Upper Whites Branch
Stream Restoration

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Rendering by Bennett Benner Partners
Background

• 400+ acre mixed use development
• Existing 9-acre stock pond
  – Unknown design/construction
  – Presented safety concerns
  – Owner elected to remove rather than rebuild
  – Jurisdictional Waters of the U.S.
    • Future development or fill would require permit
Dam Removal

• Permitting is definitely required:
  – USACE – November 2012 (NWP 27)
  – TCEQ – April/May 2013
  – City of Fort Worth – May 2013

• Dewatering & Removal – May-July 2013
One-Step Removal

TIMBER MATS

PROTECTED AREA
One-Step Removal

PROTECTED AREA

ONE STEP

PELOTON LAND SOLUTIONS
Now That That’s Out of the Way...

• Stream Restoration Design
  – H&H
  – Geomorphology
  – Landscape & ecology
  – Amenities & public access

• Stream Construction
  – Channel
  – Riffles & crossings
  – Plantings
Now That That’s Out of the Way...

• Stream Restoration Design
  – Hydrology & Hydraulics
  – Geomorphology
  – Landscape & ecology
  – Amenities & public access

• Stream Construction
  – Channel
  – Riffles & crossings
  – Plantings
Restoration Design - Concept

• Required for USACE permit – NWP 27

• Stream geometry
  – Gradient
  – Design discharge
  – Cross-sectional geometry

• Vegetation
  – North Texas Blackland Prairie
  – Native tall grasses & trees

• Recreation & access
Historical Data

- Stream parameters from historical photo
  - Pond constructed between 1963 - 1968
  - Sinuosity = 1.78
  - Gradient = 0.008 (approximate)
  - Probably not achievable today
  - Design goal sinuosity = 1.4
Hydrology

- Pond controls upper portion of the watershed
Hydrology

- Channel downstream is stable, well-formed
- Detailed survey of channel geometry available
- HEC-RAS model used to determine bankfull (dominant) discharge

\[ Q = ? \]
Hydrology

- Determine corresponding rainfall
- Use proposed hydrology model to determine post-developed bankfull discharge
- Slightly smaller than 1-year event
Alignment

• Tie-in upstream and downstream
  – Upstream just above gas well road (to be removed)
  – Downstream at Hillwood Parkway culverts

• Meander within proposed open space for sinuosity
Hydraulics

• Gradient
  – Tie in to upstream, downstream elevations
  – Influenced by sinuosity goal
  – Requires drop structures
Hydraulics
Hydraulics

- Channel geometry
  - Side slopes – 2:1
  - Depth – varies from 2’ to 3’
  - Bottom width – varies from 6’ to 10’
Channel & Mass Grading
Concept Plans
Drop Structures

• Necessary for desired gradient
• Client preferred natural look
• Examples found in nearby stream
• Constructed from on-site quarried boulders
Drop Structures
Drop Structures
Drop Structures
Construction

- Channel
- Riffles & crossings
- Plantings
Channel Construction
Drop Structures
Drop Structures
Drop Structures
Drop Structures
Amenities

• Trails with 3 bridge crossings (100-year)
• Amador Drive Conspan Arch
  – Oversized to allow trail underneath
• Native grasses & trees
  – Some areas mowed, but most allowed to grow
  – Lots of mature native trees
  – Planting by Rob Rider (SWA)
  – Consultation by LBJ Wildflower Center
Performance

• 4” rain on June 25, 2014
• Immediately after construction
• Little vegetation
• No evidence of channel damage:
  – No downcutting
  – No bank erosion/meandering
  – No damage to riffles
Performance
Performance
Performance - Video
Questions?
Saved Slides
Hydrology

- Pond controls upper portion of the watershed
- Channel downstream is stable, well-formed
- Detailed channel geometry available downstream of the dam
- HEC-RAS model used to determine bankfull (dominant) discharge
- Determine corresponding rainfall
Construction Drawings