Midwestern Hydraulic Engineering Conference

The RC Hydraulic Team:
Here To Serve You!

The RC Hydraulic Team

Dan Ghere – Chicago

Larry Arneson – Denver

Cynthia Nurmi – Atlanta

??? – Baltimore

The RC Hydraulic Team

How We Serve You

- Technical Assistance
- Training
- Technology Transfer

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Midwestern Hydraulic Engineering Conference

Technical Assistance

Solutions for Your Engineering Problems

Technical Assistance

- Design Assistance
  - Site Visits
  - Review Plans
  - Examples
    - Complex Bridge Design
    - Countermeasures

Technical Assistance

- Answer Questions
  - E-mails
  - Telephone Calls
  - Examples
    - Design
    - Software
    - Publications

Technical Assistance

- Review State Drainage Manuals
  - FHWA Guidance
  - Best Practices
  - Examples
    - Georgia DOT
    - Michigan DOT

Technical Assistance

- State Hydraulic Review
  - Team
  - Review Processes, Policy, etc.
  - Recommend Improvements
  - Recognize Best Practices

Technical Assistance

- Plan of Action
  - Coordinate through Division
  - Provide Technical Information
  - Facilitate Meetings

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Training

Increasing Your Knowledge and Skills

Training

- NHI
  - Teaching
  - Development/Updating
  - Coordinating Regional Classes

Training

- Individualized Classes
  - Short, Tailored
  - Supply Materials
  - Examples
    - Drainage
    - FEMA
    - BMP’s for NPDES
    - Tidal Hydraulics

The RC Hydraulic Team

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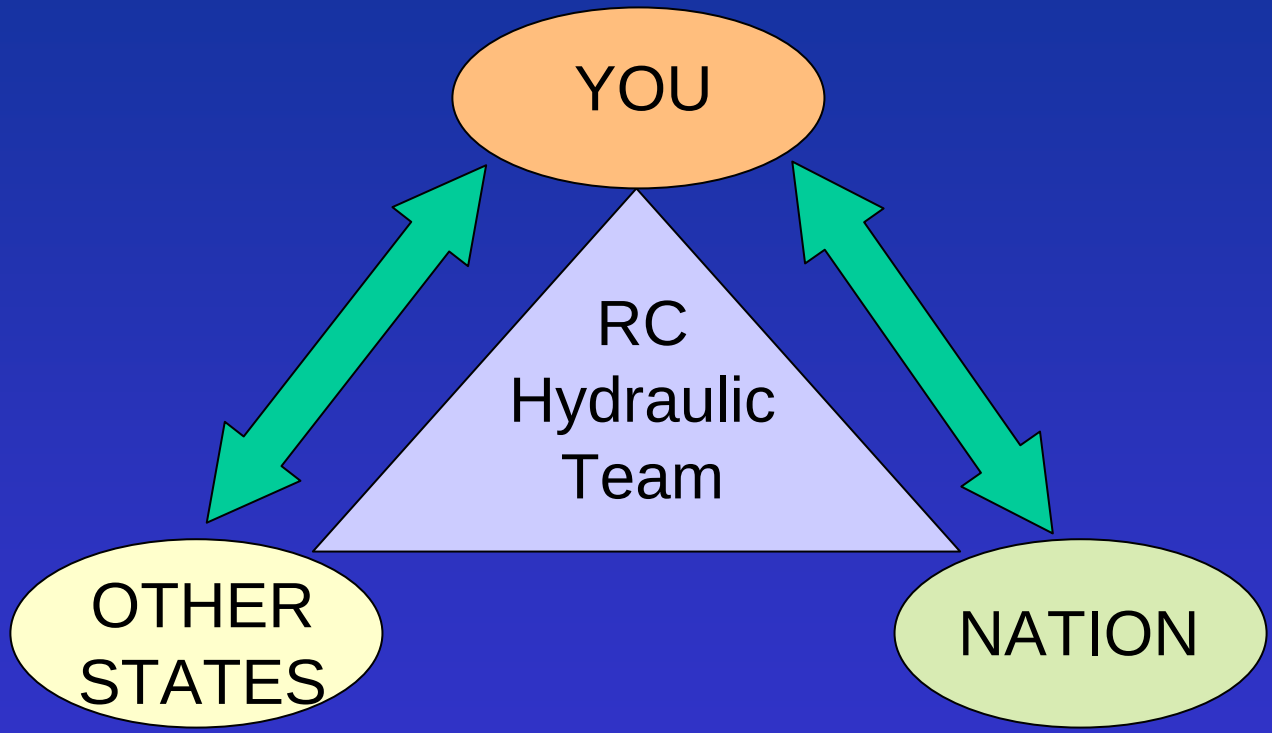
Technology Transfer



Connecting You to Your Neighbors and the Nation!

Technology Transfer

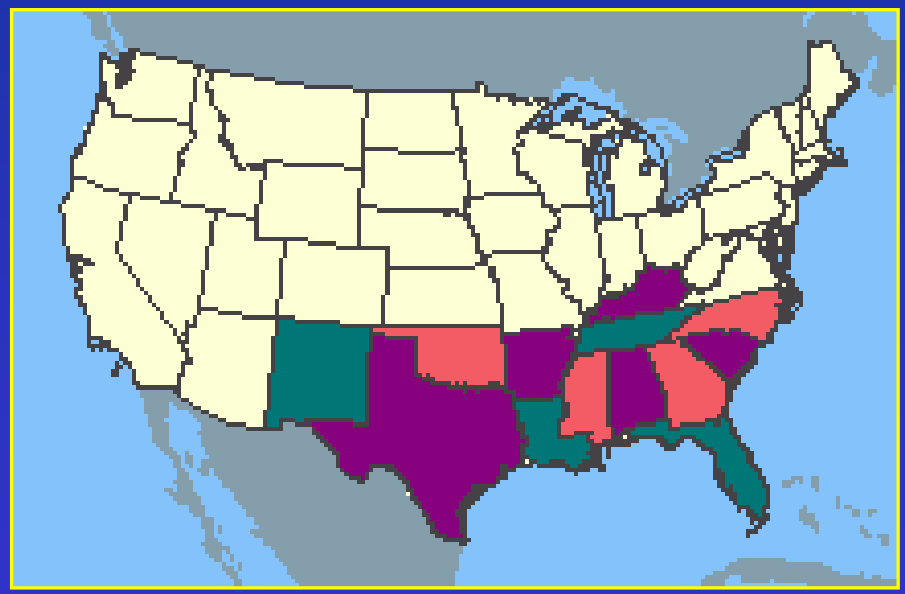
- Research
  - Involvement
    - National Level
      - FHWA, AASHTO, Others
    - State Level
      - Research Committees
      - Project Review
  - Share Information

Technology Transfer

- Information Exchange
  - Conferences
    - Annual Hydraulic Conferences
    - Video Conferences
  - Newsletters
  - Specific Answers to Questions

Information Exchange:

Southern States



- Hydrology
- Scour
- Stream Stability
- Drainage
- Water Quality

Information Exchange:
Hydrology

Texas DOT Research – Dr. Thompson

- Regional Characteristics of Unit Hydrographs (Project 0-4193) and Storm Hyetographs (Project 0-4194)
  - Data Collection and Analysis
  - Need Additional Info on Small Watersheds
  - Publish Guidance

Information Exchange: Hydrology

Tennessee DOT – USGS StreamStats

- Prototype State
- Web-based National GIS system
- Stream Statistics for State
  - Regression Equations
  - 100 yr, 7Q10, etc.
- Ungaged site characteristics

http://water.usgs.gov/osw/programs/streamstats.html

Information Exchange:
Scour

Calculating Scour

- Pier Scour
- Cohesive Material Scour
- Rock Scour
- Clearwater Scour
- Tidal Scour

Inspecting and Monitoring

Countermeasures

Information Exchange:
Scour - Pier

Florida DOT Research – Dr. Sheppard

- Equation:
  - Based on data from many laboratories
  - Predicts equilibrium scour depths
  - Function of three dimensionless groups
    - Water Depth/Structure Diameter
    - Velocity/Sediment Critical Velocity
    - Structure Diameter/Sediment Diameter

Information Exchange:
Scour - Pier

- Compared to HEC-18
  - Regular Piers:
    - Florida Equation less than HEC-18
  - Wide Piers:
    - Florida Equation comparable to HEC-18 WP for small D50
    - Florida Equation more than HEC-18 WP for large D50

Information Exchange:
Scour - Pier

- Verify Equation
  - Clearwater Scour Flume – Massachusetts
    - Fine Sediment lowered equilibrium scour depths
  - Live Bed Scour Flume – Auckland, New Zealand

Information Exchange:

Scour - Pier

Massachusetts Clearwater Flume

Information Exchange:

Scour - Pier

Auckland, New Zealand Live Bed Flume

Information Exchange:
Scour - Cohesive Materials

Georgia DOT Research – Dr. Sturm

- Laboratory and 3D Numerical Modeling with Field Monitoring of Regional Bridge Scour in Georgia
  - 4 Bridges Monitored
  - 2 Bridges Modeled in Lab
  - Compare Field, Lab, and 3-D Modeling Results
  - Regional Bridge Scour Prediction Methodology

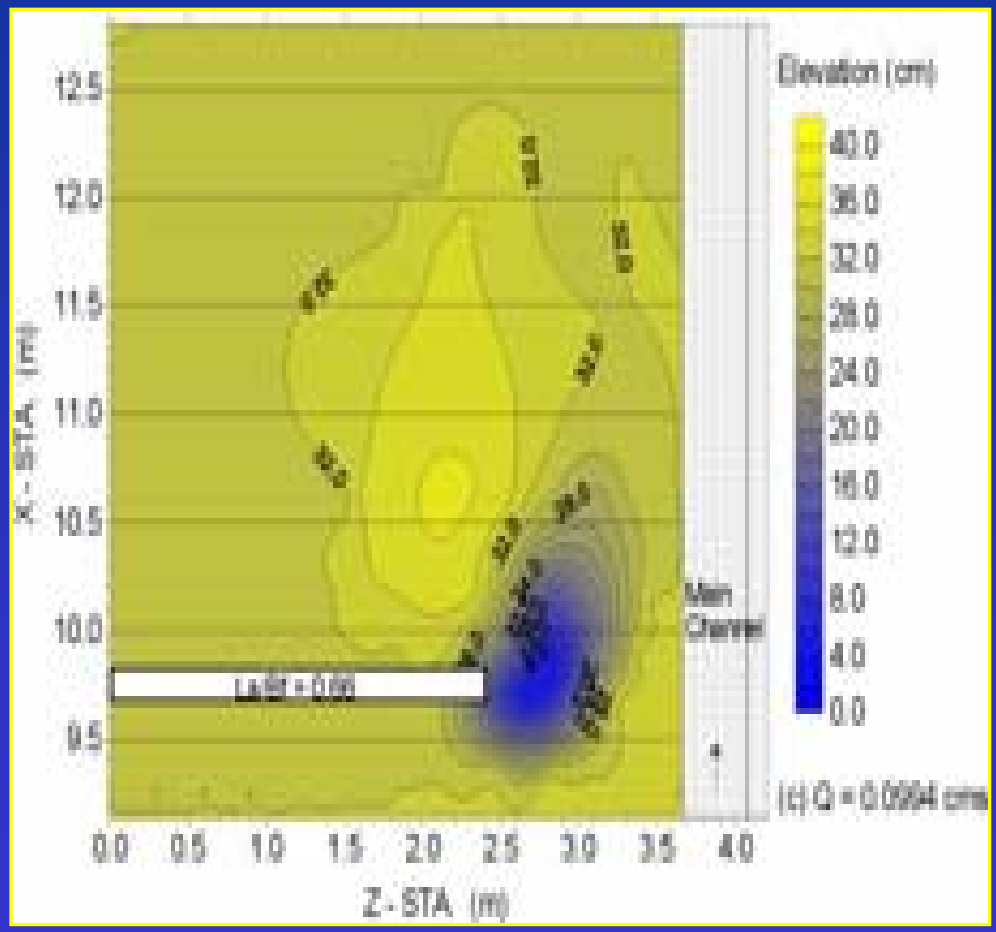
Information Exchange:

Scour - Cohesive Materials

Laboratory Modeling

Information Exchange:
Scour - Cohesive Materials

3-D Numeric Modeling



Information Exchange:
Scour - Rock

Florida DOT Research – Dr. Sheppard

- Procedure for Determining Scour in Rock
  - Determine "Rate of Erosion" properties
    - Rotating Erosion Test Apparatus (RETA)
    - Flume Erosion Test Apparatus (FETA)
  - Determine Flows over Life of Bridge
  - Construct Time History Bed Shear Stress
  - Estimate Contraction Scour
  - Estimate Local Scour

Information Exchange:

Scour - Rock

Rotating Erosion Test Apparatus (RETA)

Information Exchange:
Scour – Clearwater

SC DOT Research – Stephen Benedict

- Collect Clearwater Scour Info
  - Coastal
  - Piedmont
- Develop Limiting Curves
  - Completed for Abutment Scour
  - Continuing for Clearwater Contraction and Pier Scour

Information Exchange:
Scour - Tidal

Florida DOT

- Coastal Hydraulic Engineers Council
- ADCIRC Program
- Research:
  - Open Coast Storm Surge Hydrographs for Florida Coastline

Information Exchange:
Scour - Inspecting and Monitoring

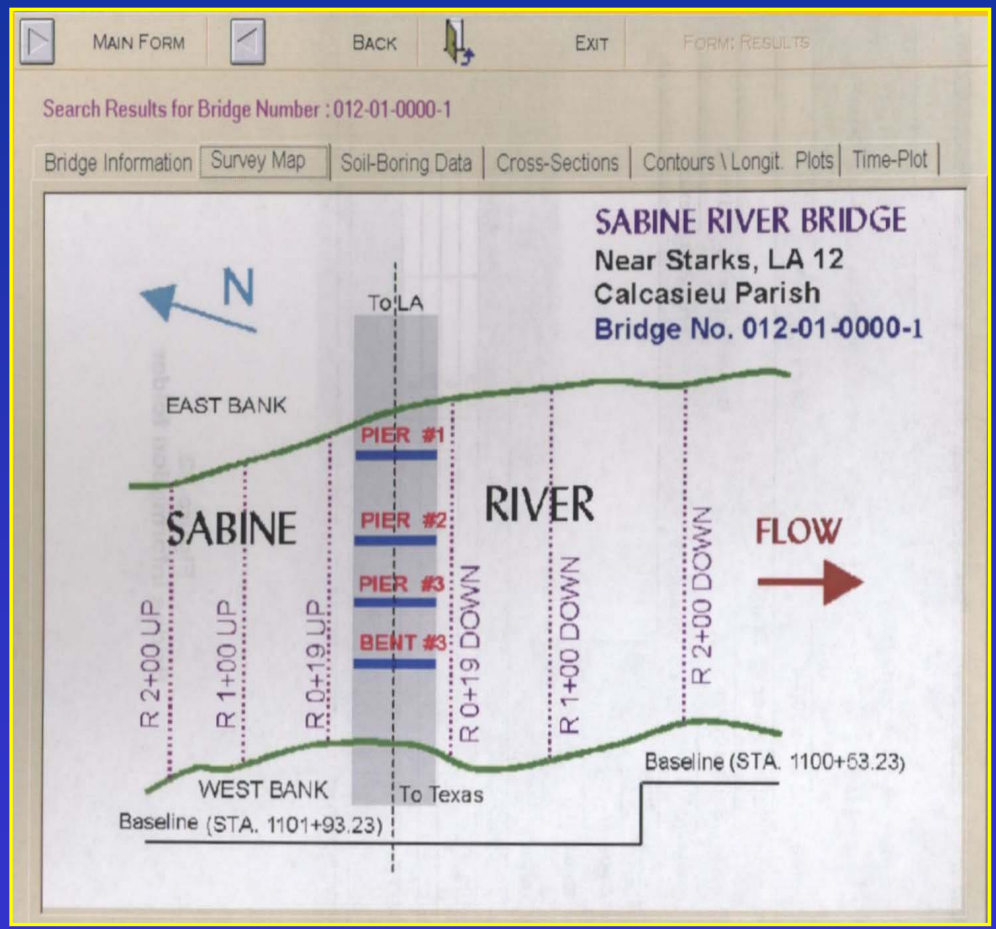
Louisiana DOTD Scour Monitoring System

- Developed by LSU
- Used Research Money
  - Program Development
  - Historical Data Input
- New Data Input by Survey Section
- Analyzed by Full-time Hydraulic Engineer

Information Exchange:

Scour - Inspecting and Monitoring

Survey Map



Information Exchange:

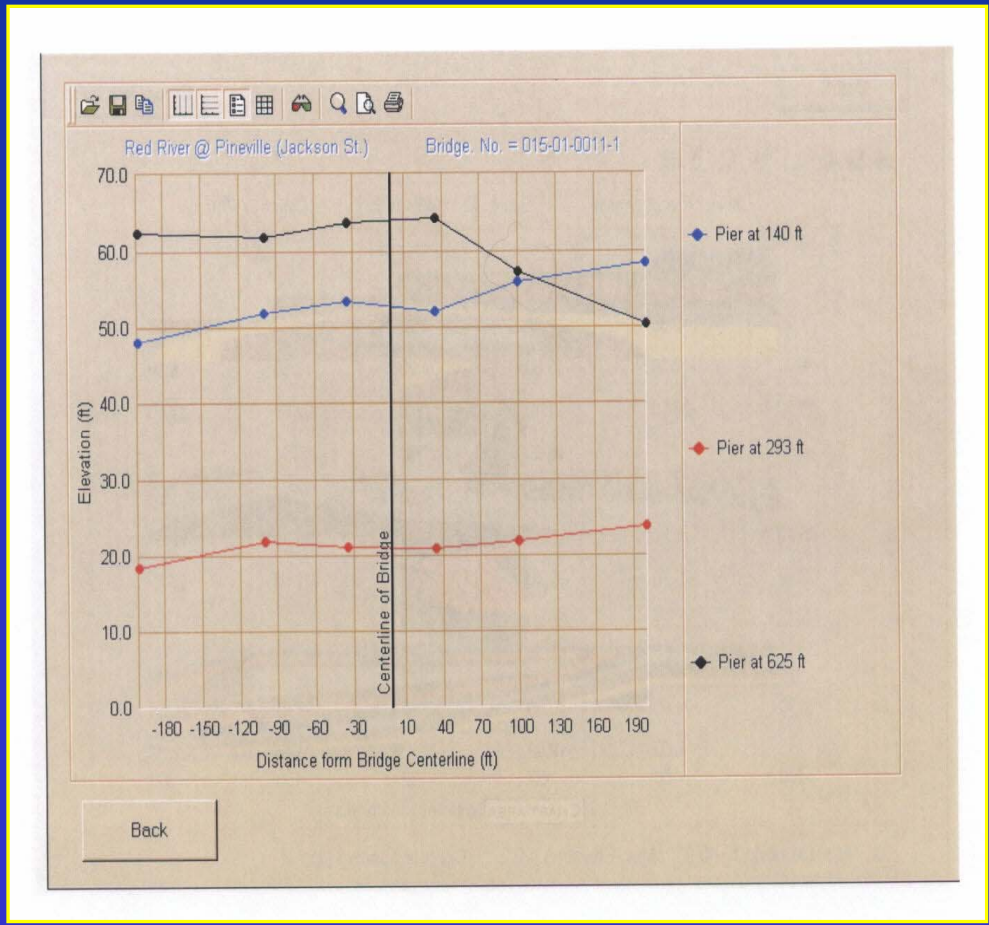
Scour - Inspecting and Monitoring

Cross-sections for Different Locations Upstream and Downstream

Information Exchange:

Scour - Inspecting and Monitoring

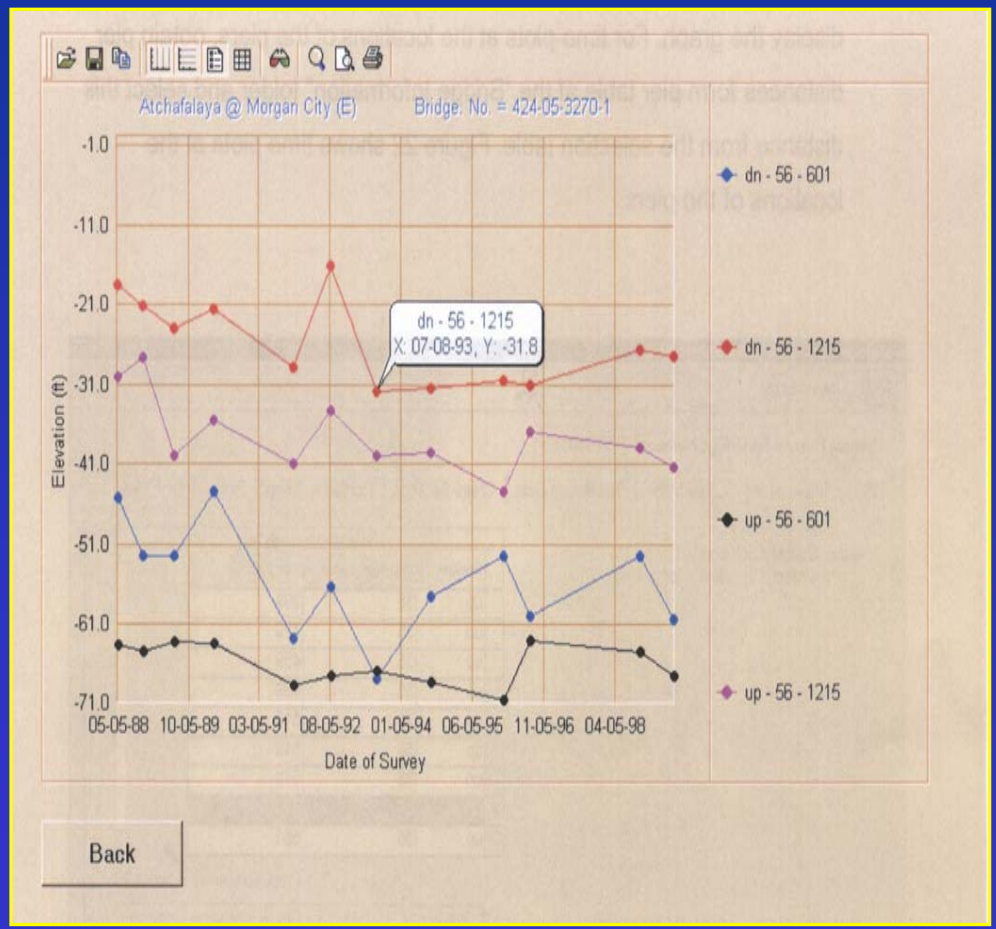
Longitudinal Plot



Information Exchange:

Scour - Inspecting and Monitoring

Survey Points Plotted Over Time



Information Exchange:
Scour - Countermeasures

Riprap Preferred

Ajacks - Kentucky KYTC

- Experimented
- Requirements for Success
  - Tie together
  - Bury

Information Exchange:
Scour - Countermeasures

Ajacks around pier

Information Exchange:
Stream Stability

Research

- Texas DOT

Countermeasures

- Oklahoma DOT
- Tennessee DOT
- New Mexico SHTD
- Mississippi DOT
- Kentucky TC

Information Exchange:
Stream Stability - Research

Texas DOT Research – Dr. Briaud

- Establish Guidance for Soil Properties Based Prediction of Meander Migration Rate (Project 0-4378)
  - Flume Tests
  - Numerical Simulations
  - Develop Prediction Method
  - Verification

Information Exchange:

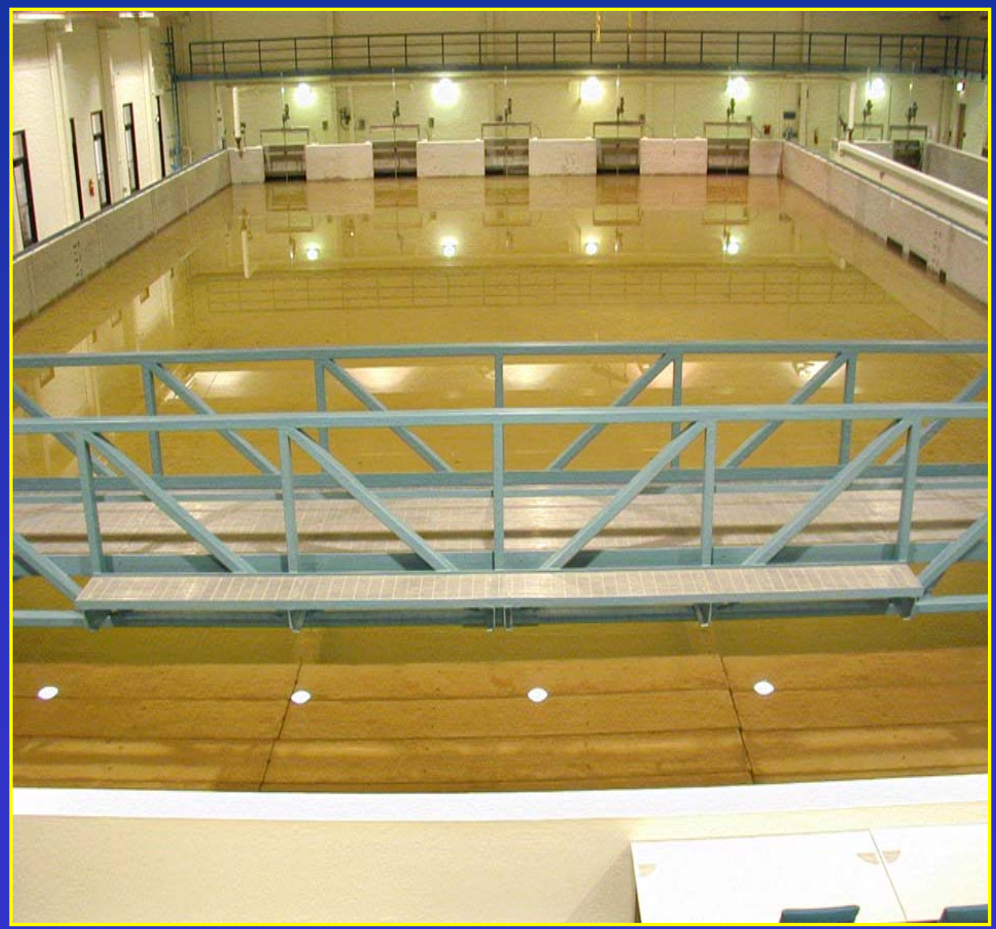
Stream Stability - Research

Flume

Information Exchange:

Stream Stability - Research

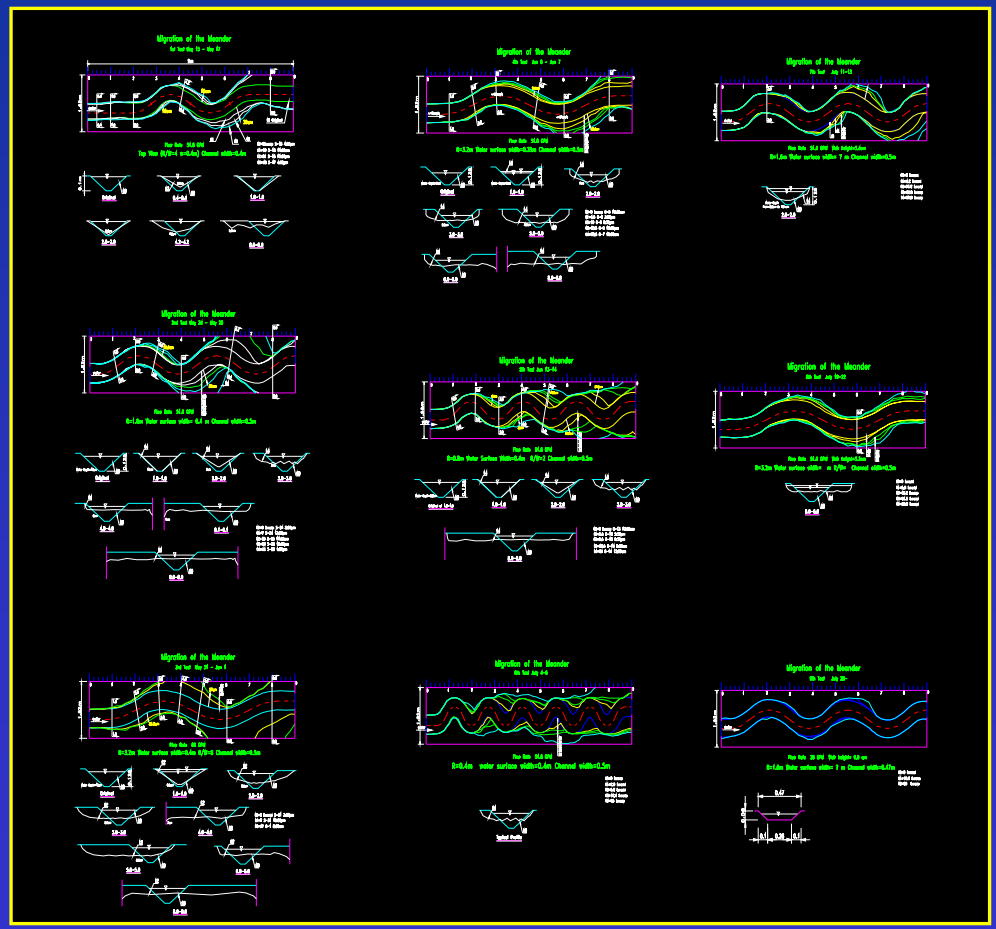
Coastal Engineering Lab Flume



Information Exchange:

Stream Stability - Research

Plot of Flume Test



Information Exchange:

Stream Stability - Countermeasures

When Used -

- Cohesionless, Highly Erodible Material
- Channelization

Examples

Information Exchange:

Stream Stability - Countermeasures

Spurs

Information Exchange:

Stream Stability - Countermeasures

Bendway Weirs

Information Exchange:

Stream Stability - Countermeasures

Jack Field

Information Exchange:

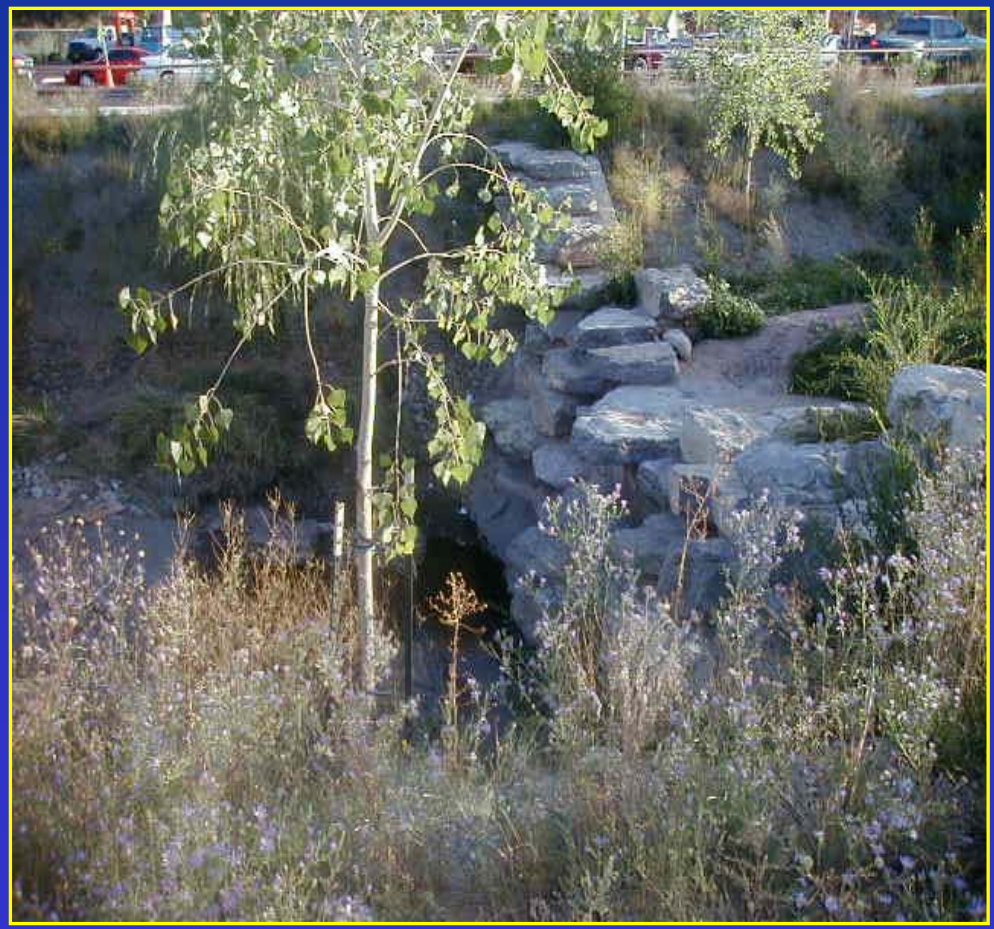
Stream Stability - Countermeasures

Drop Structure

Information Exchange:

Stream Stability - Countermeasures

Drop Structure



Information Exchange:

Stream Stability - Countermeasures

Wood
Fence
Retarder

Information Exchange:

Stream Stability - Countermeasures

Extend Bridge

Information Exchange:

Stream Stability - Countermeasures

Downstream View

Information Exchange:

Stream Stability - Countermeasures

AJACKS

Information Exchange:
Drainage

Florida DOT Pipe Policy

- Permanent Pipe - Service Life > 100 yrs
  - Not Replace Pipe
  - Developing Criteria
- Non-Permanent Pipe – Service Life > 50 yrs
  - Replace Pipe
    - Driveways

Information Exchange: Environment

Water Quality

- Research Centers
- Projects

Fish Passage

Stream Restoration

Information Exchange:
Environment – Water Quality

Research Centers

- Florida DOT – Stormwater Management Academy
  - University of Central Florida
  - Research:
    - Effective Storage in Large Ponds
    - Manual for Stormwater Practice in High Recharge Areas
    - Economic Value of Water Storage in Florida

Information Exchange:
Environment – Water Quality

Research Centers

- NC DOT – Center for Transportation and Environment
  - North Carolina State University
  - Research:
    - Methodology to Estimate Non-Point Source Pollutant Loadings from North Carolina Highways
    - Measures to Reduce Erosion and Turbidity in Construction Site Runoff

Information Exchange:
Environment – Water Quality

Research Centers

- Texas DOT – Center for Transportation Research
  - University of Texas at Austin
  - Research:
    - Effectiveness of Permanent Highway Runoff Controls: Grass Swales and Sedimentation/ Filtration Systems

Information Exchange:
Environment – Water Quality

Research Centers

- Texas DOT – Texas Transportation Institute
  - Texas A&M University
  - Research:
    - Performance of Low-End Stormwater Quality Structures

Information Exchange:
Environment – Water Quality

PROJECT: I-65 Widening

- KYTC
- Mammoth Cave
- Green River plus Underground Streams
- Karst Topography
- BMP's
  - Cap Sinkholes in Right-of-Way
  - Trap and Filter All Flow to Sinkholes within 150 ft
    - Rock dams and swales

Information Exchange:
Environment – Water Quality

PROJECT: Multi-Compartmental Filtration Basin

- NMSHTD
- First Compartment –
  - First Flush (2 yr)
  - Trap Debris, Oil, Sediments
  - Concrete Lined
- Second Compartment –
  - Separated by Metal Weir
  - 100 yr Flood Capacity
  - Unlined

Information Exchange:
Environment – Water Quality

Filtration Basin

Information Exchange:
Environment – Fish Passage

Georgia DOT

- Bottomless culverts
- Modified Culvert

North Carolina DOT

- Baffles

Information Exchange:
Environment – Fish Passage

Bottomless Culvert

Information Exchange:
Environment – Fish Passage

Modified Culvert – Upstream View

Information Exchange:
Environment – Fish Passage

Modified Culvert – Downstream View

Information Exchange:
Environment – Fish Passage

Culvert with Baffles

Information Exchange:
Environment – Stream Restoration

North Carolina DOT

- Stream Banking
  - 1 to 1 onsite
  - 2 to 1 offsite
- Rosgen Techniques
  - J – Hooks
  - Rock Vanes
  - Coir Bundles
  - Root Wads

Information Exchange:

Environment – Stream Restoration

J – Hook

Information Exchange:

Environment – Stream Restoration

Rock Vane with Log

Information Exchange:

Environment – Stream Restoration

Coir Bundle
and
Root Wad

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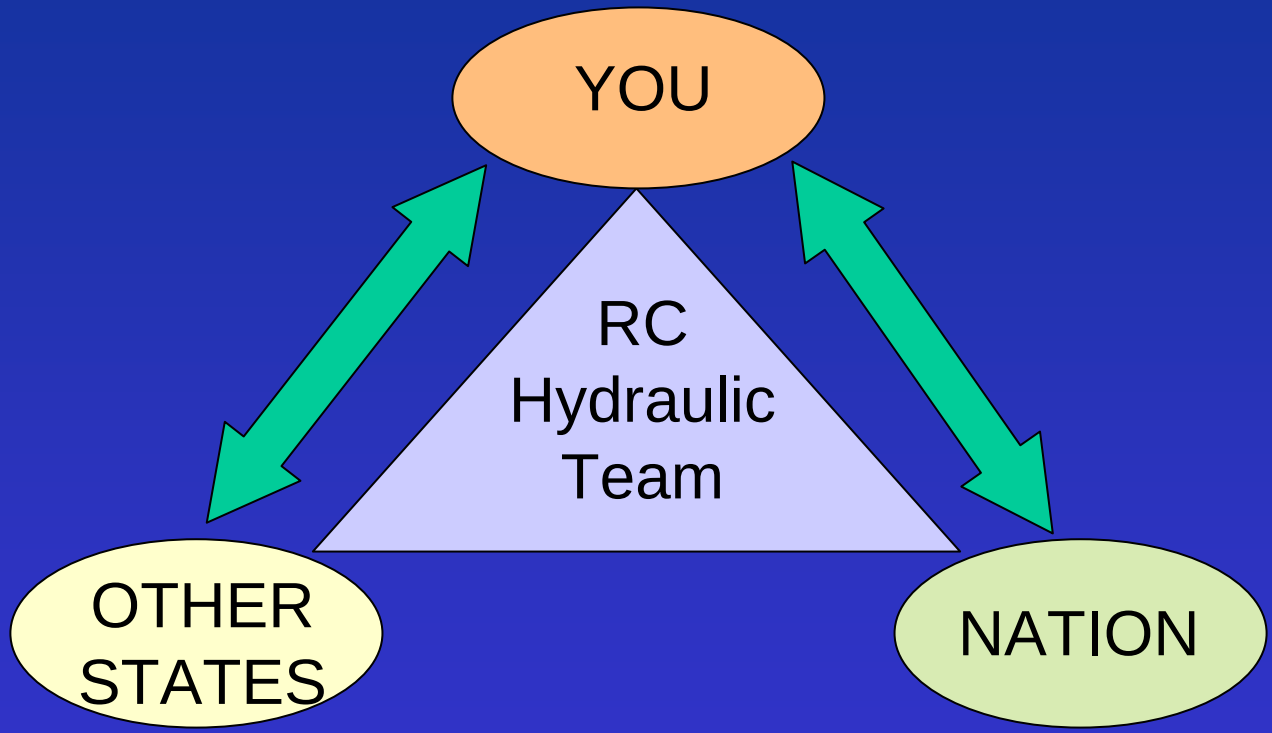

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