Photo: http://en.wikipedia.org/wiki/File:SeededfertilizedlawnJPG

Status Update of Turf Work Order

January 18, 2013 MIDS Workgroup Meeting

Categories of Turf "Credits"

1. **Impervious Surface Disconnection-** turf (or green space) that captures runoff from impervious surfaces

2. **"Better Turf"-** turf that does not capture impervious runoff, but is installed and maintained to promote infiltration at a higher rate than typical (amended or loosened soils)

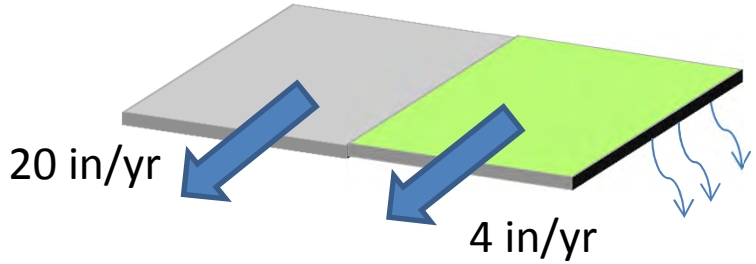
Credits for **Impervious Surface Disconnection**

- Runoff from impervious areas (sidewalks, parking lots, etc.) is redirected to green space instead of the storm sewer
- Overall site runoff will be reduced
- Reduction will depend on the additional infiltration capacity of the turfed area (annual basis)

Photo: http://www.reporthost.com/a1qual/sample1/

Credits for **Impervious Surface Disconnection**

- During most rainfall events, there is no runoff from pervious surfaces, and full infiltration capacity is not utilized.



- Redirection of impervious runoff takes advantage of the “extra” infiltration capacity of turf, but infiltration of ALL redirected runoff is unlikely.

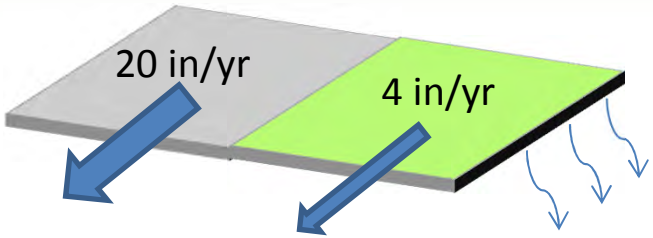
So how much of the redirected runoff will still run off?

- Primary factors include:
  - Ratio of Impervious Area to Turf Area

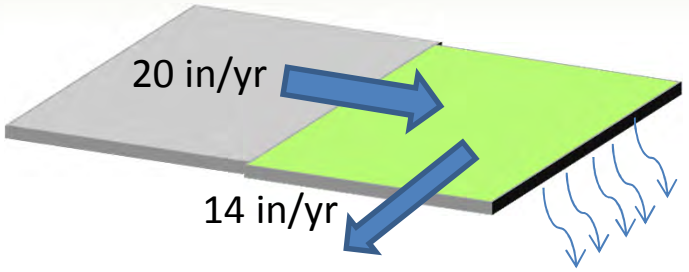
  - Soil type (infiltration capacity)

Runoff Reduction from Hypothetical Site

- Use modeling results to determine annual site runoff reduction



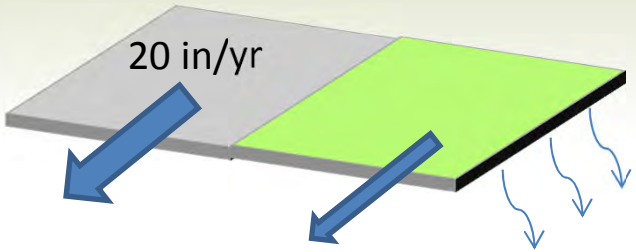
Site Runoff = 24 inches/year



Site Runoff = 14 inches/year

- Site Runoff Reduction = 24 in/yr – 14 in/yr
  = 10 in/yr

Quantifying Disconnection "Credit"



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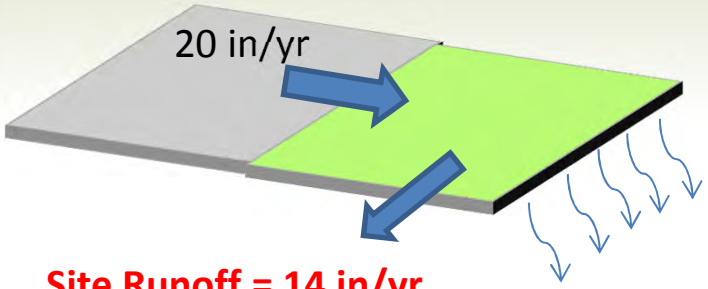


Site Runoff = 14 in/yr

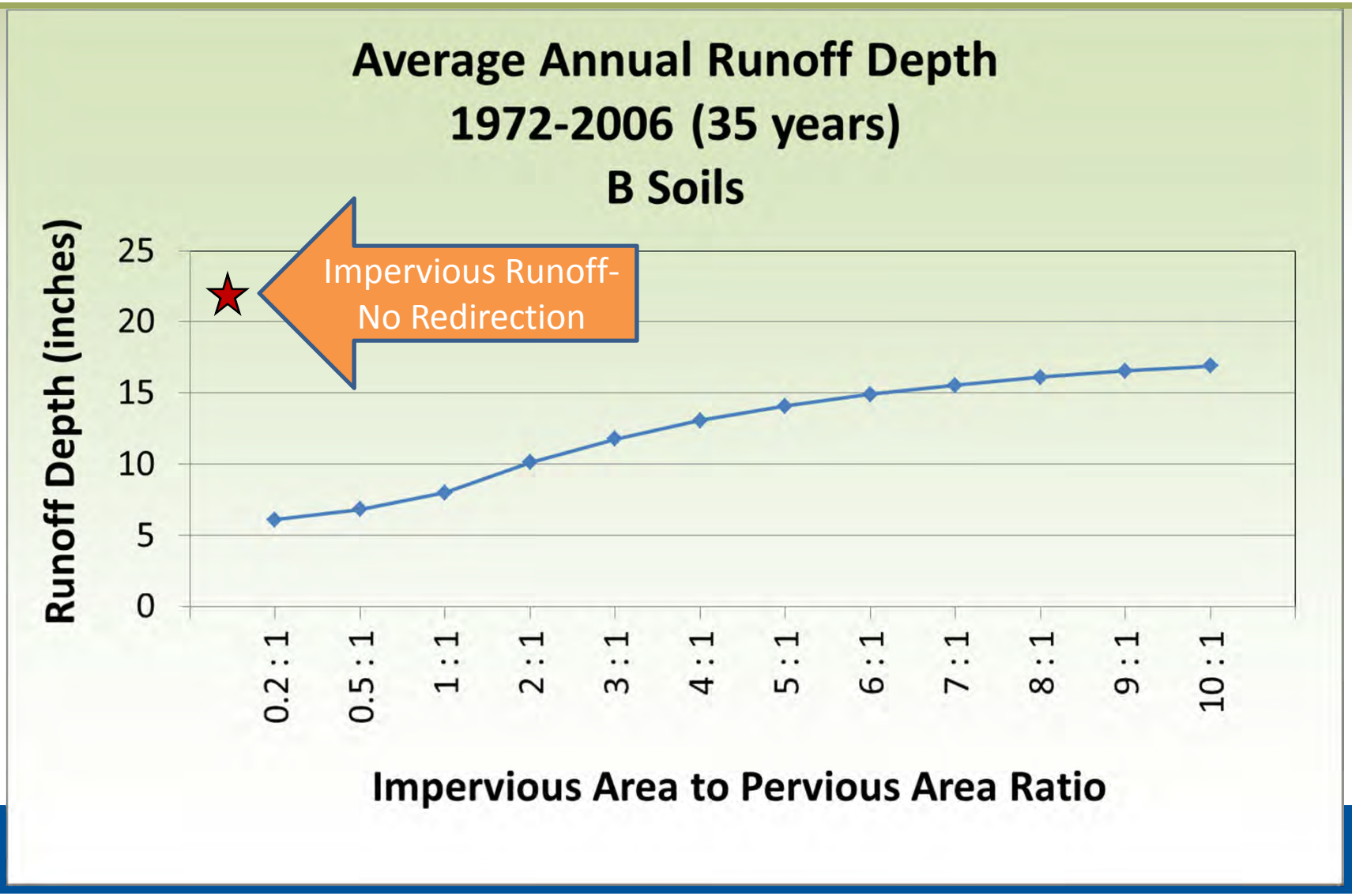
- Percent Reduction of Impervious Runoff =

$$\frac{\textbf{Site Runoff Reduction}}{\textbf{Pre-disconnection Impervious Runoff}} = \frac{10\ \text{in/yr}}{20\ \text{in/yr}} = \frac{1}{2} = 50\%$$

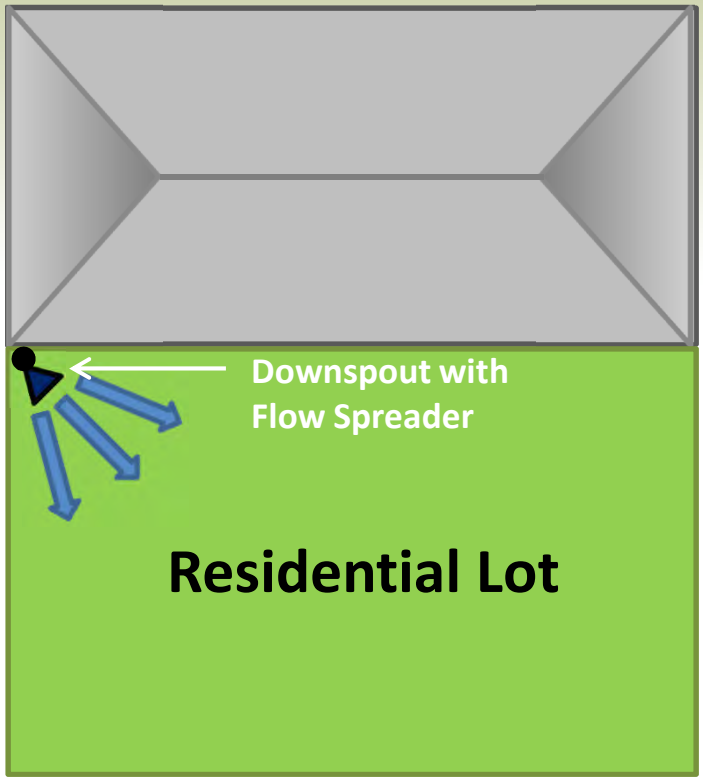
Modeling Methodology

- Used XP-SWMM hydrologic model to quantify runoff reduction
  - Long-term simulation to determine annual performance (35 years of climatic data)
  - Event-based simulation to assess relation to 1.1-inch performance goal (1.1-inch storm over 15- and 30-minute durations)
- Redirected impervious runoff to pervious areas and quantified overall site runoff
- Varied soil type AND ratio of impervious to pervious area (I/P Ratio)

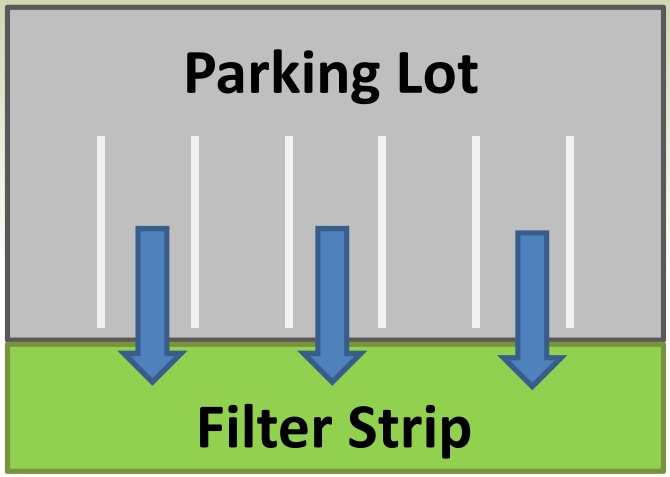
Average Annual Runoff Impervious Ratio Comparison



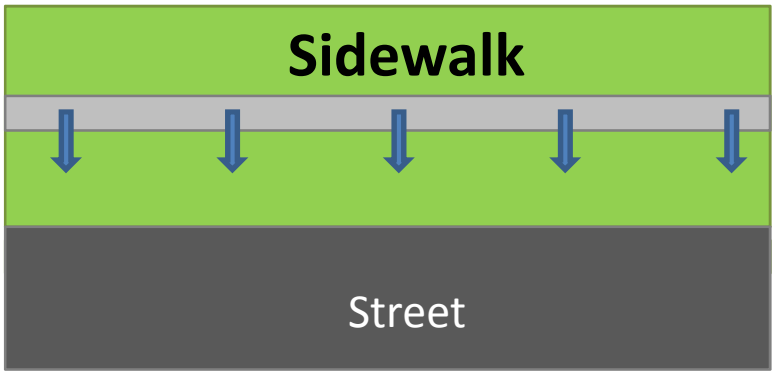
Example Scenarios with varying Impervious/Pervious Area (I/P) Ratios



I/P Ratio = 1:1

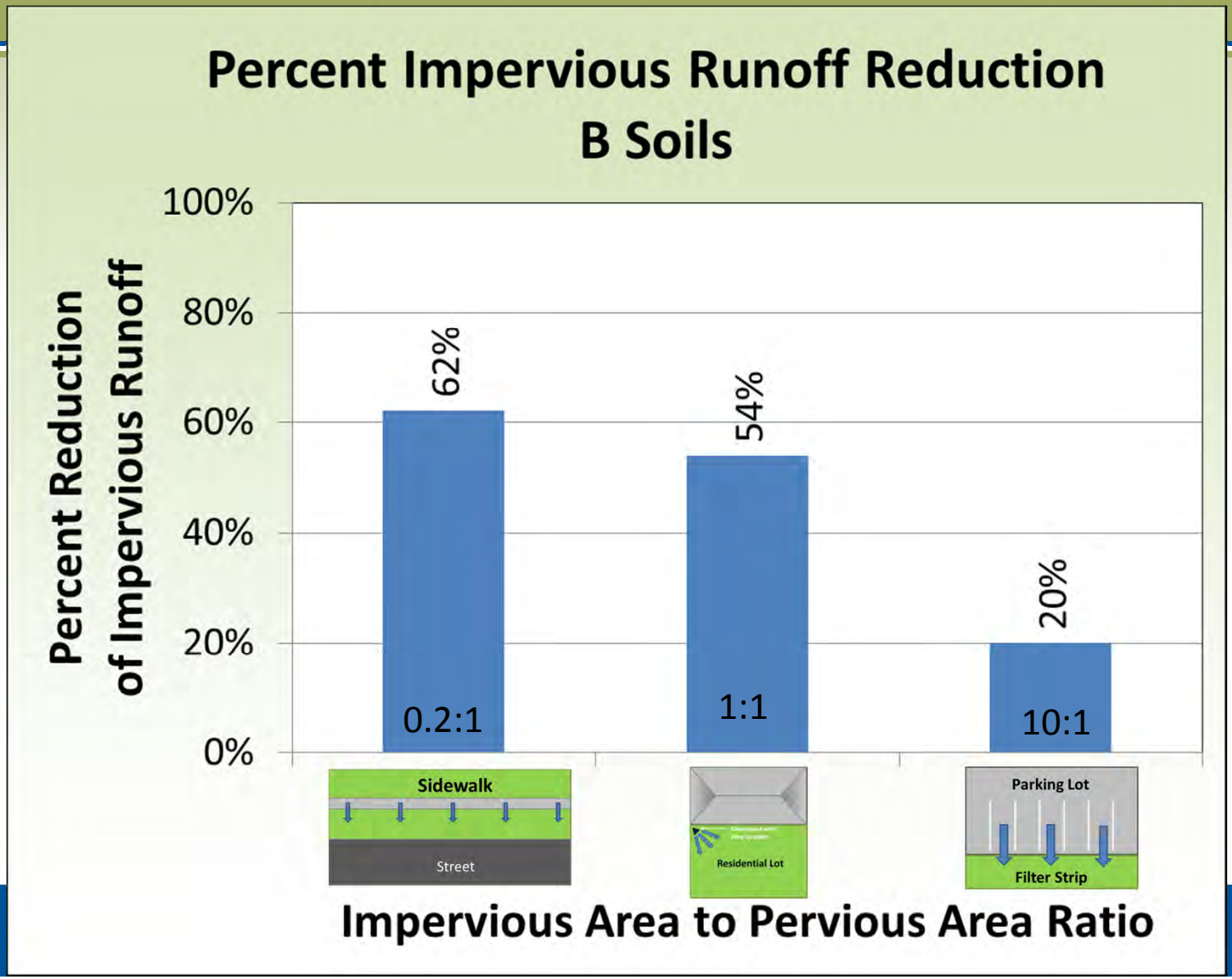


I/P Ratio = 10:1

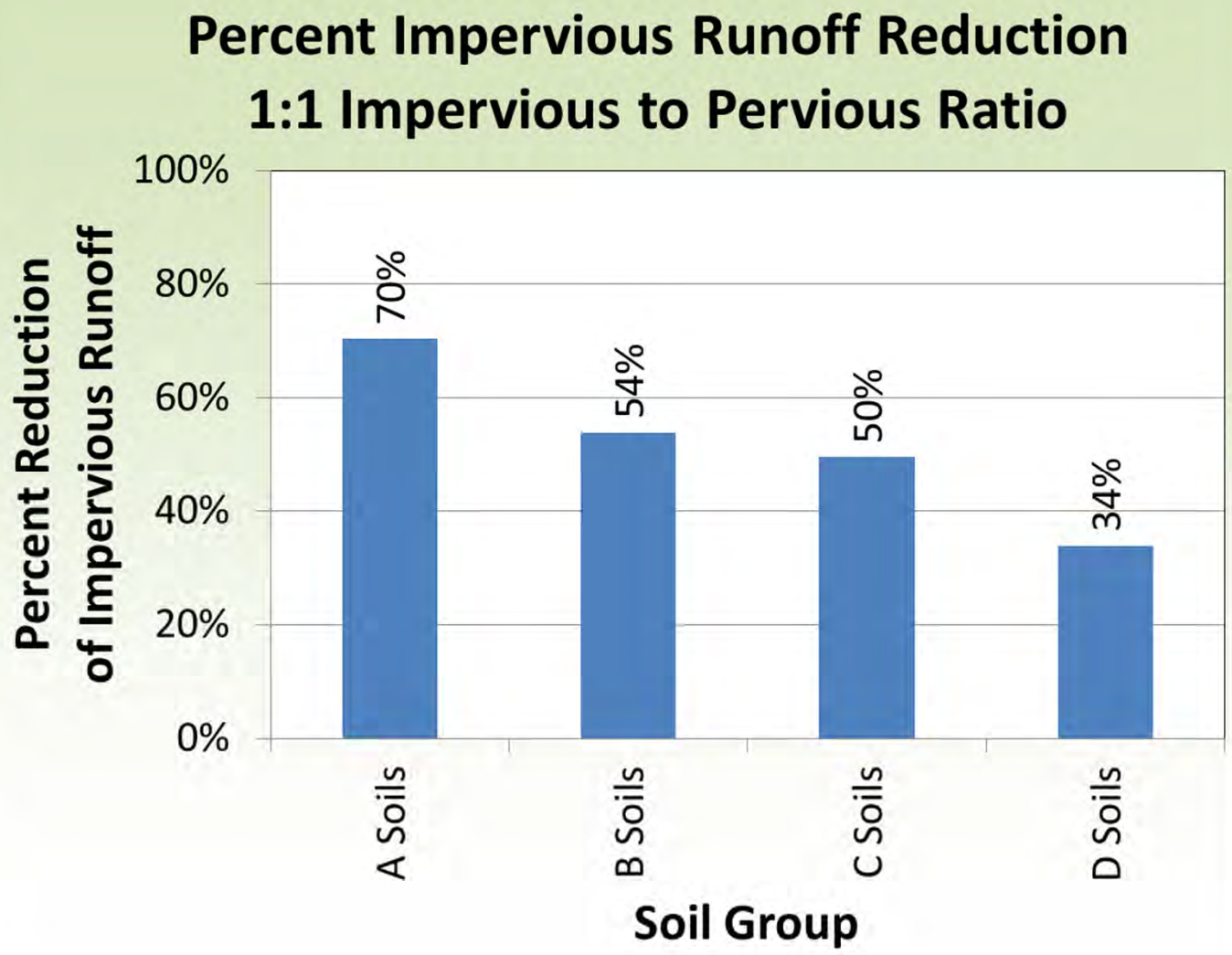


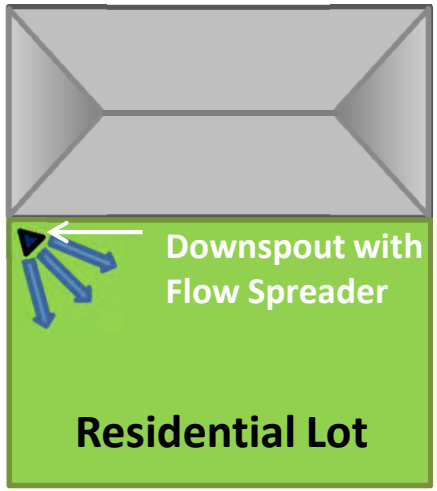
I/P Ratio = 0.2:1

Average Annual Runoff Reduction Varies based on I/P Ratio



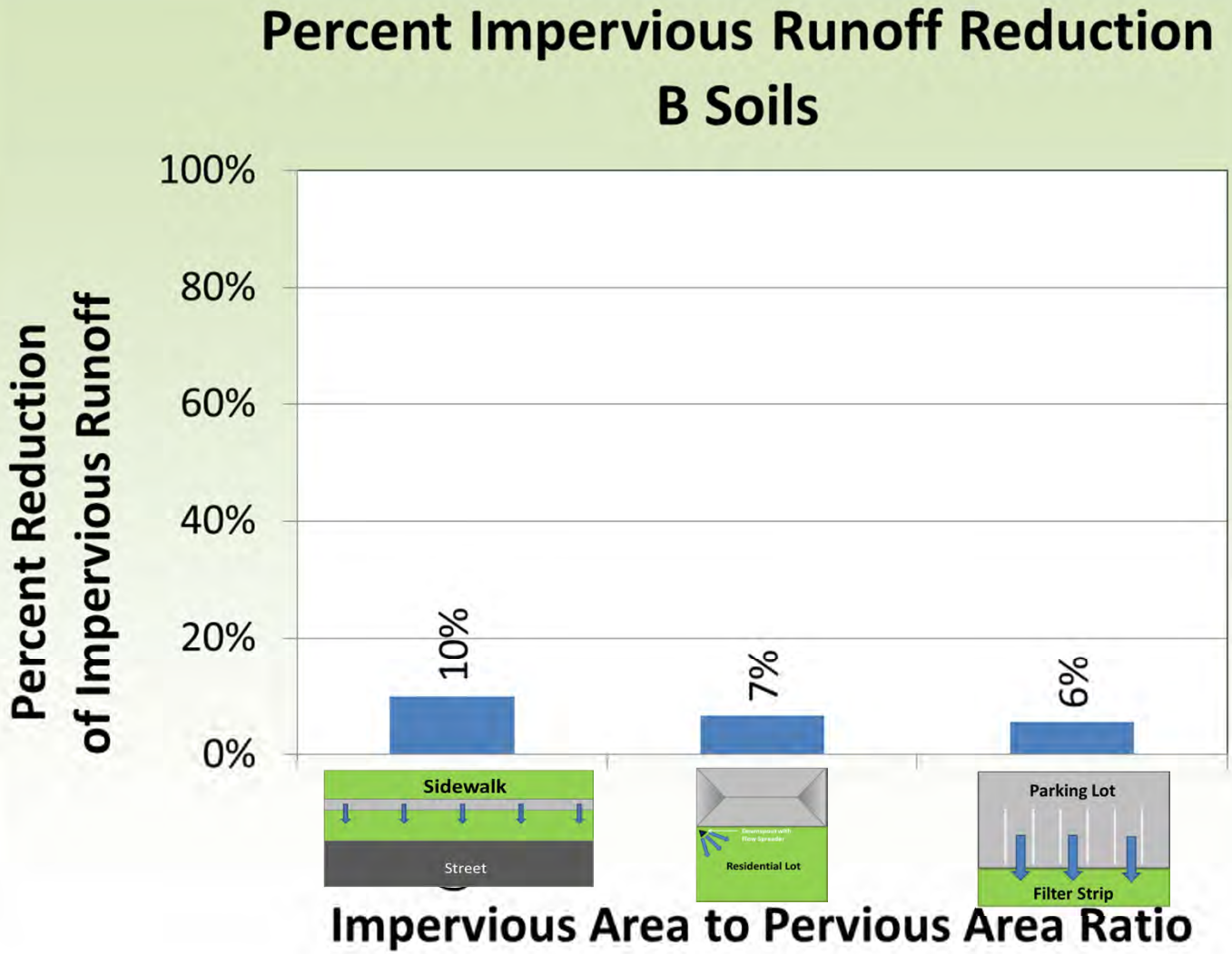
Average Annual Runoff Reduction Varies by Soil Type





I/P Ratio = 1:1

Event-based Runoff Reductions less than Annual Reductions



Event = 1.1 inches rainfall in 15 minutes

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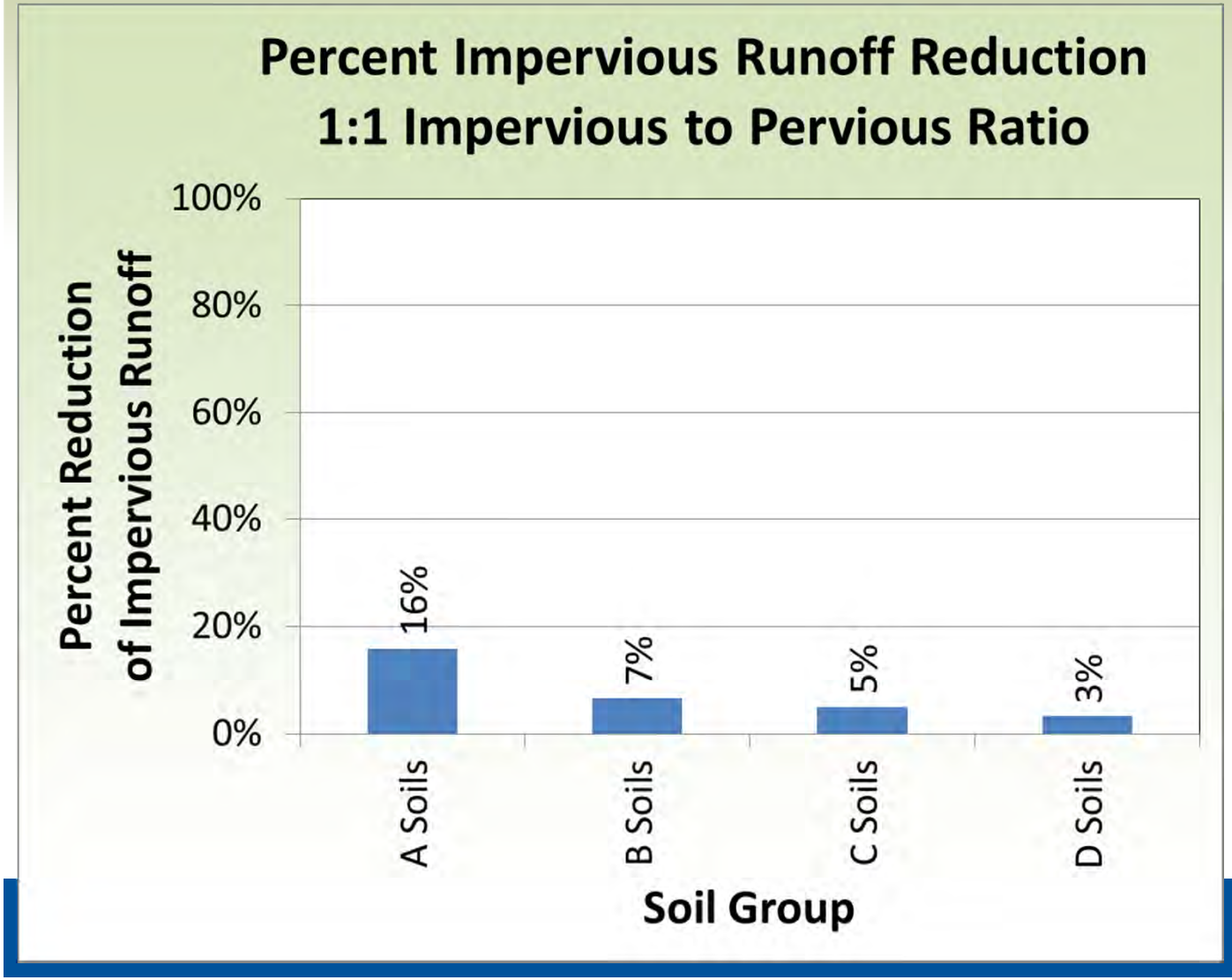
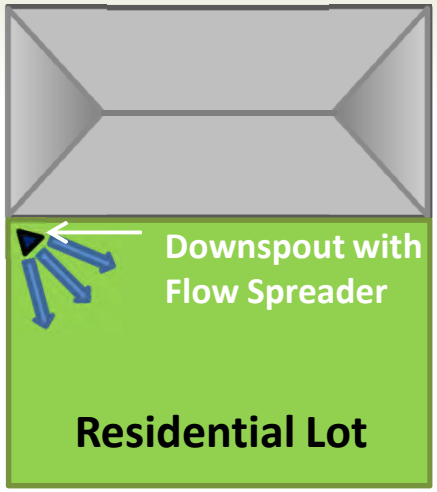
Event-based Runoff Reductions less than Annual Reductions





I/P Ratio = 1:1

Event = 1.1 inches rainfall in 15 minutes

BARR

Impervious Surface Disconnection Conclusions and Caveats

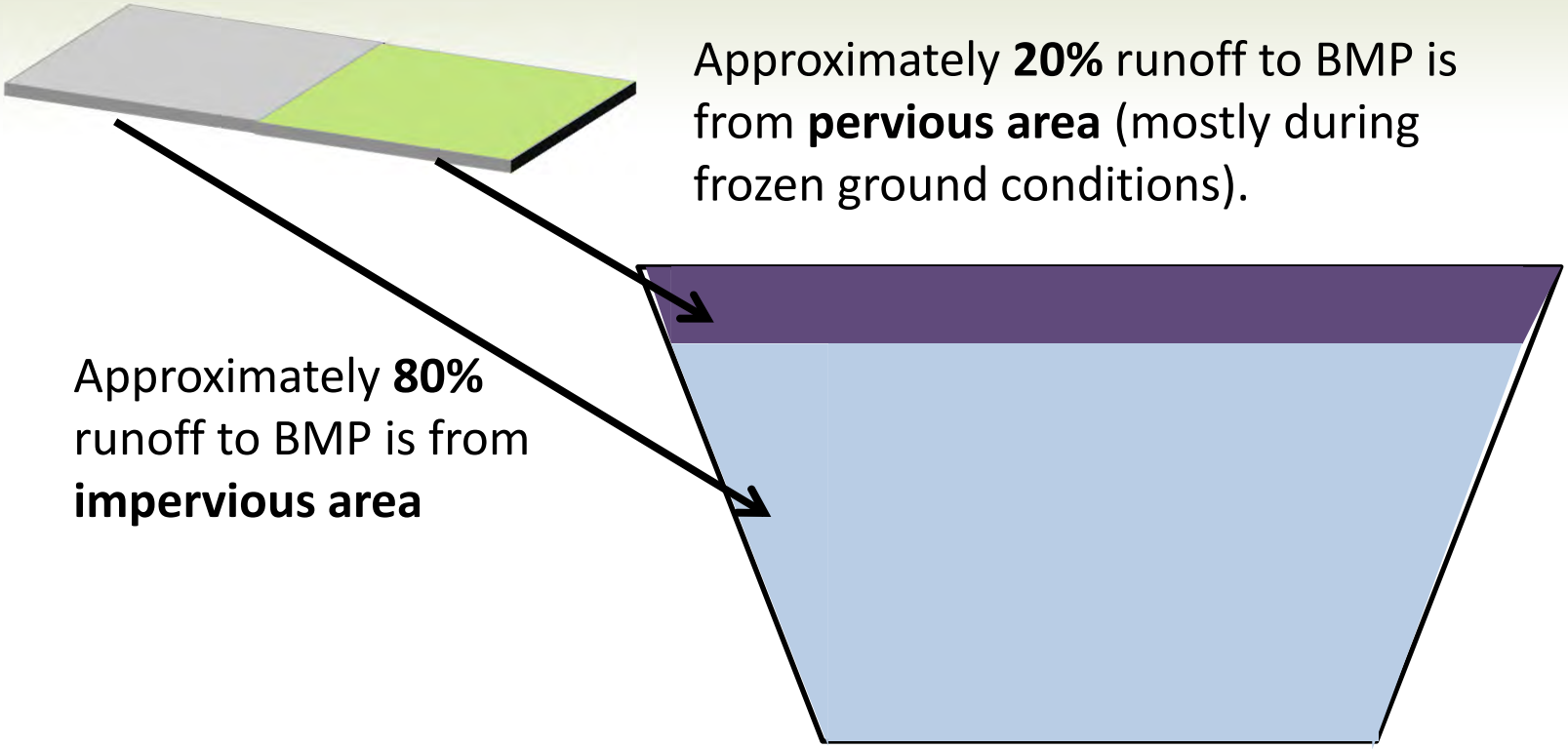
- Impervious surface disconnection can result in significant runoff reductions on an annual basis
- Redirection is less effective for high-intensity storms
- Site design criteria must be specified to appropriately apply modeling results to credit calculation
  - Modeling assumes redirected water is equally distributed over turf area
  - "Effective" turf areas must be able to maintain sheet flow (concentrated flow will leave the site before infiltrating)

Credits for "**Better Turf**"

- Turf area is maintained or amended to achieve higher infiltration rate
- Overall site runoff will be reduced
- Reduction will depend on the additional infiltration capacity of the turfed area (annual basis)

How much runoff does this practice target?

For a 50% impervious site with B soils



Approximately **20%** runoff to BMP is from **pervious area** (mostly during frozen ground conditions).

Approximately **80%** runoff to BMP is from **impervious area**