

# **CHANNEL STABILIZATION IN AN URBAN SETTING *IS ENGINEERING OUR ONLY SOLUTION?***

**PRESENTED BY:**



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# Introduction

- Collaboration
- Parker Jordan Centennial Open Space – A Case Study in Successful Collaboration
  - Design
  - Contractual Obligation verses Stakeholder Design
  - Construction
  - Flood Event
- Importance of Collaboration

“Individually, we are one drop. Together, we are an ocean” – Ryunosuke Satoro

# Planning . Engineering . Ecology . Permitting . Landscaping



Systems Thinking Focuses on Cyclical Rather Than Linear Cause and Effect

## **CASE STUDY IN COLLABORATION**

# **Cherry Creek Stream Reclamation at Parker Jordan Centennial Open Space**

- Open space owned by a metropolitan district and municipality
- A unique Public – Private partnership
- 15 vested stakeholders / reviewing agencies
- Extremely degraded and damaged riparian corridor
- Stream reclamation in an urban environment
- Extensive channel improvements necessary
- A very complex project from beginning to end
- **Success could only be achieved through COLLABORATION**

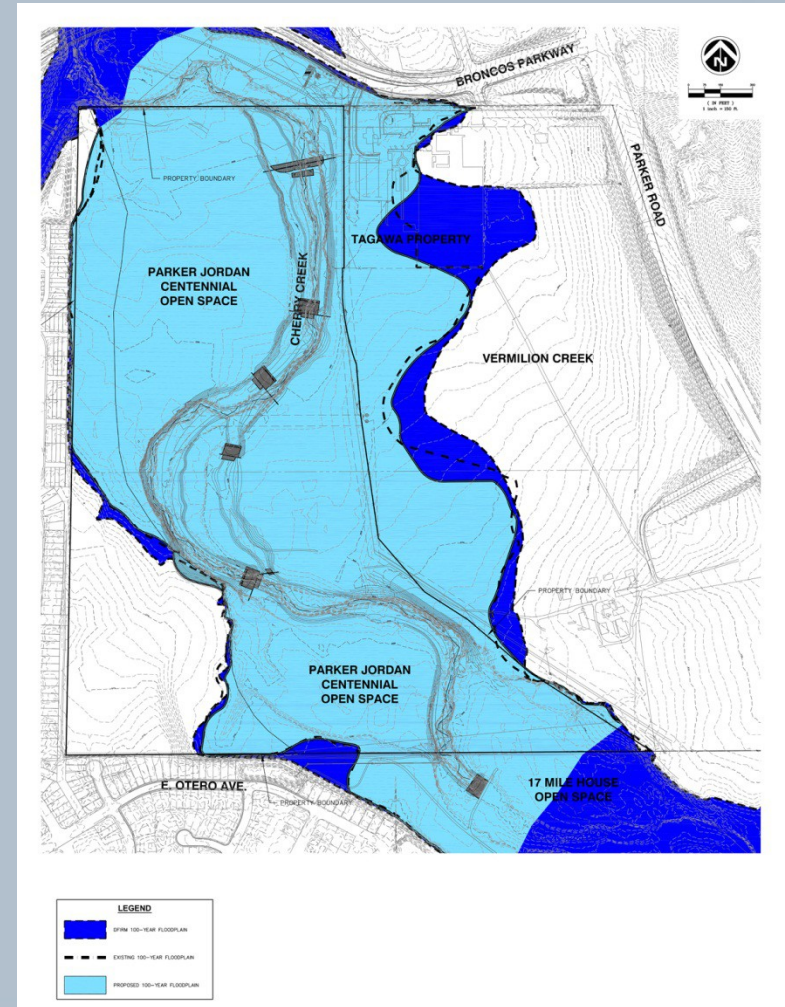
# The Existing Site

- Considered one of the most degraded, unstable reaches of Cherry Creek.
  - Limited diversity
  - Limited understory cover
  - Declining groundwater table
  - Incising stream
  - More confined stream
  - Increased erosive forces
  - Degrading riparian corridor
- Causes
  - Increased runoff
  - Grazing pressure
  - Off-Road, Recreational Uses
  - Noxious Weed Encroachment
  - Lower Water Table



# The Project Complexity

- Property history...this project had a little baggage.
- Adjacent landowners
- Urban location
- Public – Private partnership
- Floodplain
- Public Open Space
- Restoration project downstream beginning early design phases



# Stakeholder Collaboration

- 15 Stakeholders
    - 2 Property Owners
    - 8 Reviewing Jurisdictions
    - 6 Vested Parties
  - Involved early
  - Coordination throughout the entire process
  - Communication instrumental
- Arapahoe County
  - Arapahoe County Water and Wastewater Authority
  - City of Centennial
  - Cherry Creek Basin Water Quality Authority
  - Cherry Creek Stewardship Partners
  - Colorado Department of Public Health and Environment
  - Colorado State Engineers Office
  - Federal Emergency Management Agency
  - Parker Jordan Metropolitan District
  - Southcreek Homeowners Association
  - Southeast Metro Stormwater Authority
  - State Historical Preservation Society
  - Urban Drainage and Flood Control District
  - United States Army Corps of Engineers
  - United States Fish and Wildlife Service

“Alone we can do so little; together we can do so much.” Helen Keller

# Design Team Collaboration

- Benefits to specialization
- Maximize strengths
- A single discipline doesn't know it all!

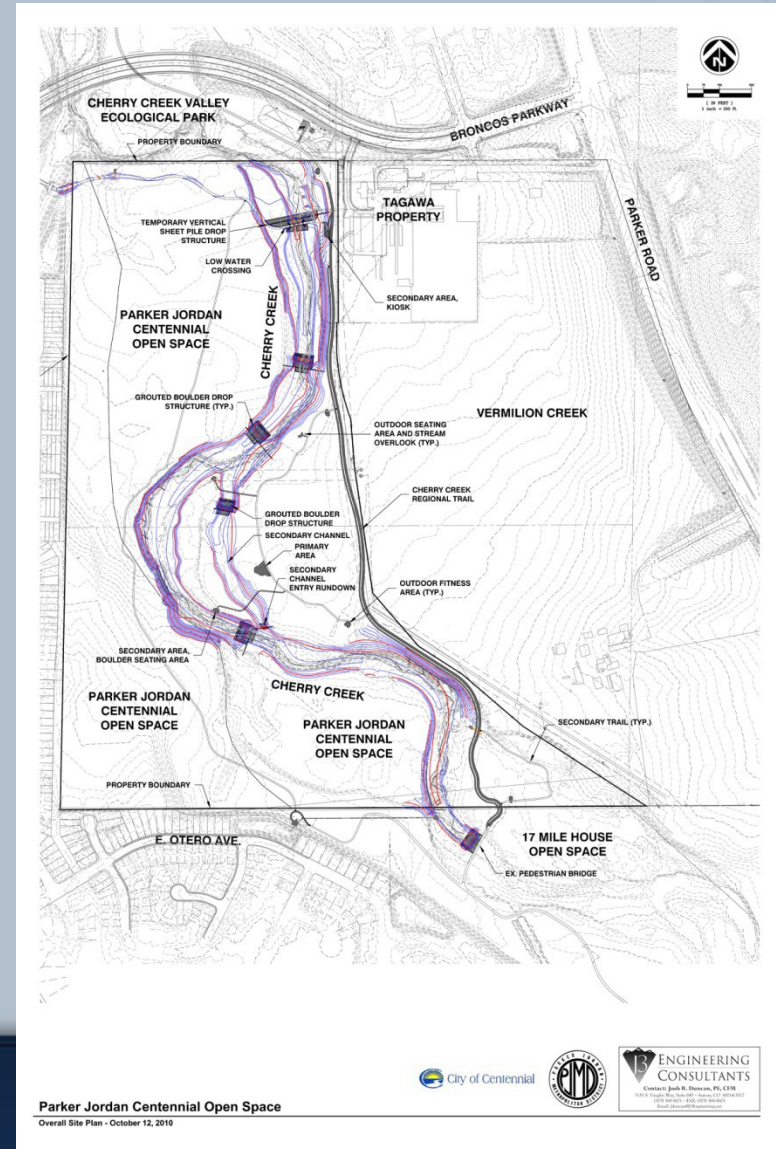
## DESIGN TEAM

- J3 Engineering (Water Resource Engineer)
- Valerian (Land Planner)
- The Restoration Group (Ecologist)
- ERO Resources Corporation (Permitting)
- Ground Engineering (Geotechnical Engineer)
- Performance Engineering (Structural Engineer)
- Hutchison Papes Engineering (Electrical Engineer)
- United Development Companies (Construction Management)



# The Project Goals

- Encourage detention up-gradient
- Increase low terrace development
- Increase upland terrace development
- Eliminate grazing
- Eliminate off-road use
- Implement a weed management program
- Raise the thalweg of channel
- Protect channel from incision using engineering and bio-habitat solutions
- Monitor water pumping
- Protect cultural resources



# Contractual Obligation vs. Stakeholder Design

- Two final designs completed for the project
  - Different project goals
  - Different stakeholders collaboration
- Allowed for a direct comparison of two designs
  - Impacts to project goals
  - Benefits to riparian corridor
  - Construction costs
  - Stakeholder objectives

# Collaboration Benefits to Design

- Substantial reduction in earthwork quantities
- Reduced construction disturbance
- A decrease in channel velocity
- Increase in average wetted area
- Increase in floodplain, water table and riparian corridor connectivity
- Increase in long-term stability
- Promoting a cohesive design with adjacent project
- Maintenance eligibility
- Stakeholder objectives achieved

# Collaboration During Construction

- Comprehensive construction oversight from design team and construction inspection from stakeholders
- Routine site inspections occurred with appropriate design team member



# Collaboration Benefits to Construction

- Singularity – A unified team
- As problems arose, immediate solutions suggested
- Constant communication
- Construction not delayed



# Flood Event

- June 6th – 7th, 2012
- 1,700 cfs
- 2-year event
- Completion:
  - Phase 1 – 100%
  - Phase 2 – 80%
  - Phase 3 – 25%
- Minimal vegetation growth



# Collaboration after the Flood Event

- Prepared a comprehensive Flood Assessment for thorough understanding and analysis
- Reconstruction of some areas required more harm than good
- Damage required cost effective alternatives without compromising design intent
- Expertise in the field lead to consensus among stakeholders

# The Project Successes through Collaboration

- Comprehensive design that fulfilled local, state and federal with project goals achieved
- Cost savings
- Funding assistance (2.1 Million)
- The unanticipated waters were easier to navigate
- Better, more complete final project
- Happy client / happy stakeholders



“If everyone is moving forward together, then success takes care of itself.” Henry Ford



# Conclusion

- Project Achievements
- Channel Stability
- Amenities
- Increased Habitat
- Regional Connectivity
- Water Quality Benefits

