DAM REMOVAL SUCCESS
BY DESIGN-BUILD PARTNERING
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Sheraton Mill and LeFever Powerhouse
Dam Removal and Restoration Project
DAM FUNCTIONALITY?

• Dams with Purpose
  » Drinking Water Supply
  » Flood Control Basin
  » Aquatic Recreation
  » Canal and/or Irrigation Diversion
  » Industry Water Supply
  » Power Generation
  » Shallow Utility Crossing
  » Grade Control Structures

• Dams Forgotten
  » Run-of-the River Mill and/or Hydropower Dams
AGENDA

- Low Head Dams
- Dam Removal Issues
- Design-Build Case Project
- Questions
LOW HEAD DAMS

• Run-of-River Dams

  » History
  - Mill and Hydropower Industry 1600s to 1900s
  - Tens of Thousands Mill Dams in Eastern US by 1840
  - Replaced by Concrete Weir Dams by early 1900s

  » Current Statistics
  - Potentially 2700 to >4600 still exist in US (source: B. Tschantz, Assoc. State Dam Safety Officials)
  - Many Abandoned & Not Tracked

Kentucky is 1 of 9 States that keep track of low-head dams... Approximately 16 recorded
LOW HEAD DAMS

• Reasons for Removal

  » No Longer Functional
  » Public Safety Concern
    – Aged Infrastructure Failure
    – “Drowning Machines”
      (source: B. Tschantz, Assoc. State Dam Safety Officials)
  » River Impairments
    – Poor Ecological Health
      – Fish Barrier
      – Sediment Aggradation
      – Water Temperature
      – Habitat
    – Poor Morphological Function
      – Sediment Transport
      – Reservoir vs Streambed
DAM REMOVAL ISSUES

• Decision Factors
  » Safety
  » Environmental
  » Social
    o Involve, Educate & Avoid Misconceptions
  » Economical
    o Cost of Repair vs Remove
    o Effect on Community, Businesses & Landowners
    o Recreation Opportunity
DESIGN-BUILD CASE PROJECT

Abandoned Low Head Dams – Cuyahoga Falls, Ohio
ADVANCING THE MOVEMENT

• OEPA Initiatives
  » Improve Water Quality
    o Substantial progress since 1969 fire on the river
    o TMDL Action Plan
  » Restore River Health & Function
    o Fish, Bugs & Wildlife Habitat
  » Funding Mechanism
    o Water Resources Restoration Sponsorship Program (WRRSP)
STEPS TO FREE FLOWING RECOVERY

- Cuyahoga River, Northeast Ohio

- Lake Rockwell to Lake Erie
- Kent Dam Removed 2004
- Munroe Falls Dam Removed 2006
- Opted to Design-Build Approach for 2 Dams in Cuyahoga Falls 2013
- More Dams to come down
Great Falls of the Cuyahoga River, circa 1880
DESIGN-BUILD BUY-IN

Intentional Partnerships & Stakeholder Engagement

[Logos and images of associated organizations]
WHY DESIGN-BUILD?

• Best Delivery Method to Manage the Unknown
  » Dam Structure Composition & Extent?
  » What Lies Beneath the Dam Pool?
  » Best Strategy to Protect Remaining Structures?

• Best Delivery Method to Apply Modification
  » Designer-Contractor Relationship Start-to-Finish

• Best Delivery Method to Maximize Budget
  » Not the Traditional Low Bid Arrangement
  » “More Bang for the Buck”
PRIORITYZATION

• Maximize $1M Budget
  » Safe Removal of 2 Dams
  » Protect Remnant Historical Structures
  » Stabilize Streambanks & Storm Outfall Structures
  » Establish BEHI Action Plan
  » Improve Recreational Safety
DESIGN-BUILD APPROACH

• 30% Design & Permitting
  » Safety & Efficiency Priorities
  » Access, Staging & MOT Plans
  » Assess Unknowns & Establish Assumptions
  » Hydraulic & Structural Engineering
    o Self-supported Deflection Walls
    o Bedrock Anchoring
    o Withstand 100-year Flood Forces
  » Local, State, Federal Permits

• Construction
  » Safe Dam Pool Drawdown
  » Value Engineering
    o Structure, Streambed, Streambank & Storm Outfall Condition Assessment
  » Design-Build Field Modifications
SAFE & EFFICIENT APPROACH

Difficult Site Access

» Urban buildings/structures
» Steep vegetated/bedrock banks
» Riverbed 30’ below SR8
SAFE & EFFICIENT APPROACH

Barge Access Strategy
- Construction Access Ramp
- Mobilize/Assemble Modular Barge
- Drawdown Approach
  - Staged Drawdown
  - Specialized Equipment – Underwater Breaker
  - Seismology Monitoring Equipment

DAM SITE
SAFE & EFFICIENT APPROACH

- Construction Access Ramp
- Mobilize/Assemble Modular Barge
- Drawdown Approach
  - Specialized Equipment – Underwater Breaker
  - Staged Drawdown
  - Larger Breaker
  - Seismology Monitoring Equipment
SAFE & EFFICIENT APPROACH

Altered Access Approach
  » Downstream Riverbed Route

Dam Pool Drawdown
  » Horizontal Notch Strategy

ODNR Dam Safety Division
  » Decommission Protocol
SAFETY

Protection of Crew
» Barge Safety Training
» Cuyahoga Falls Fire Department Collaboration

Public Safety
» Control of Project Boundaries
» Control of Dam Pool Release
VALUE ENGINEERING

30% Design Strategy

» Conservative Approach Due to Unknown Conditions

Structure Protection

» Flood Stage & Velocity Change
  o Dam Pool vs Channel Flow
  o Channel Restriction
  o Structure Stability

» Deflection System
  o Structural Walls & Fill
VALUE ENGINEERING

- Field Modification
  » Natural & Practical

Reshape bedrock to adjust river thalweg alignment

Natural stone deflection wall and sloped backfill

Reinforced wall integral to powerhouse and existing mat foundation
ADDITIONAL BENEFITS

• Safe Boater Exit
• Improved Emergency Access
• Free Flowing Water Trail
THANK YOU