



# **Sediment Basin Design and Effects on Retention Efficiency**

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# Sediment Export?







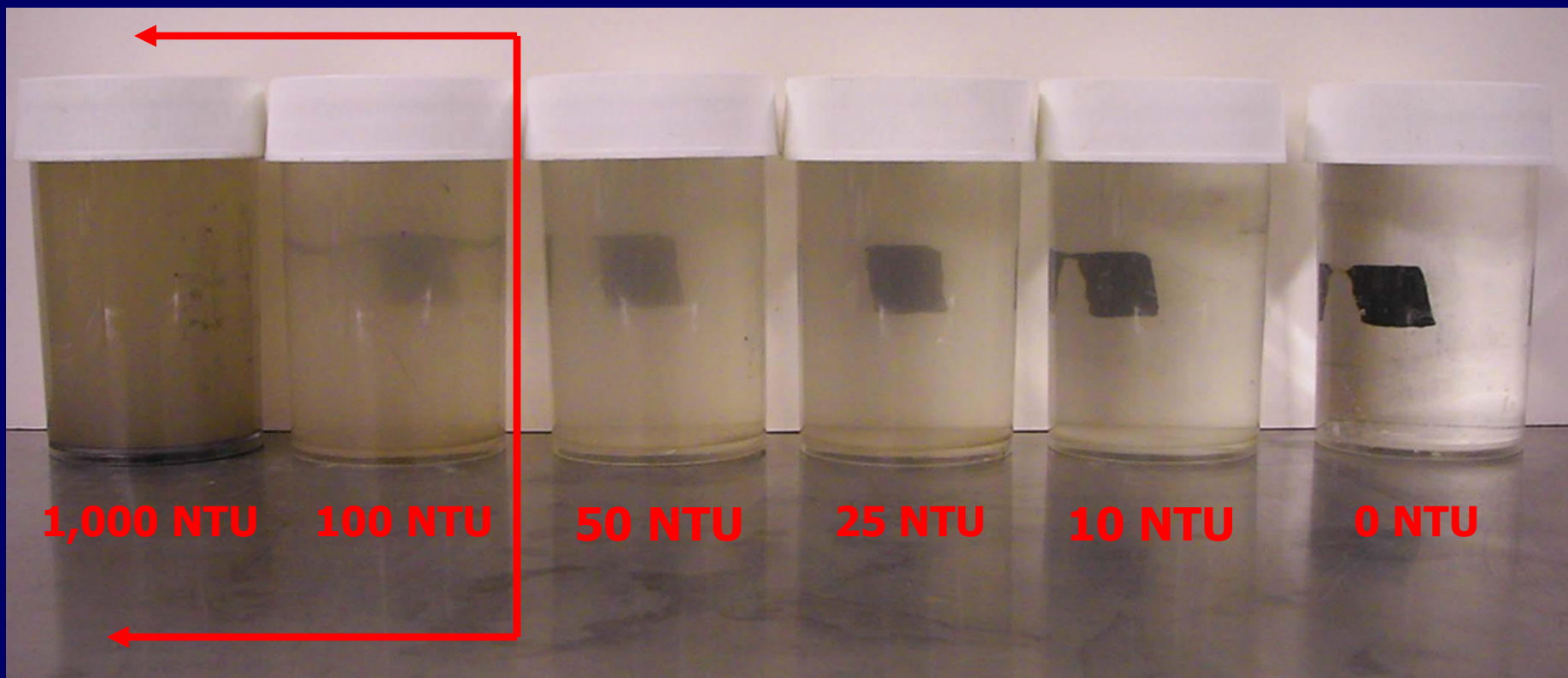




# NC Discharge Regulations

**From an active construction site**

- **50 NTUs (nephelometric turbidity units)**
- **10 NTUs for Trout waters**





# Problem....

- Very hard to reduce turbidity

## BUT....

- we can lighten the load of sediment entering the waters





# How do we do it?

## Is More Better?



MAYBE....





**Different ways  
to lighten the load!**





# Infiltration?

- Possible in some soils.
- May be able to construct infiltration areas.
- Doubtful for most situations.

\*a study in PA (Bidelsbach & Jarrett) showed that some basins can infiltrate 1-2 yr storm event without discharge





# Sizing :

-1800 ft<sup>3</sup> ac<sup>-1</sup>  
(for basins)

-3600 ft<sup>3</sup> ac<sup>-1</sup>  
(for traps)

Length = 2x  
Width





# Baffles...which are now required!

- **Reduced turbulence** – solids settle faster.
- **Reduced flow** – inflow spread across basin, reducing carrying capacity of the water.

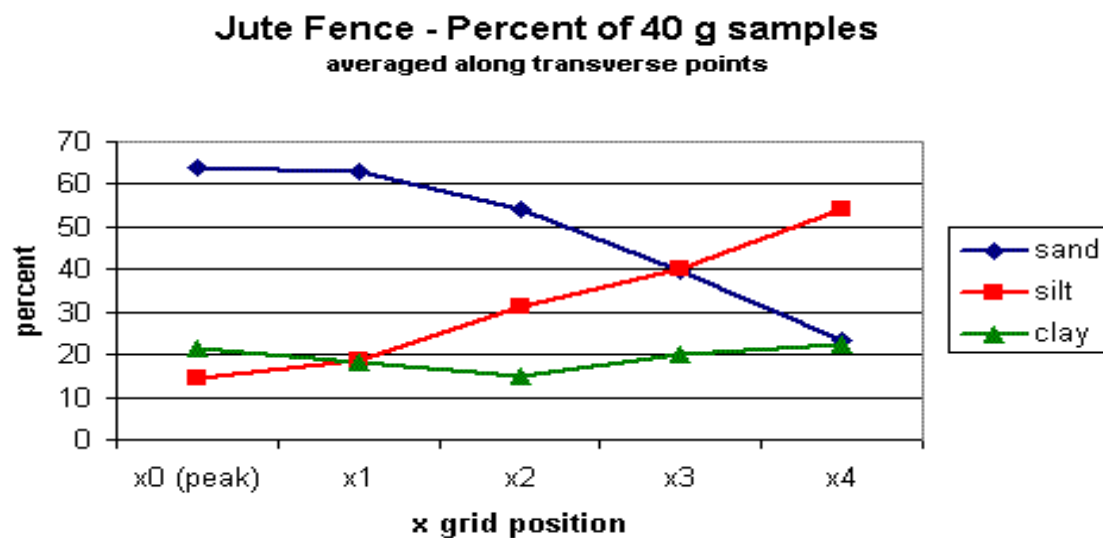
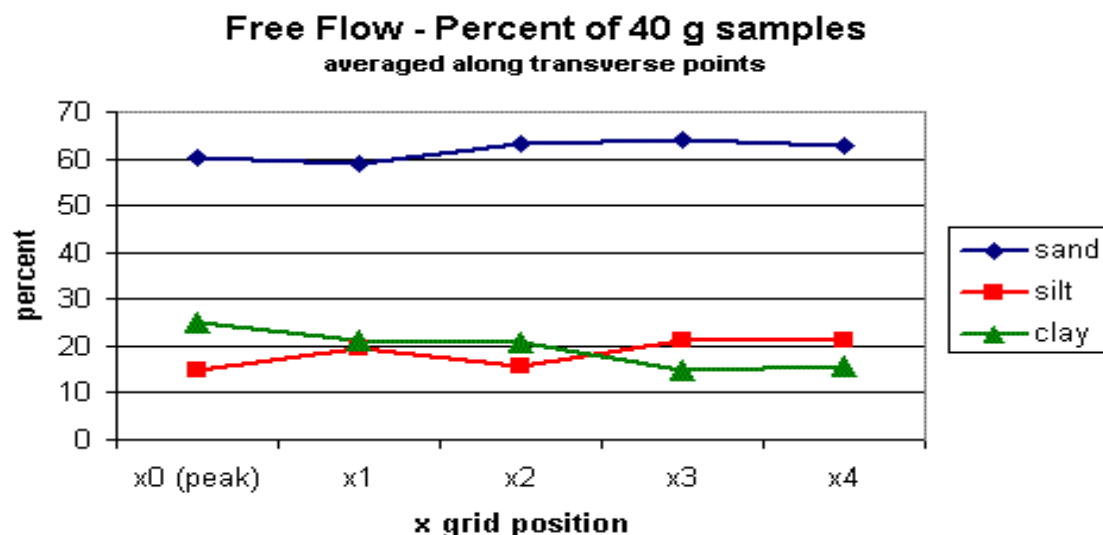






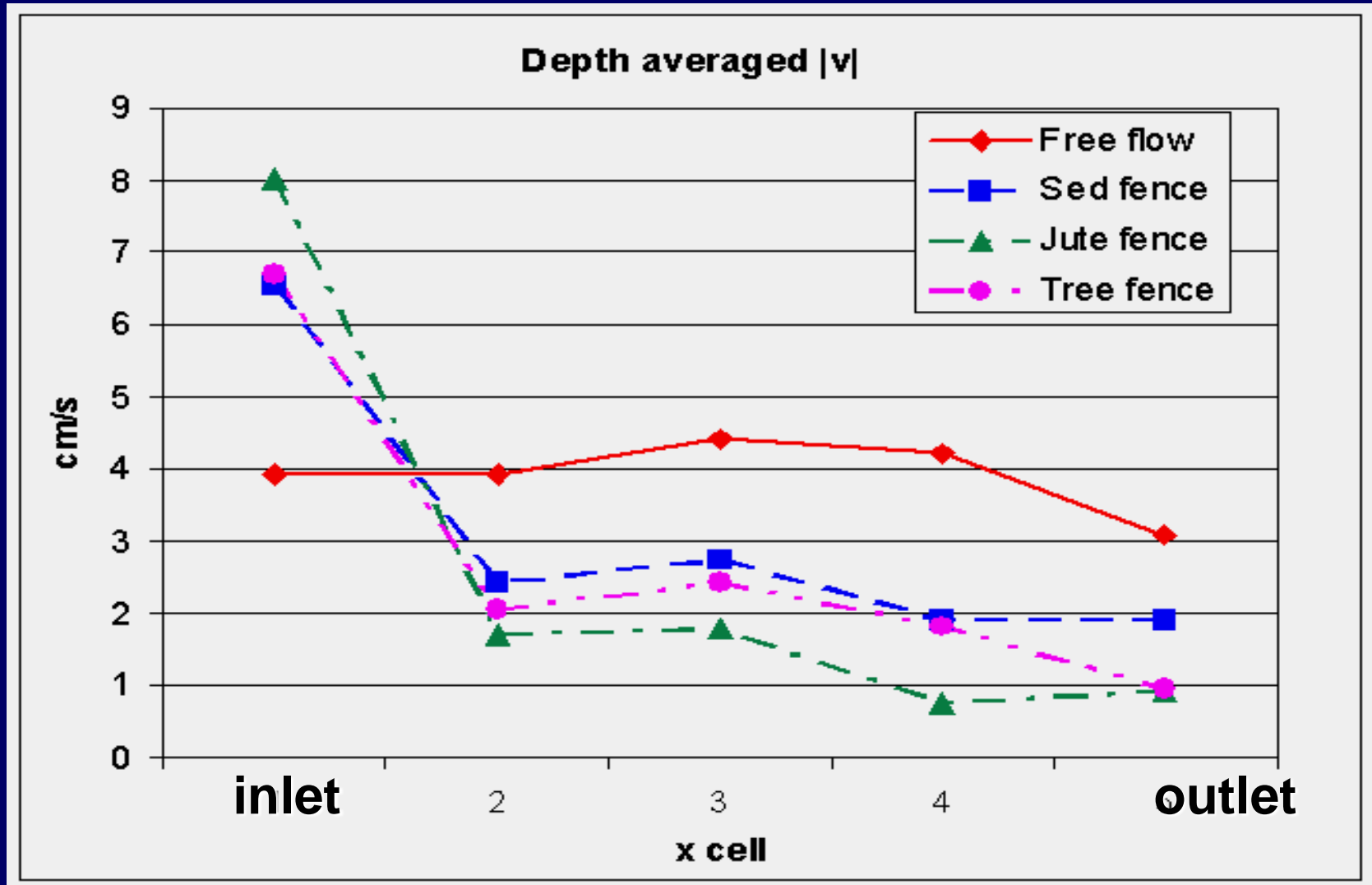


# Effects of Baffles: Particle Distribution





# Effects of Baffles: Velocity





**What's the problem here?**





# Surface Outlets

- Perforated Riser





# Flashboard Riser Outlet

- Adjustable standing pool
- Can empty for sediment removal



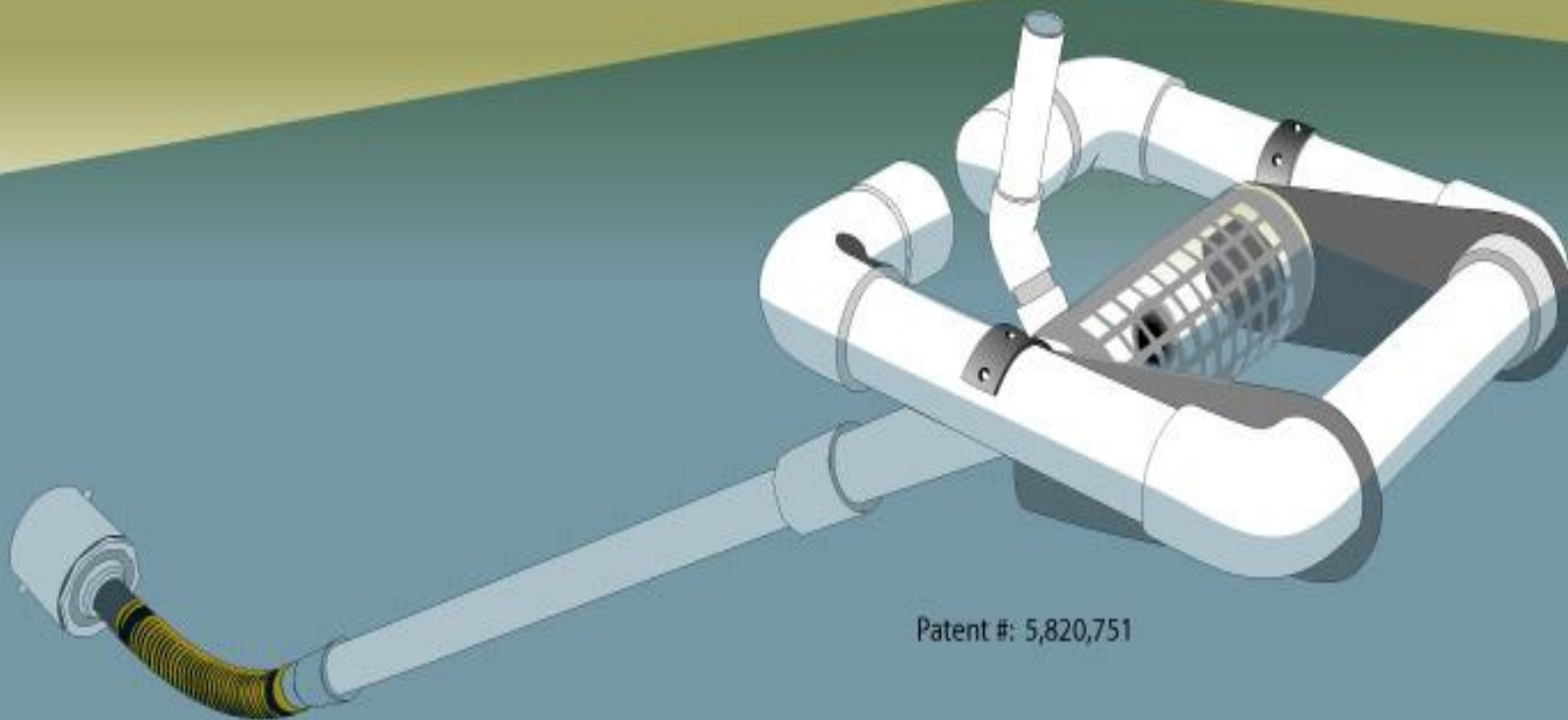






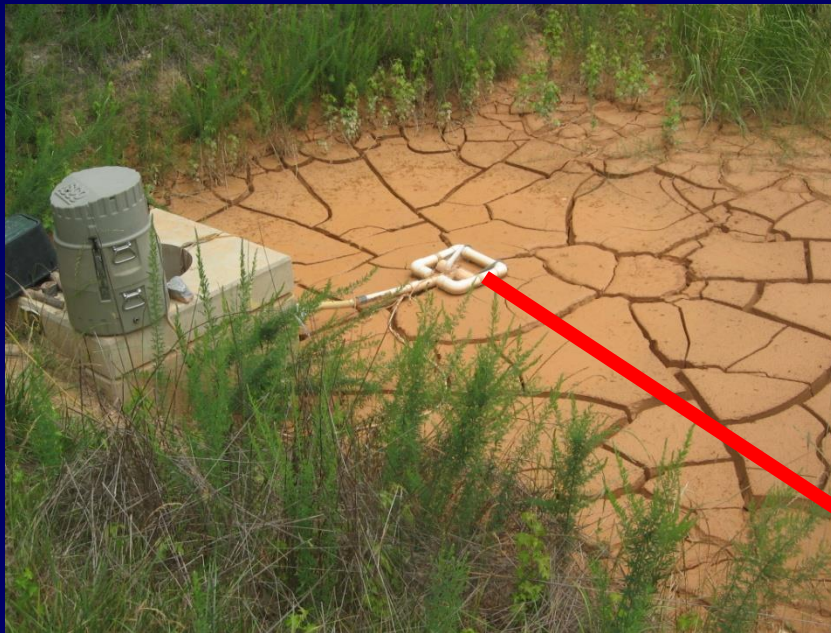
# Faircloth Skimmer

The Faircloth Skimmer floats on the surface of the sediment basin, releasing the cleanest water in the basin instead of draining from the bottom as conventional outlets do.



Patent #: 5,820,751







# Stabilize inlets and sidewalls











4 Tons of Soil







# Maintenance!!!!













# Two Chamber Basin Design

**First Chamber for  
Sediment Control**



**Second Chamber for  
Turbidity Control  
using PAM**





# Maximum Sediment Control



- Forebay
- Baffles
- Skimmer + Emergency Spillway



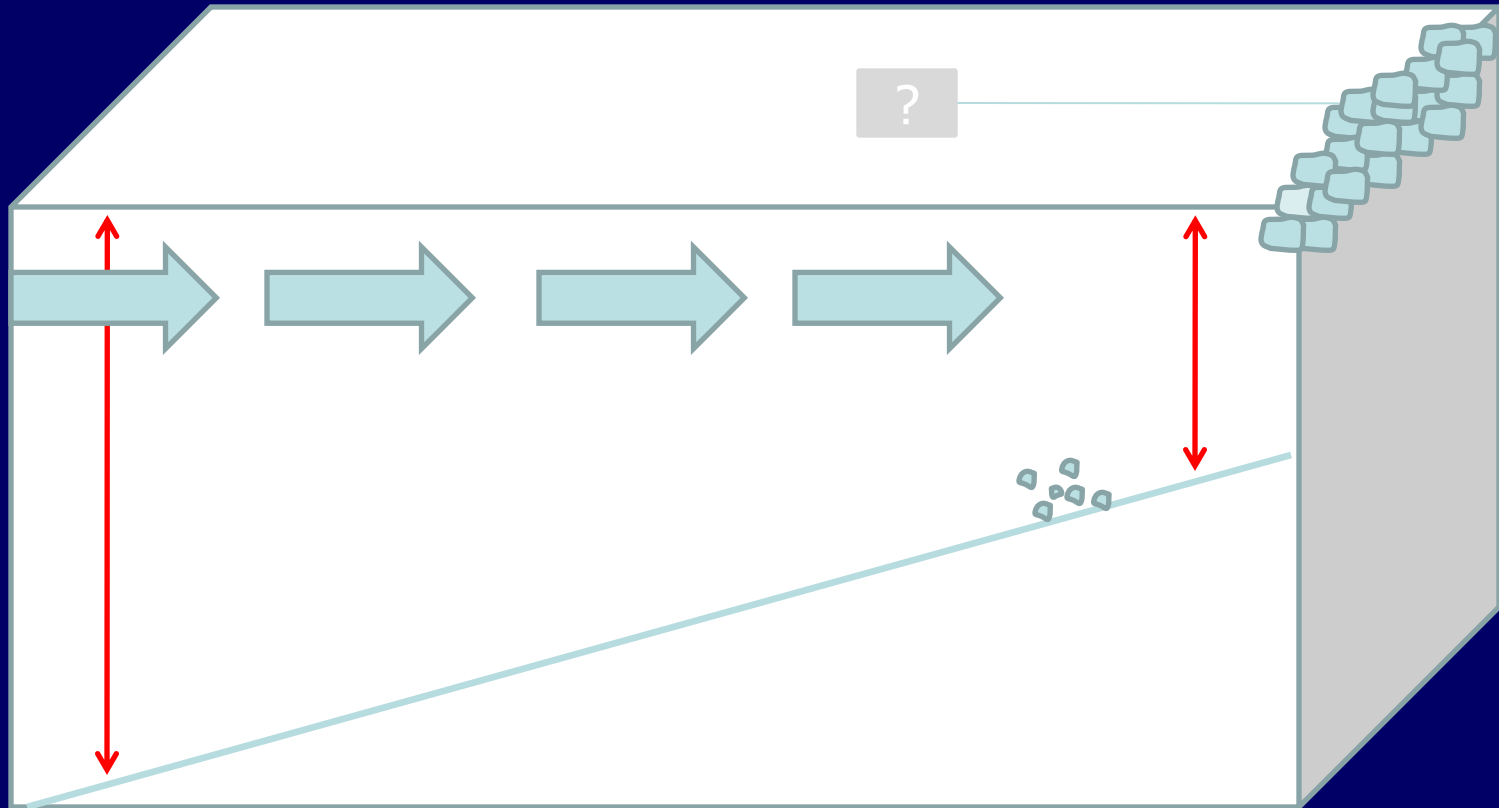
# Design of the device

- Vertical walls?
- Storage capacity?
- Surface outlet?
- Baffles?
- Maintained?



# Open for Discussion!

## Design Idea.....





# Standard 10-year Trap



**37% Efficiency**

**131 m<sup>3</sup>**  
**1 ha**



# Standard 10-year Trap14



**46% Efficiency**

**6m x 2m x 1m**  
**0.61 ha**



# Standard Basin with Silt Fence Baffles

**45% and 36%  
Efficiency**

**22m x 11m x 1m  
0.60 ha**





# Standard 10-year Trap2



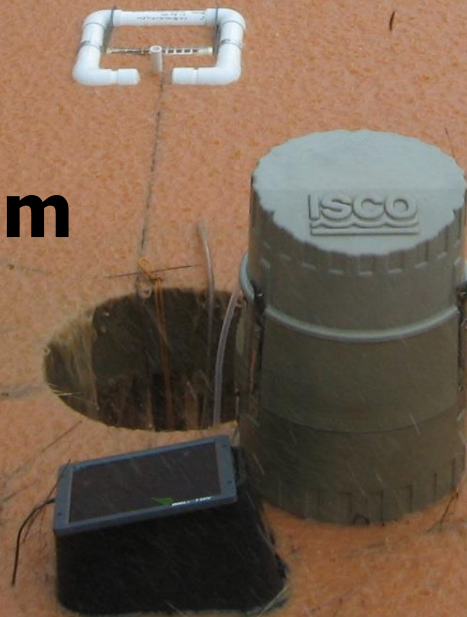
**76% and 36%  
Efficiency**



# Skimmer Basin

**99.8% and  
76% Efficiency**

**42m x 21m x 1m  
1.4 ha**





# Conclusions!

- Increased surface area and volume will decrease the total load of sediment leaving the basin/trap



# Conclusions cont'd.

- Baffles reduce the velocity of water entering the basin/trap creating time for the heavy soil particles to fall out of the suspension.
- Vertical walls should be avoided because they fail, producing sediment within the basins/traps and diminishing the effective volume of the device.



# Conclusions cont'd.

- Surface outlets decrease the total amount of sediment leaving the basin/trap by dewatering from the top of the water column.
- MORE IS BETTER!





**QUESTIONS???**