

Removal and Restoration of In-stream
Sediment Ponds: Part 1 – Sediment Pond
Removal and Enhanced Designs

Appalachian Stream Mitigation
Workshop

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9 1'00

Overview

- Sediment pond removal considerations
 - Current Methods
- Designing sediment ponds to
 - Cost-effectively remove/control deposited sediment
 - Reduce potential environmental impacts
 - Reconstruct streams
- Enhanced sediment control

Sediment Pond Removal Considerations

- Scheduling
- Baseflow diversion
- Dewatering provisions
- Sediment handling
- Potential to discharge sediment
- Down-gradient sediment control(s)
- Erosion control(s)
- Stream reconstruction
- Riparian vegetation

Scheduling

- Low storm probability
 - Lowest monthly rainfall - September through and November
- High evapotranspiration timeframe
 - Highest evapotranspiration – June through August
- Low base flow timeframe
 - Largest difference between rainfall and evapotranspiration – June through September

Baseflow

- Almost all sediment ponds had baseflow emanating year-round from a valley fill

Observed Baseflow Diversion Methods

- Baseflow diversion options used
 - Small dam built up-stream and pump to pipeline to bypass baseflow
 - Diversion built to bypass baseflow
 - Temporary diversion constructed and ‘stabilized’ within sediment pond
 - No baseflow diversion provisions

Sediment Ponds

- Location
 - Near toe of valley fill
 - Further down-gradient of valley fill
- Type of spillways
 - Single spillway (emergency spillway design)
 - Emergency spillway with straight-pipe
 - Emergency spillway with drop inlet
 - Emergency spillway with perforated riser
- Disadvantage – wet deposited sediment

Dewatering Methods

- Predominantly pump over emergency spillway or through principal spillway
- Sump(s) used to further reduce water level
- Trench occasionally used to reduce water level
- Siphons occasionally used in lieu of pump
- Incrementally remove embankment

Sediment Handling Options

- Difficult and costly to remove and transport sediment that has been dewatered by previously listed methods
 - Long arm backhoe used but low-production rate
- Sediment wave – push deposited sediment with materials removed from the embankment
- Sediment blending – blend embankment materials with deposited sediment (can only be accomplished when deposited sediment is relatively dry)

High Potential to Discharge Sediment

- Poor scheduling timeframe
- High baseflow
- No controlled bypass of baseflow
- Sediment ponds without dewatering options
 - Inadequately dewatered sediment

Down-gradient Sediment Controls

- Often time - none used
- Controls
 - Straw bales
 - Rock check dam located in stream

Erosion Control of Stream Bank and Riparian Zone

- Often time none used
- Products
 - Straw mulch
 - Excelsior blankets (infrequently used)
 - Grasses and legumes

Sediment Pond Designs for Efficient Sediment and Embankment Removal

- Valley fill design
- Passive/active dewatering provisions
- Multi-chamber design

Valley Fill Design

- Sediment ponds built down-gradient of valley fills constructed with new specific-conductivity minimization techniques had no baseflow between mid-May and mid-November
- Hence, sediment pond removal should occur in October and November when the chance of a storm event is minimal

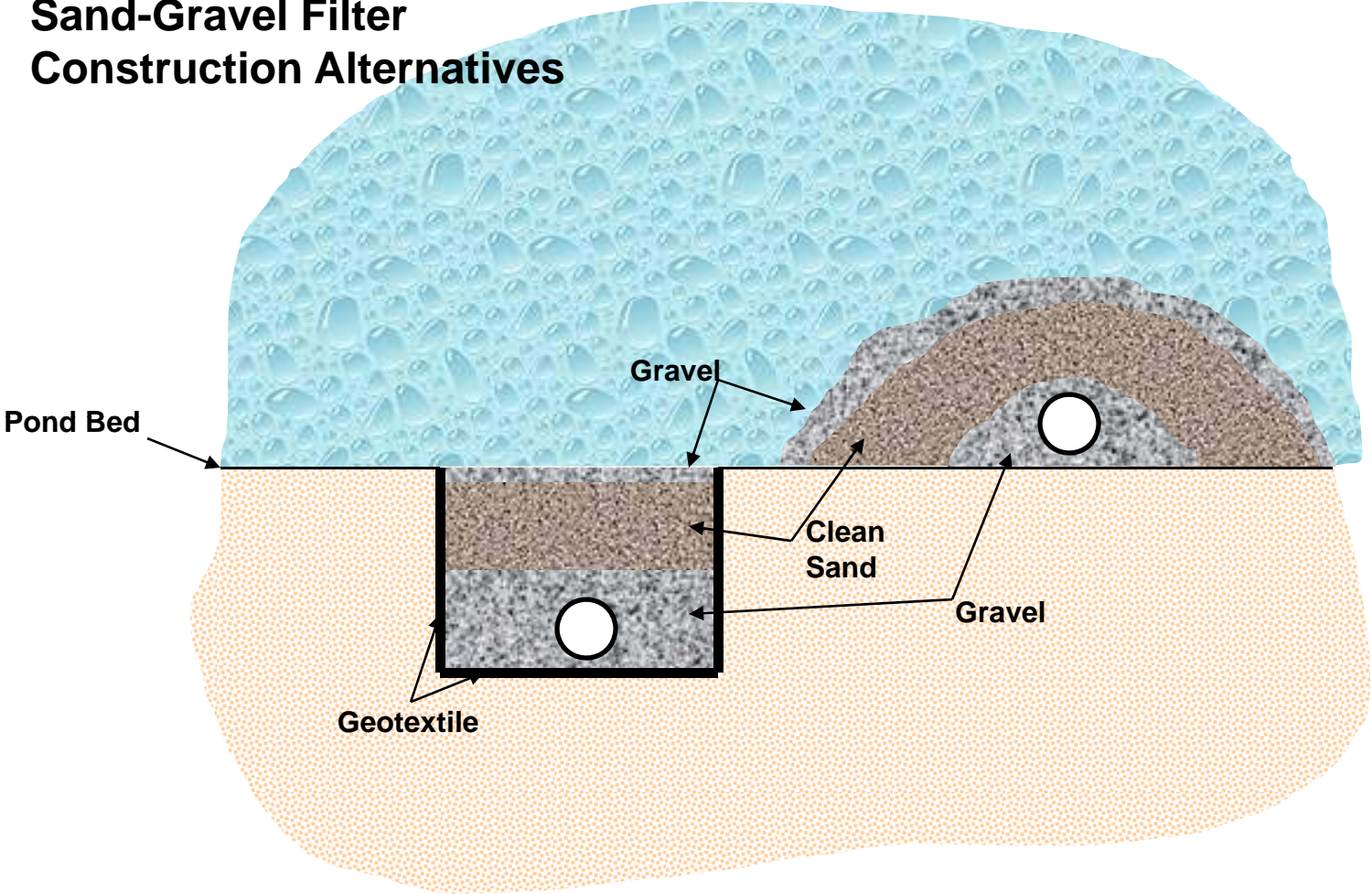
Sediment Pond Dewatering Design Options

- Floating siphon
- Floating decant
- Internal sand-gravel filter
- External sand-gravel filter
- Advantages:
 - Drier sediment – much more cost effective removal or soil blending with embankment
 - Slightly higher deposited sediment density
 - Enhanced stream channel stabilization
 - Greater opportunity for tree establishment in riparian zone

Floating Siphon



Sand-Gravel Filter Construction Alternatives



Internal Sand-gravel Filter



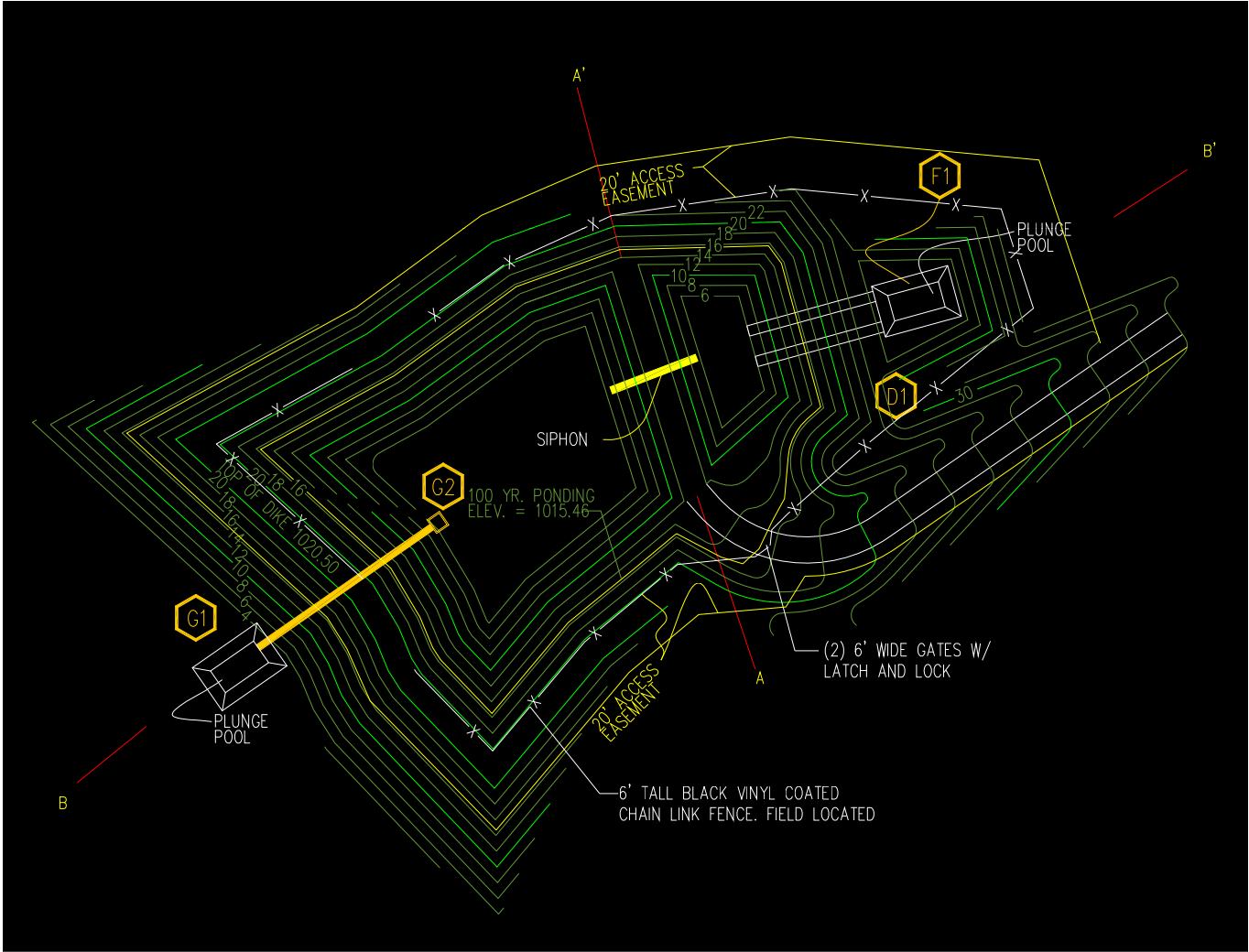
External Sand-gravel Filter



Multi-chamber design

- Use slope for passive dewatering to down-gradient chamber
- Size up-gradient chamber for efficient sediment removal
- Size separation berm for excavator – truck operation

Multi-chamber Sediment Pond



Multi-chamber Pond



Multi-chamber Pond



Sediment Control

- Combination weep berm – natural grass filter
- Advantages
 - Allows for infiltration as well as sedimentation and sediment storage
 - Directs overflow slowly into natural riparian zone or grass filter for further treatment
 - Sediment trap efficiency ~ 99+%

Weep Berm

