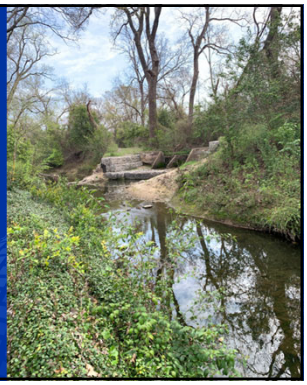
Streambank Stabilization & Maintenance



TFMA Annual Meeting
March 9th, 2023

Presenters

Charles Perkins III
EIT, CFM

Vahid Zarezadeh
PhD, PE, CFM

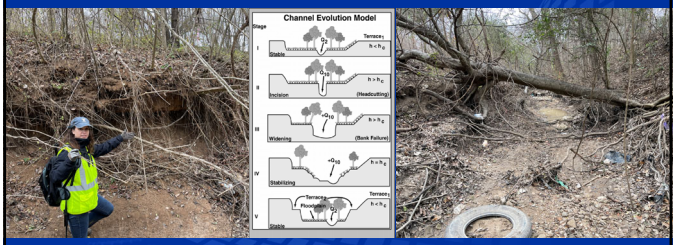
Agenda

- Channel Mechanics
- Erosion Factors
- Stabilization Methods
- Maintenance
- Case Studies

Slide 2

ZV0 [@Perkins, Charles] Place your high quality headshot here
Zarezadeh, Vahid, 2023-02-22T20:28:15.202

Channel Evolution



Stream Mechanics

Larger Meander Length = Lower Slope & Velocity

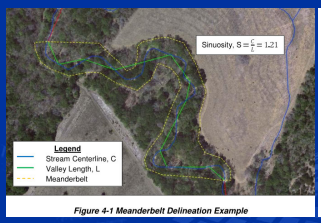
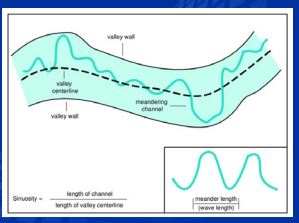
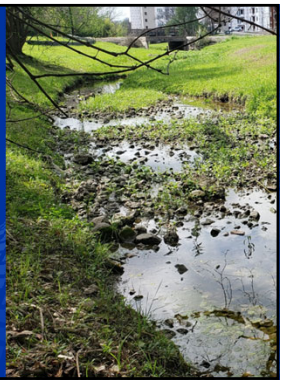


Figure 4-1 Meanderbelt Delineation Example



Streambank Erosion Factors

- Vegetation Levels
- Upstream Land Use
- Soil Types
- Climate
- Storage Capacities
- Stream Flow, Velocity, Shear Stress



Slide 4

MM0 What's being illustrated with these three photos? It doesn't seem clear what stage any of them are.
Manges, Matt, 2023-03-01T14:34:15.553

Slide 5

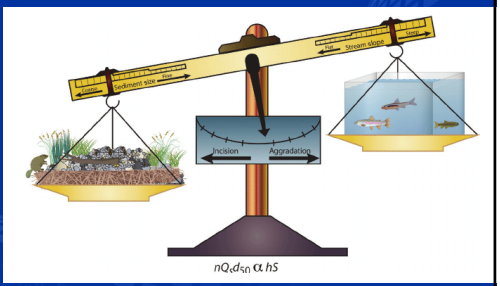
MM0 Too many concepts/ideas/text on this slide. Boil it down to key concepts. Suggest removing the equation, the middle bottom photo, bottom right.
Manges, Matt, 2023-03-01T14:35:42.758

Slide 6

MM0 Too much text on this slide. Distill it to the key topics. You can say as much as you want. Each slide's text needs to be the very essence of the idea.
Manges, Matt, 2023-03-01T14:29:07.800

Streambank Erosion Factors

Lane's Relationship Diagram



Streambank Erosion - Typical

Toe Erosion | Headcuts | Erosion Outside Bends

Vegetation Removal | Downstream of a Hardened Structure

Streambank Stabilization Factors

Flow Power: Amount of Flow | Flow Depth | Stream Slope

Flow Resistance: Sediment Size | Sediment Volume | Roughness

Slide 7

MM0 Too much text. You can take off the entire sentence and just state what it is. Consider only one image if possible to make your point.
Manges, Matt, 2023-03-01T14:29:41.988

Slide 8

MM0 Right photo is reused.

Is this meant to illustrate a progression or examples? If showing examples suggest limiting to one big picture concept per slide.
Manges, Matt, 2023-03-01T14:36:37.613

PC0 0 Maybe we can use slide animations to highlight which pictures correspond to the erosion type?
Perkins, Charles, 2023-03-01T23:20:10.601

Slide 9

MM0 What's being illustrated with these two images and the arrows along with the psuedo equation at the bottom?
Manges, Matt, 2023-03-01T14:33:49.634

Streambank Stabilization Methods

Hard Armoring Structural Systems

- Rock Riprap
- Revetments (Gabions, Concrete Mattresses, Soil Cement, Retaining Walls)

Soft Armoring Soil Bioengineering Systems

- Live Stakes
- Live Fascines
- Vegetated Geogrids
- Brush Mattress

Streambank Stabilization Methods

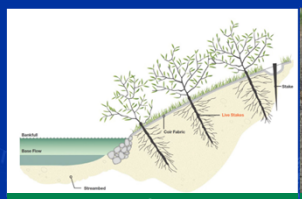
Hard Armoring

Rock Riprap

Gabions

Streambank Stabilization Methods

Soft Armoring



Live Stakes

Coir Matting

Slide 10

MM0 Too much text. Distill and consider a photo.
Manges, Matt, 2023-03-01T14:36:56.186

Slide 11

MM0 Way too much text.
Manges, Matt, 2023-03-01T14:37:12.188

Streambank Stabilization Methods

Soft & Hard Armoring Combinations

MMO

Streambank Stabilization Comparison

Hard, Engineering Approaches

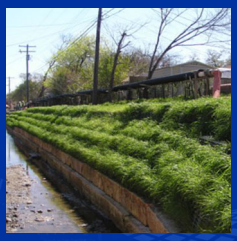
- Advantages:
  - Durable, highly stable, can give rise to vegetation
  - Local damages can be repaired easily
- Disadvantages
  - Need construction practice and restricted to some design parameter
  - Need manpower, materials, equipment
  - Comparatively costly

Soft, Bioengineering Approaches

- Advantages:
  - Long-term, re-generating protection
  - Often less costly
  - Potential for better environmental outcomes
- Disadvantages
  - May require time to establish
  - Not always practical (requires soil, water and mild slopes)
  - Can cause damage later on via wind-throw of mature vegetation

MMO

Maintenance



Ensure plant establishment

Regular monitoring and inspection

Repair small eroded spots

Pick up litter and trash

Slide 14

MM0 Way too much text. Consider a different way to present this.
Manges, Matt, 2023-03-01T14:38:51.895

Slide 15

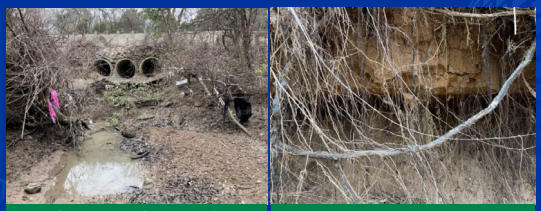
MM0 Too much text. Blurry photo. What's the point of the photo?
Manges, Matt, 2023-03-01T14:39:46.219

Case Studies

- Here are some of the projects we have with bank stabilization:
- Charles:
  - P:\120\120-12242-000 Farmer's Branch Reach 1
  - P:\120\120-12242-001 Farmer's Branch Reach 2
- pw:\\ladpw.ladco.int:projectwise\Documents\Projects\170-10804-006\ Palmetto State Park stabilization. I think this project has been achieved but there is a good comparison of bank stabilization solutions. We can have IT pull it out of storage.
  - P:\120\120-12100-001 Purgatory Creek has some retaining walls we can talk about various wall solutions pros/cons
- Vahid:
  - P:\shared\projects\120\120-12175.003Carson Creek has a bank stabilization solution, alternative between walls and realigning channel.
  - P:\129\129-10023-000 Copperas Cove Drainage Master Plan has some channel stabilization (Ellie can help point you to the project solutions)
  - P:\130\130-10951-000 Lebow has multiple bank stabilization solutions

- TO BE CONTINUED

Case Study: Carson Creek Low Water Crossing Improvement



Scour hole (Head cut)

Bank erosion

MMO

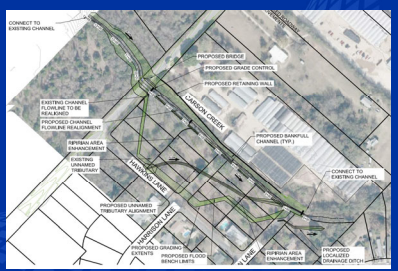
Case Study: Carson Creek Low Water Crossing Improvement

Flood mitigation

Stabilize channel

Reduce erosion

Enhance natural-built environment



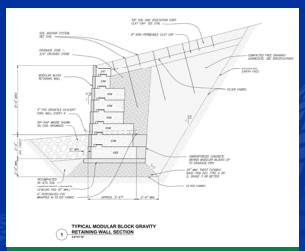
Slide 18

MM0 Too many small photos. What's the main point of this slide?
Manges, Matt, 2023-03-01T14:40:59.214

Case Study: Farmers Branch Creek – Soil Erosion

Major erosion on banks

Case Study: Farmers Branch Creek – Soil Erosion



Proposed Retaining Wall
(110' Long, 10' Tall)

Case Study: Farmers Branch Creek – Soil Erosion

Proposed Retaining Wall
(110' Long, 10' Tall)

Slide 19

MM0 There's a lot going on here. Is top right before? Suggest labels and simplifying layout. Consider removing the design detail and just use the post construction photo. Can we say XX events have occurred and it has remained in place?
Manges, Matt, 2023-03-01T14:41:57.449

WJ1 I put these items on an animation so the old transforms into the new. I'm not sure if Matt still wants slide converted to only end design with incident call out
White, Julie, 2023-03-06T20:20:00.554

Questions

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Email: vzarezadeh@lan-inc.com

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