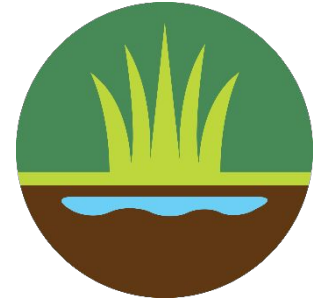


EcoStream 2018

# Getting Our Feet Wet at Every Stage: Optimizing the Restoration of Urban Streams

August 16, 2018



# Presentation Outline

Planning/Design – challenges, approaches, optimization

Public Outreach/Stakeholder Involvement – tips to get it right

Permitting - considerations

Construction – how to avoid the pitfalls





# Optimizing the Restoration of Urban Streams Planning and Design

# Identify Stream Problems



**Bank Erosion**



**Debris**



**Maintenance Issues**



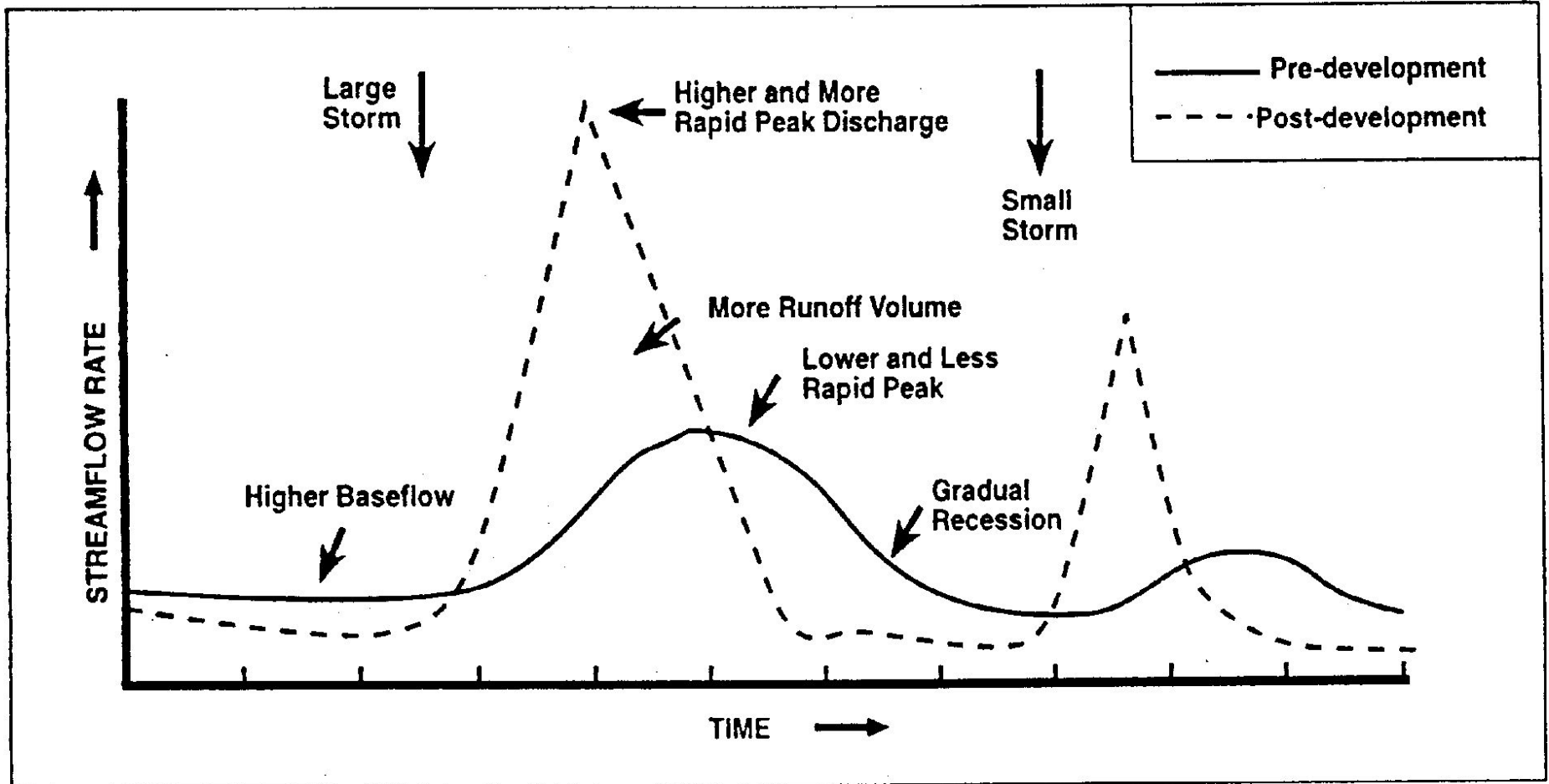
**Water Quality**



**Inadequate Buffers**

# Development Impacts on Streams

## STREAMFLOW



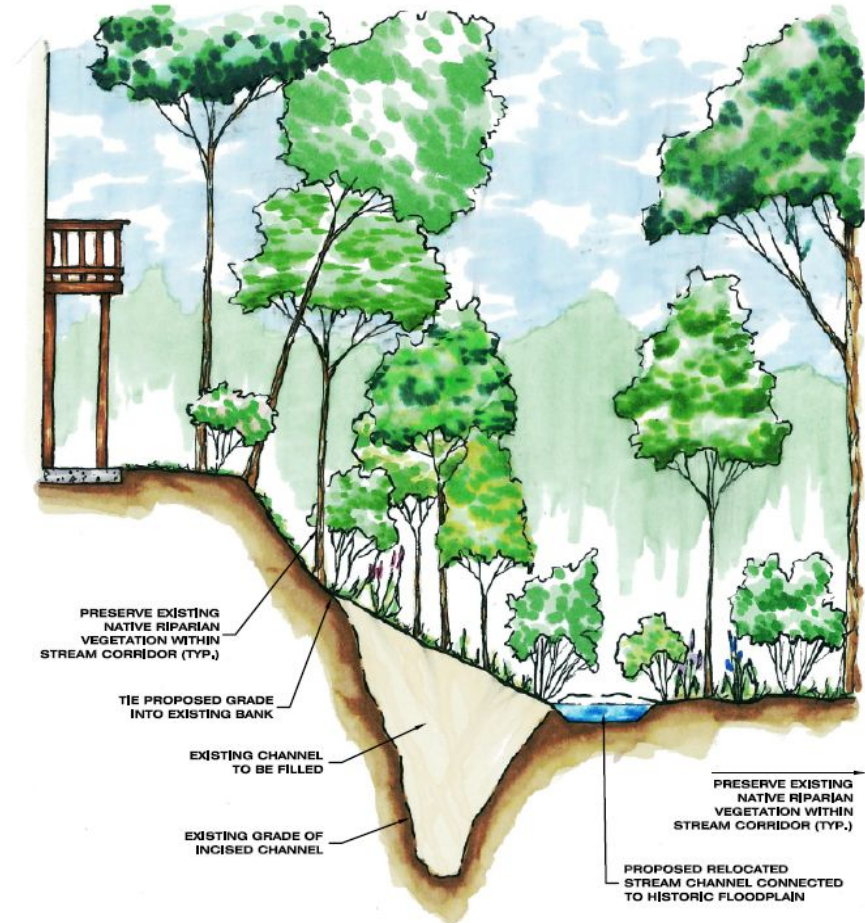
# Know Your Project Challenges/Issues

- Location – park, public area, private property
  - Safety
  - Maintain use of adjacent areas
  - Is tree removal an issue?
- Urban Environment
  - Utilities
  - Culvert alignments
  - Construction vehicle access/impacts
  - Noise impacts



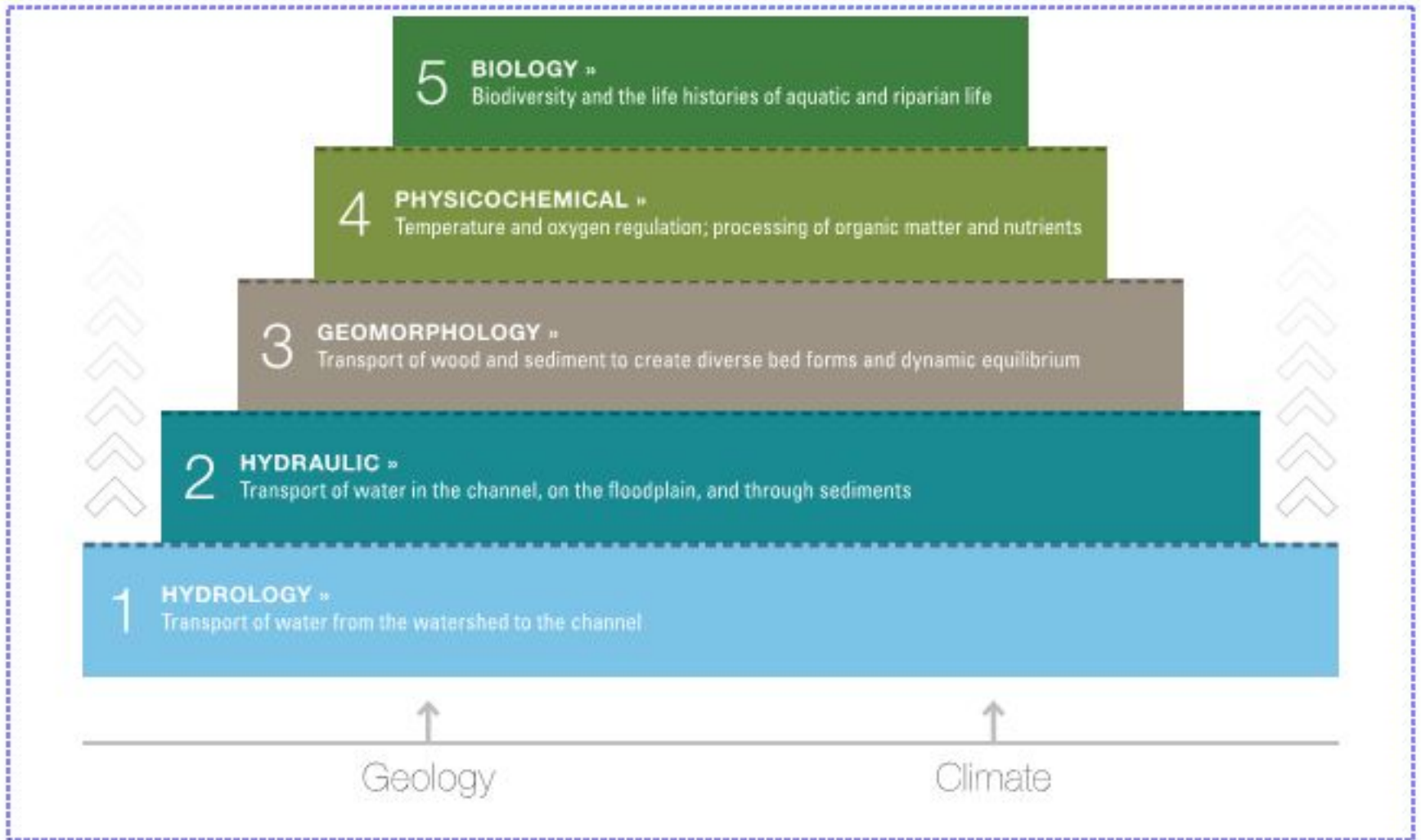
# What are your Project Goals?

- Stabilize stream banks to reduce water quality impacts
- Reduce impacts to downstream aquatic resources
- Protect adjacent infrastructure
- Provide enhanced recreational opportunities
- Provide an educational opportunity



Set goals that relate to solving a functional problem

# Stream Functions Pyramid



Source: Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.



# Know your Restoration Approach

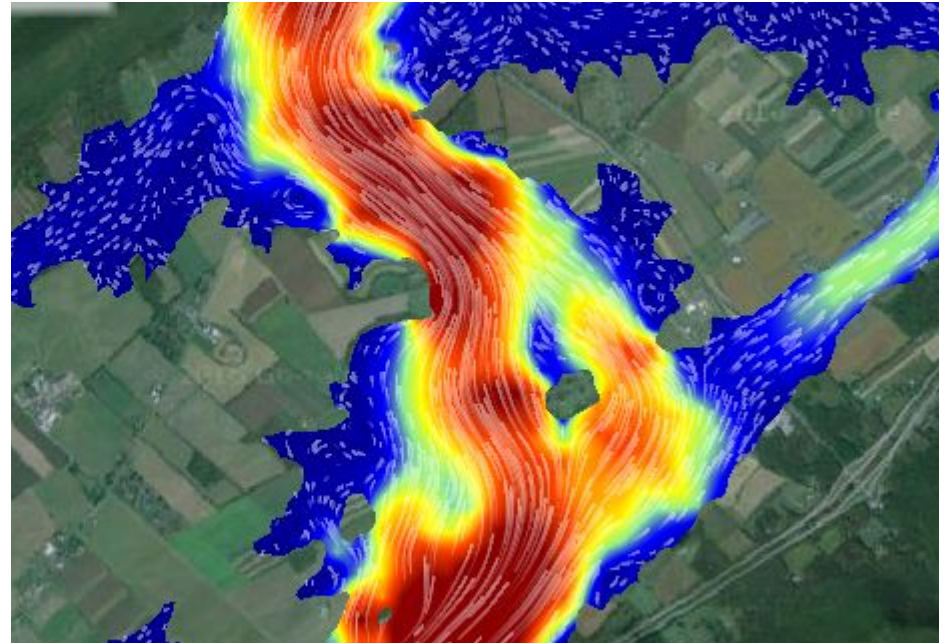
- **Natural Channel Design**
  - Stable dimension, pattern and profile
  - Not aggrading or degrading
  - Bankfull channel
  
- **Valley Restoration**
  - Small channel
  - Minimal sediment transport
  - Encourage groundwater/surface water interaction
  - Pre-disturbed conditions

# Know your Restoration Approach

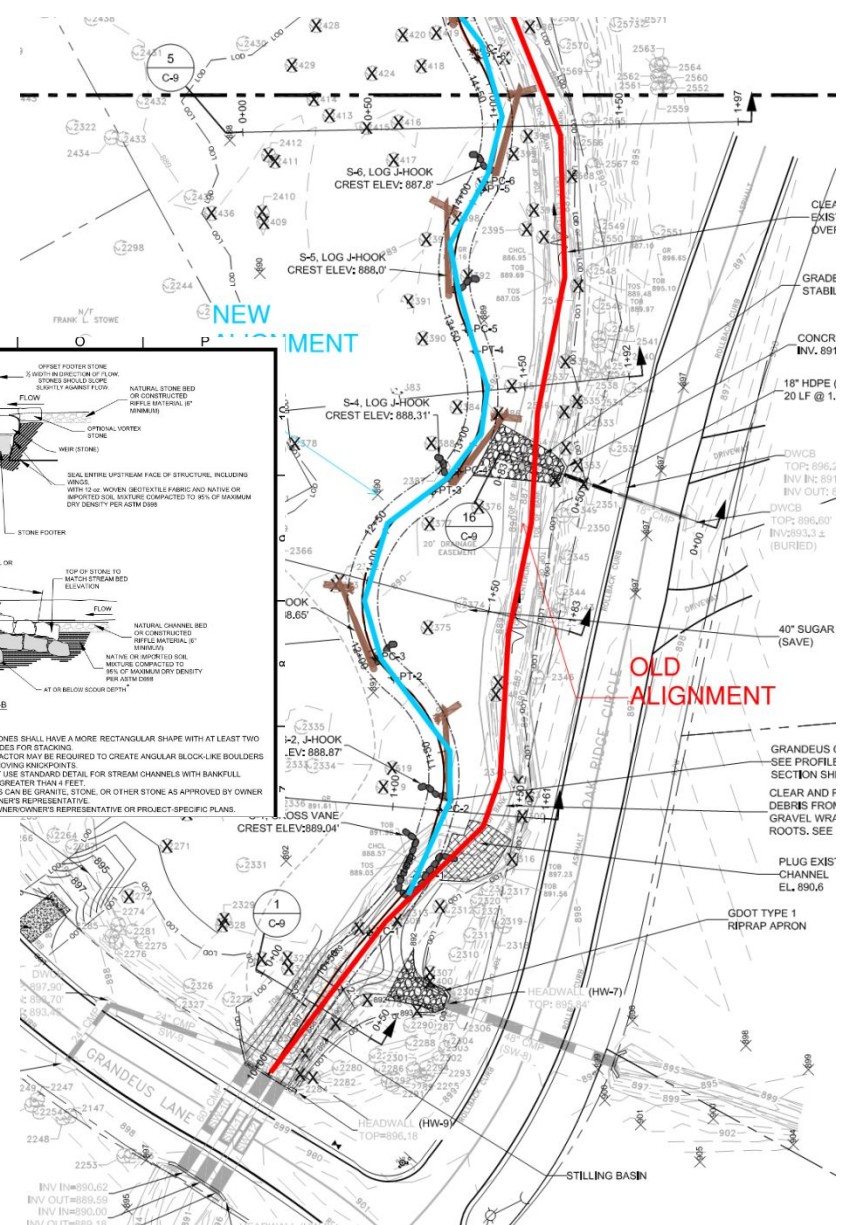
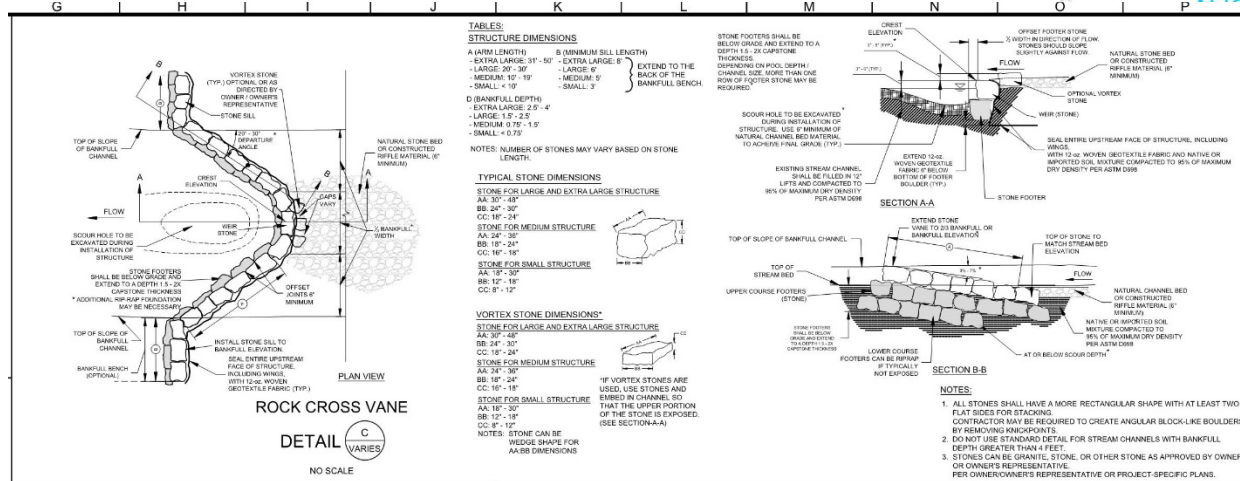
- Re-generative Design
  - Often considered a BMP
  - Step Pool Stormwater Conveyance (SPSC)
  - Ephemeral Channels - Regenerative Stormwater Conveyance (RSC)
- Others
  - Large Woody Debris
  - Dam Removal

# Modeling to Evaluate Current and Future Conditions

- Hydrology and Hydraulics
  - Flows
  - Velocities
  - Sheer Stress
- Sediment Supply and Transport
  - Suspended sediment
  - Bedload



# Constructability

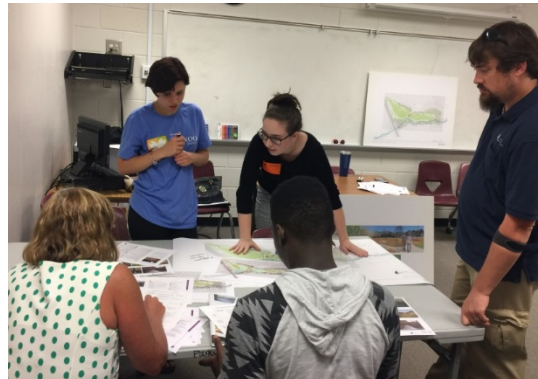




# Optimizing the Restoration of Urban Streams Public Outreach/Stakeholder Involvement

# Lessons Learned


- Stakeholder Engagement is Important
  - Include all Stakeholders – Schools, neighborhood associations, public, other groups
  - Early – Conceptual Design (or even before in some cases)
  - Frequently – Monthly/quarterly
  - Information at the level of your audience



# Public Communications

- Public Meeting prior to construction
  - Overview
  - Existing Conditions
  - Project Improvements
  - What to Expect
  - Schedule
- Project Signs





# Optimizing the Restoration of Urban Streams Permitting



# Keys to a Successful Submittal

- Know what permits are needed
  - State and Local
  - Federal
- Communication
  - Verbally
  - Often
  - Client-Consultant-Reviewer



# Keys to a Successful Submittal (cont.)


- Relationships
  - State and Local Agencies
  - USACE
- Know your reviewers and their limitations
  - Know and understand the regulations
  - Understand what things they may or may not have any leeway on



# Keys to a Successful Submittal (cont.)

- Unique issues about your site/project
  - Location
  - Social Issues
  - Environmental Issues
  - Site Conditions
- Develop project alternatives (if needed) early
  - Feature locations
  - Size
  - Avoid, Minimize, Mitigate





# Optimizing the Restoration of Urban Streams Construction

# Construction



# Construction



