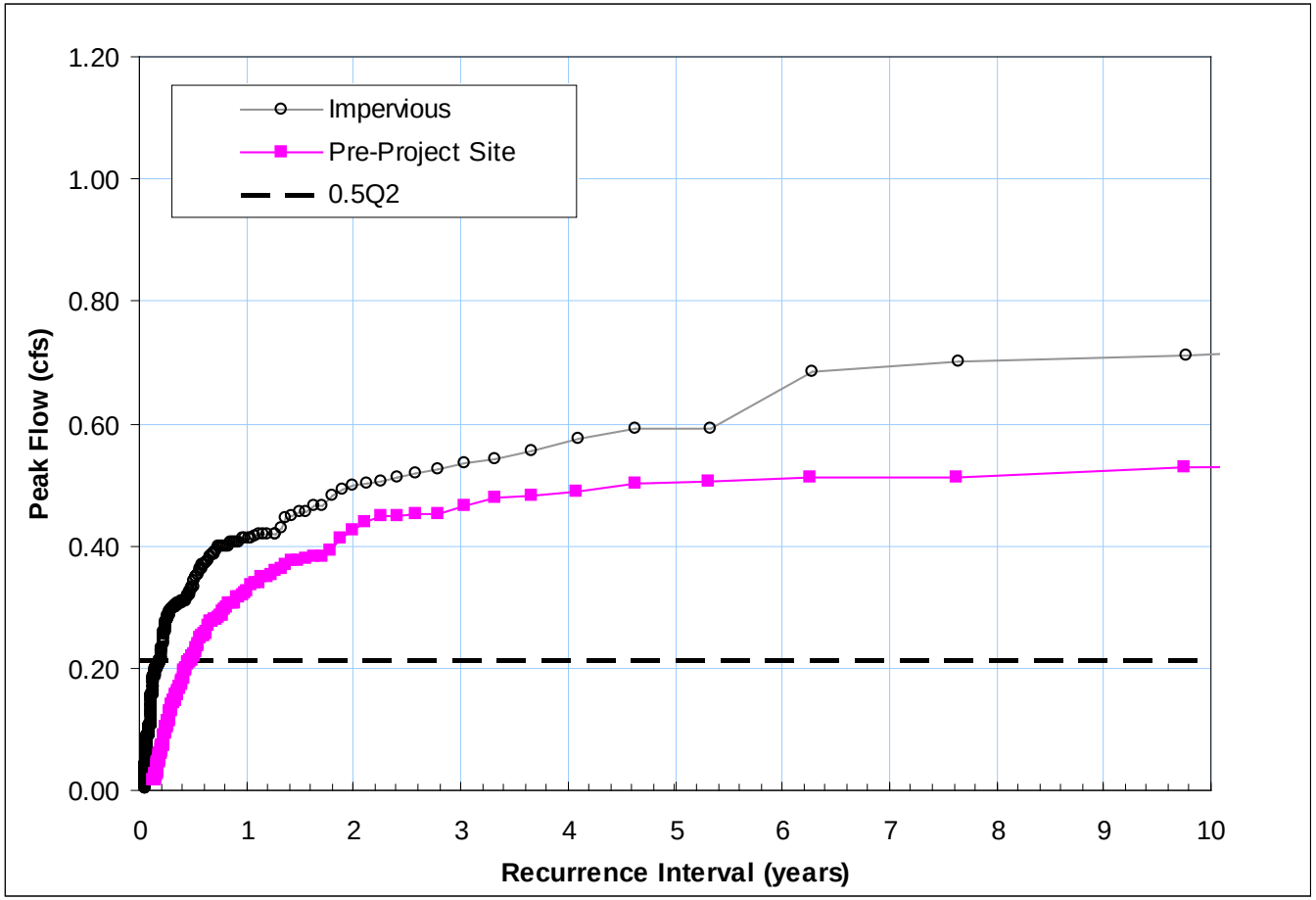
Peak Flow Frequency
(Partial Duration Statistics)



- **Identify all HSPF storms in record and rank**

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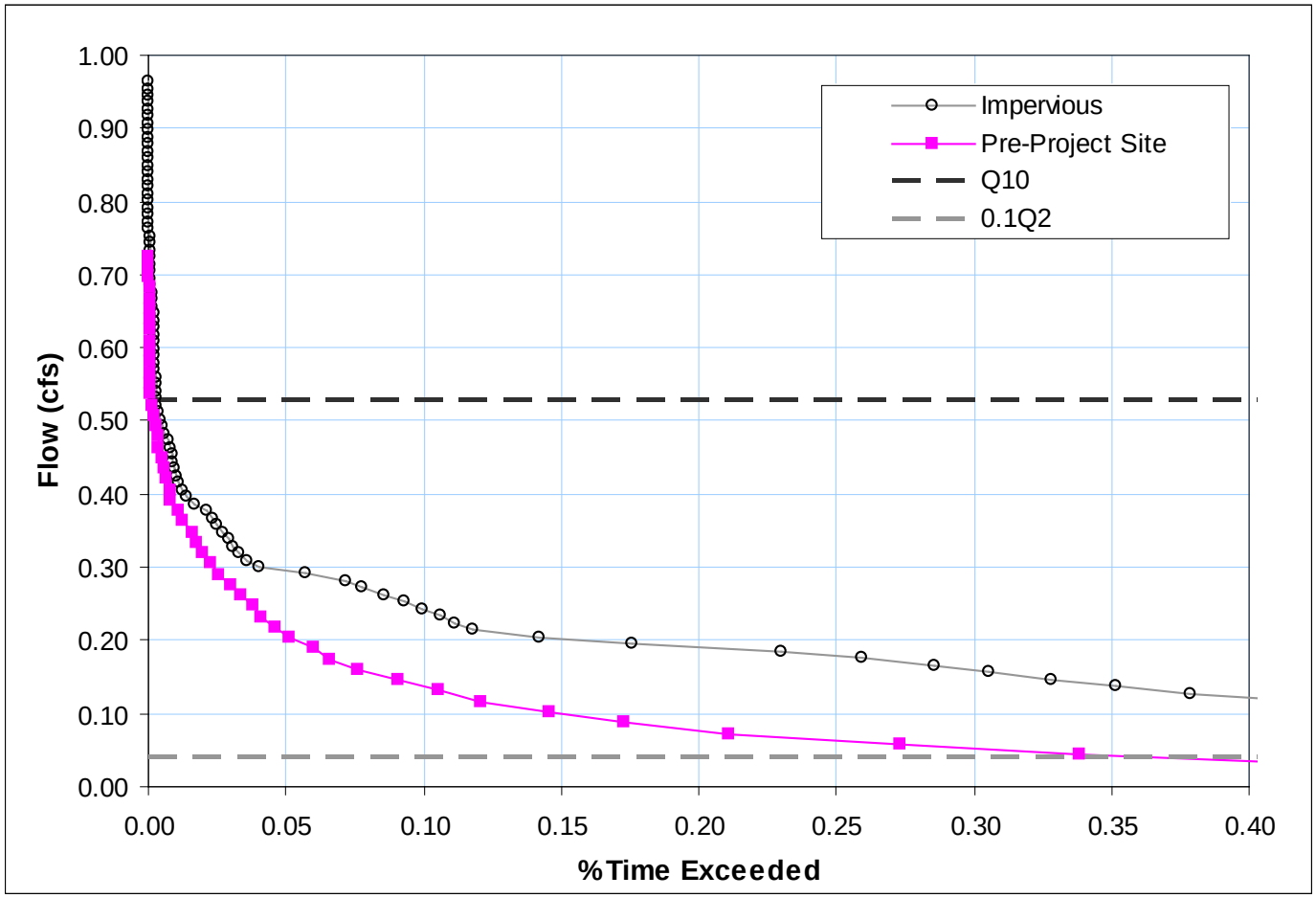
Flow Durations



- **Rank hourly outputs from HSPF model**

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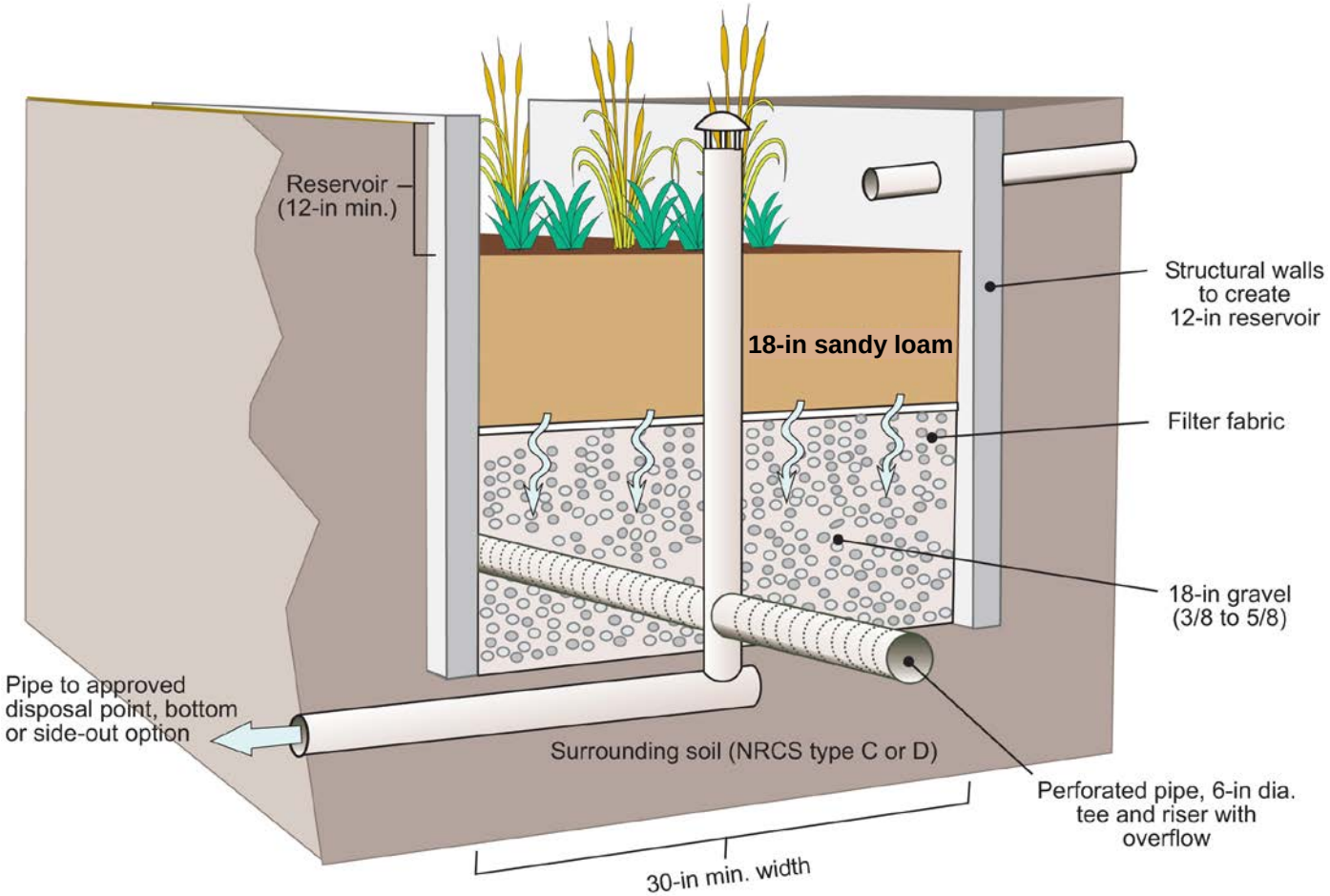
Example IMP: In-Ground Planter



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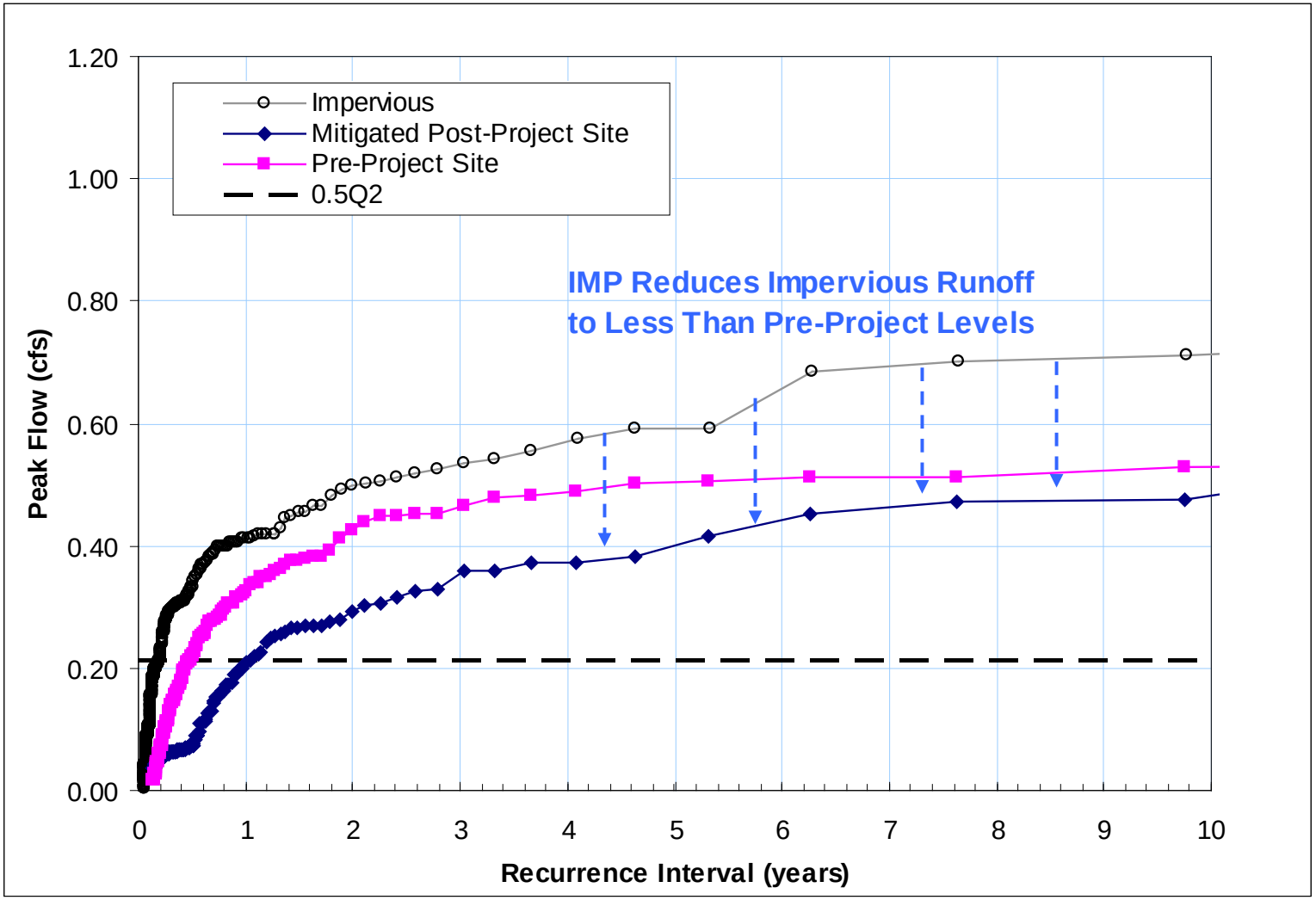
Peak Flow Matching Example



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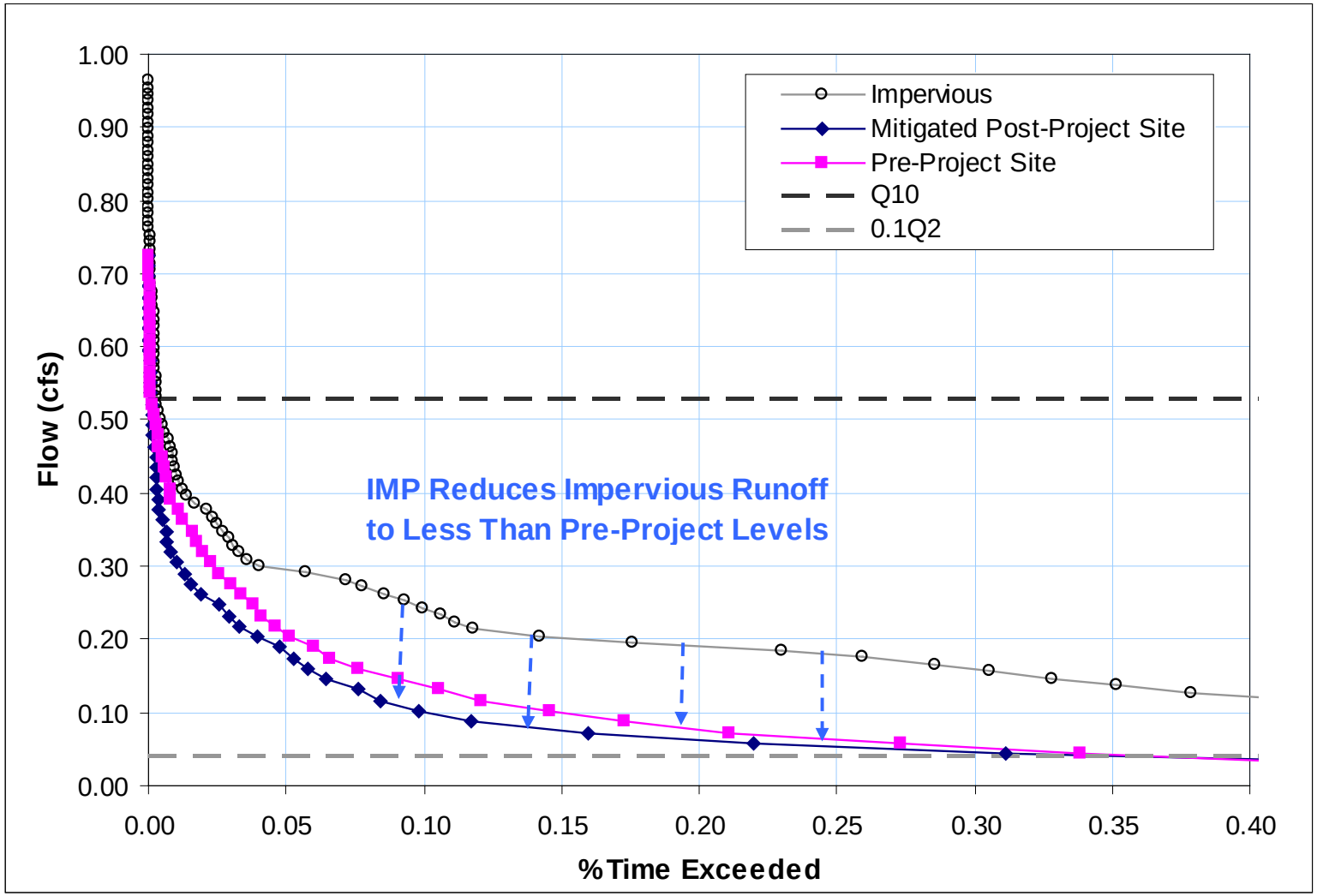
Duration Matching Example



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BMP Sizing Factor Summary

Under-Drain or Infiltration:

IMP	Sizing Factors
In-Ground Planter	Group A: 0.08 Group B: 0.11 Group C: 0.06 Group D: 0.05
Flow-Through Planter	Group C: 0.06 Group D: 0.05
Vegetated/ Grassy Swale	Group A: 0.10 to 0.14 Group B: 0.14 to 0.21 Group C: 0.10 to 0.15 Group D: 0.07 to 0.12
Bioretention Basin	Group A: 0.13 Group B: 0.15 Group C: 0.08 Group D: 0.06

Infiltration Only:

IMP	Sizing Factors
Dry Well	Group A: 0.05 to 0.06 Group B: 0.06 to 0.09
Infiltration Trench	Group A: 0.05 to 0.06 Group B: 0.07 to 0.10
Infiltration Basin	Group A: 0.05 to 0.10 Group B: 0.06 to 0.16

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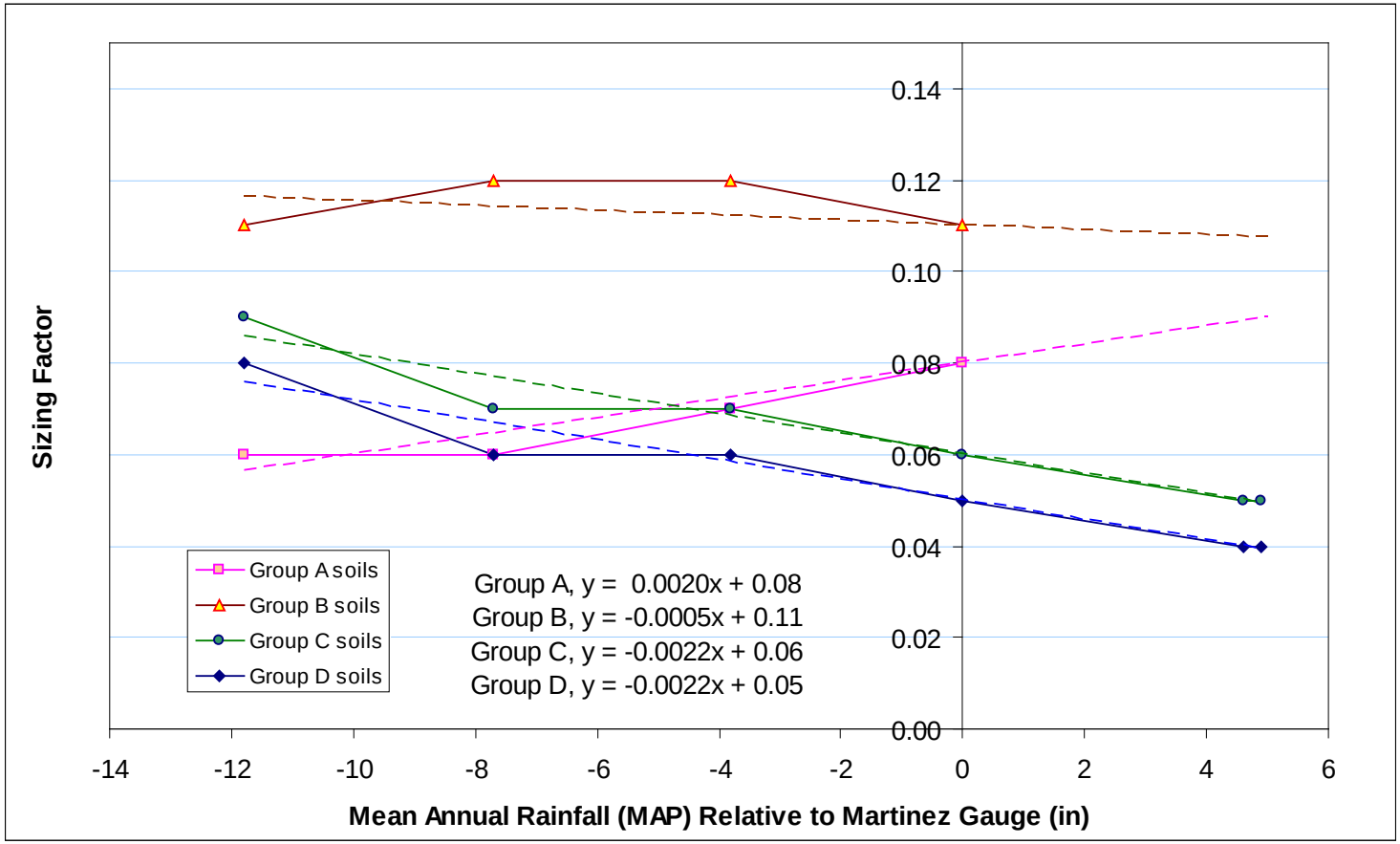
Adjusting IMP Sizing to Account for Rainfall Variability



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Sizing Conclusions for Implementation

- IMPs in Group D soil sites are generally smaller than Group A soil BMPs
- Steep side walls produce smaller sizing factors
- Sizing factor may be particularly important for on-site BMPs
- Swales and Bioretention basin footprint may be less important if BMPs fit into otherwise undeveloped space

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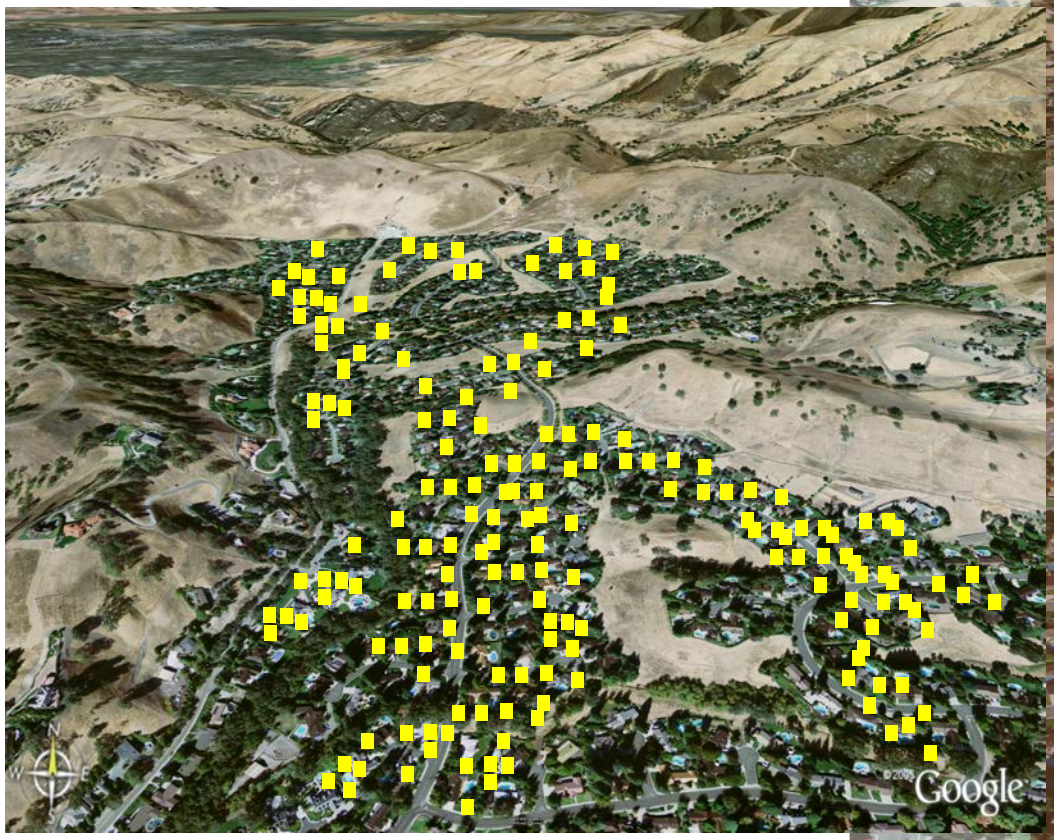
Questions?

Contra Costa Approach to Hydrograph Modification

- **Encourage LID to control stormwater flows**
- **HMP is technically rigorous and easy to apply**
- **Assumes need to match pre-project condition**



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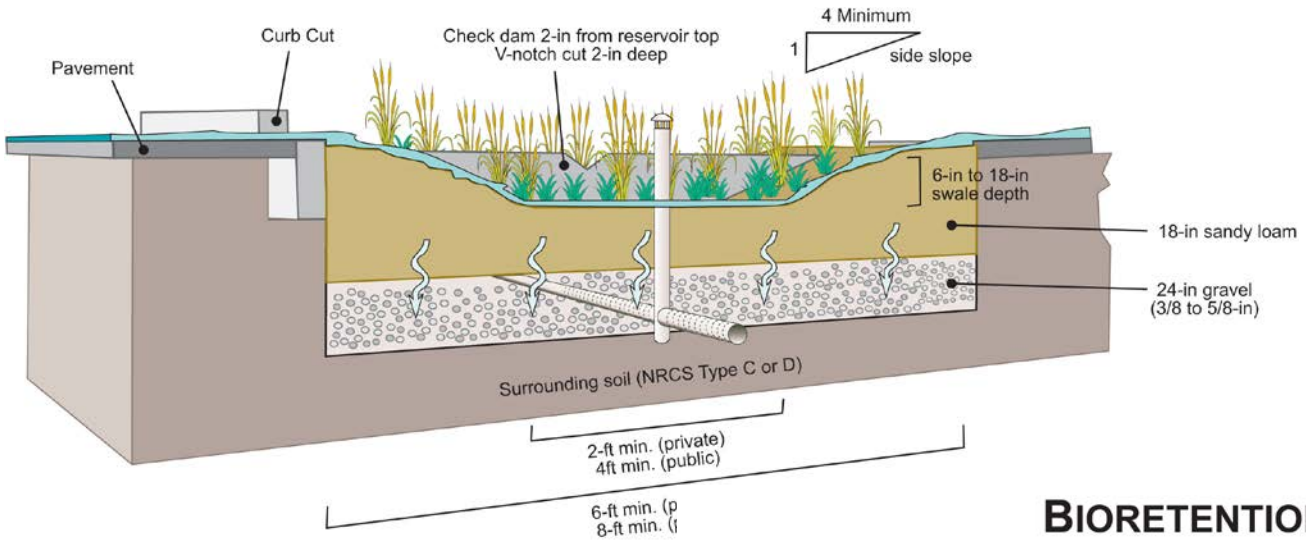
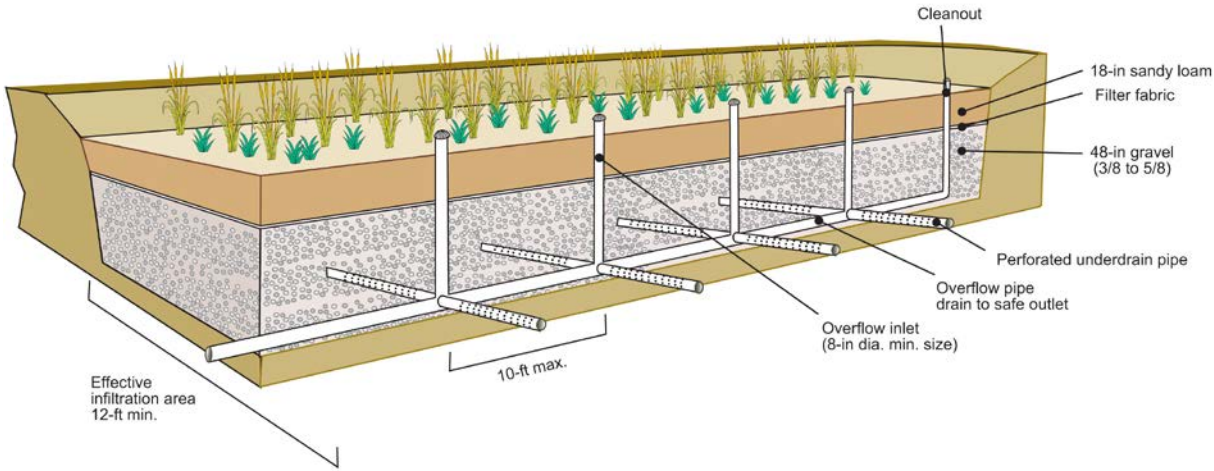
BMP Gallery

GRASSY/VEGETATED SWALE

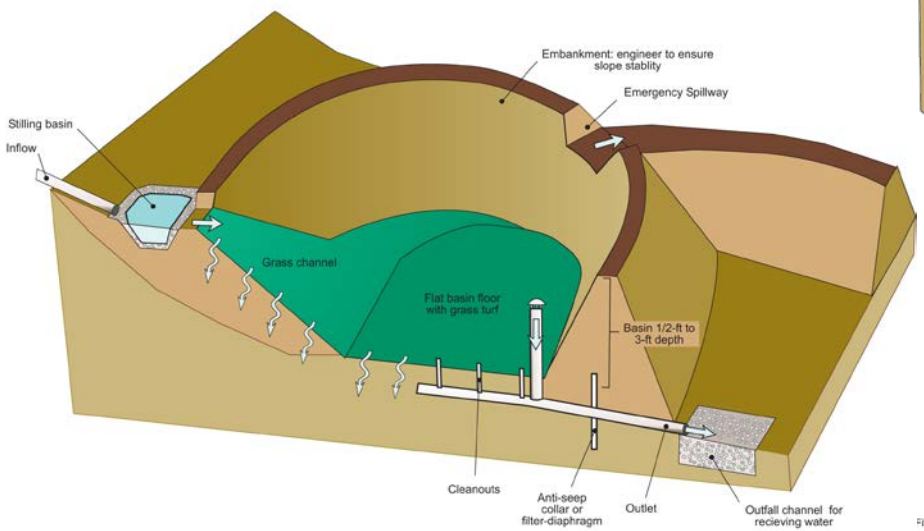


BIORETENTION DETAIL



BMP Gallery

Infiltration Basin Detail



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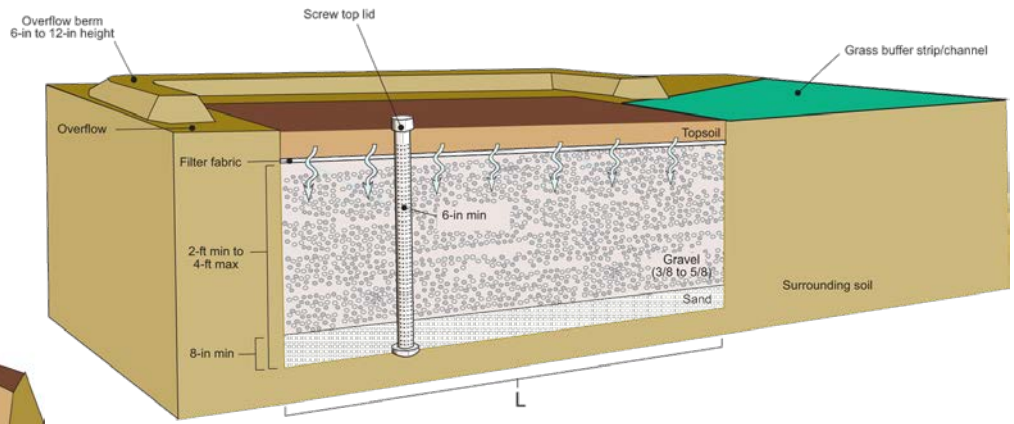
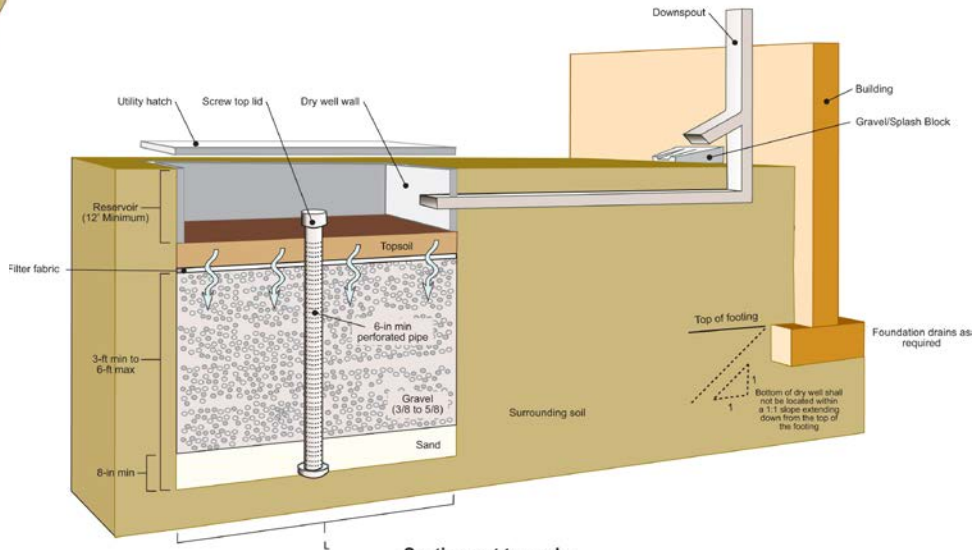
Infiltration Trench Detail



Dry Well Detail



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Instructions for Computing Local Sizing Factors

1. Describe each DMA on the project site, including area, soil type, post-project surface type
2. For DMA's draining to IMPs, select an IMP and configuration (e.g. swale width, dry well depth)
3. Pick the appropriate sizing factor from the summary sizing factor table (see handout)
4. Compute the rainfall adjustment using the regression equations (see handout)
5. Local sizing factor = Sizing Factor x RainAdj