Tapley Tributary

Buffalo Bayou Partnership
CMP Grant # 09-042
Tapley Tributary, Final Report

BRINGING THE BAYOU TO THE BAYOU CITY

In 1974, Charles Tapley developed the first master plan for Buffalo Bayou, a visionary approach for an underutilized natural resource in the heart of Houston. Today, many of his innovative concepts and recommendations serve as the template for current bayou improvement projects. For one innovative project, known as the Tapley Tributary, Charles directed water from a stormwater outfall through a constructed urban wetland designed to enhance habitat and attract wildlife. At the time, this was an incredibly innovative approach to stormwater management and ecological design in the heart of Downtown Houston, the bayou city that had long ago turned its back on the bayou.

Tapley's designs were supported in the 2002 twenty-year visionary *Buffalo Bayou and Beyond Master Plan*, developed by Buffalo Bayou Partnership to transform Buffalo Bayou into an ecologically functioning, pedestrian-friendly waterfront. One of the major recommendations of the plan is the restoration of the bayou's riparian buffers and storm water tributaries.

Historically, bayou tributaries were long, meandering creeks stretching throughout the watershed. Today, only short fragments of the original channels remain. If properly managed, these tributary fragments can play an important role in increasing plant and wildlife diversity, attracting migratory birds and the birders who follow them, improving the native aesthetic of the riparian corridor and enhancing user experiences by revealing unique topographic and water features. As important, this work will further improve the quality of the storm water runoff before it empties into the bayou and eventually into Galveston Bay.

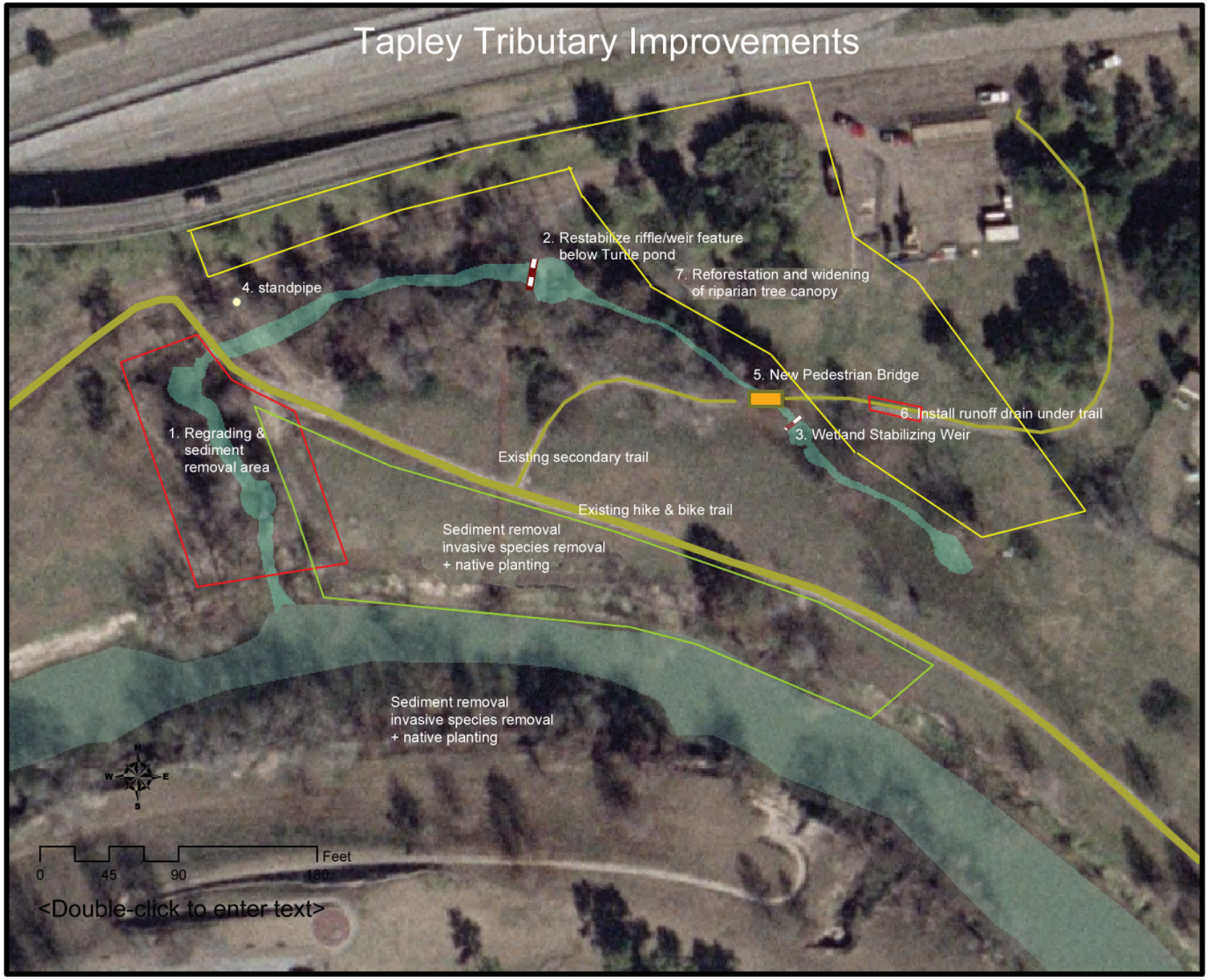
The Tapley Tributary is crossed by a heavily used hike and bike trail and is easily accessible by trail from free public parking approximately 300 yards to the east. The tributary extends from a stormwater outfall and runs roughly 150 yards to Buffalo Bayou. Tapley's original design created a water pool-riffle-run pattern where granite steps were strategically placed to create a riffle of water leading to a long run of free-flowing water to a pool of standing water followed by another riffle and so on. Over the years, the City of Houston Parks and Recreation Department, strapped for man-power and money, has neglected Tapley Tributary. Sediment build-up prevents the site from functioning properly.

The $102,823 CMP grant award along with $173, 275 matching funds have restored this hidden gem in the heart of Houston. Over the past several months, Buffalo Bayou Partnership, in conjunction with the Harris County Flood Control District, has removed substantial amounts of sediment and non-native species to restore Charles Tapley's original design for this space, improving the flow of water, people, and fauna through this beloved site.

Buffalo Bayou Partnership submitted a proposal to fund habitat, water quality and flood capacity improvements to the Tapley Tributary and the adjacent segment of Buffalo Bayou's riparian buffer.

To complete the improvements of Tapley Tributary, Buffalo Bayou Partnership began working on attaining the necessary permits, assessing existing conditions, and hiring consultants and contractors necessary to fulfill the terms of the CMP Proposal. Over the course of the project and based on a previous CMP grant project, it became apparent there were essential steps that were overlooked and consequently delayed completion of the project. In addition, heavy summer rain and severe flooding impacted the construction.

PRODUCTS
Archeological Survey
Antiquities Permit
Right of Entry
Development and Building Permits
Construction Documents including engineering for bridge abutments and shop drawings for bridge
Planting Plan


Tapley Tributary Improvements
2. Restabilize riffle/weir feature below Turtle pond
7. Reforestation and widening of riparian tree canopy
4. standpipe
5. New Pedestrian Bridge
6. Install runoff drain under trail
3. Wetland Stabilizing Weir
1. Regrading & sediment removal area
Existing secondary trail
Existing hike & bike trail
Sediment removal invasive species removal + native planting
Sediment removal invasive species removal + native planting
N
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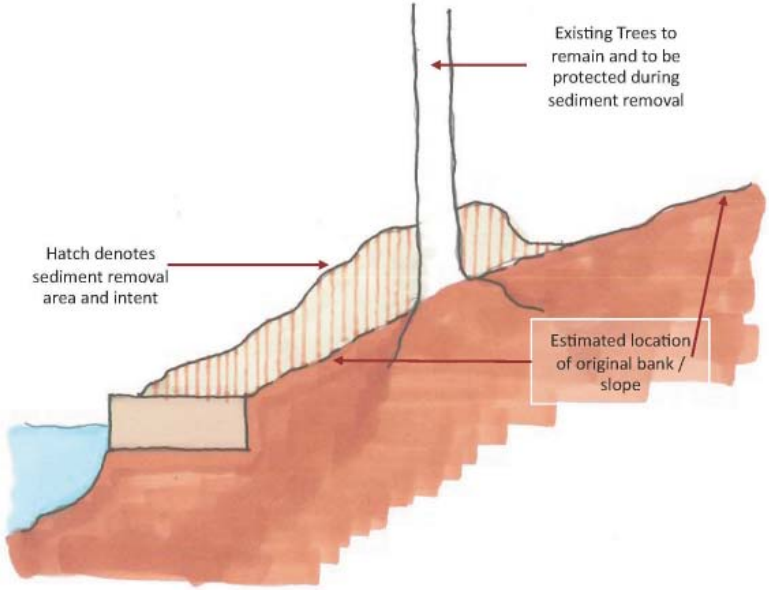
Task One: Sediment Removal and Riparian Re-vegetation

Canoe Launch
East Bank

Canoe Launch
West Bank



Typical Section

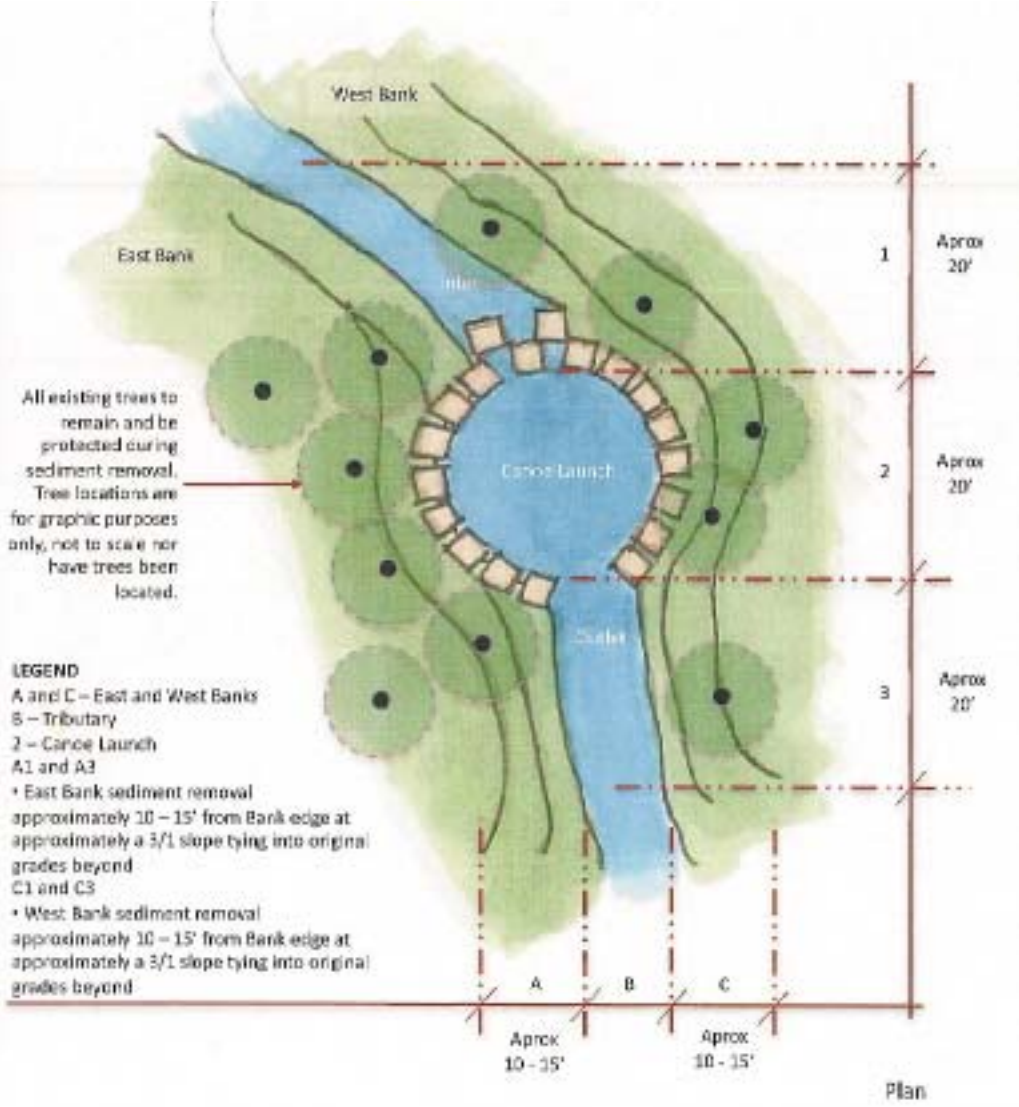
Selective invasive species removal occurred across the five-acre Tapley Tributary site by Buffalo Bayou Partnership's volunteer groups. Non-native species removed include Giant Turks Cap and Aspidistra. Invasive species include Ruellia, Elephant Ear, and Chinese Tallow. Almost 200 cubic yards of sediment was removed by a professional contractor, followed by 3:1 grading, coconut fiber matting and native grass seeding. While the contractor was careful doing much of the sediment removal manually, there was one problem where a tree bark was damaged. The contractor and project manager met on site with the City Forestor to remedy the situation. Although there was initial concern, the forester advised the contractor to clean the bark and let the tree heal naturally. Additional tree planting occurred including: 200 oaks (various species, except water and willow), 75 red maple, 25 sweet gum, 10 sycamore, and 9 pine. Understory material installed includes Red buckeye, American Beautyberry, Common Buttonbush, Silverbell, Palmetto, Coralberry, Arrowood Viburnum, Inland Sea oats, Yaupon, and Farkleberry.

In addition, an additional 1.5 acres of selective removal of invasive trees and vines occurred under the adjacent Harris County Flood Control District Sediment Removal Project (matching funds). Over 10,000 cubic yards of sediment was removed. Reforestation occurred including a total of 84 trees planted, including 33 Bald Cypress,8 Cedar Elm,19 Sycamore,18 Red Maple and 6 Green Ash. Five trees were spaded in, including 4 Overcup Oak and 1 Red Maple.

Task One: Sediment Removal and Riparian Re-vegetation - Construction

Canoe Launch Outlet
Looking South

Canoe Launch Inlet
Looking North



Deliverable(s):

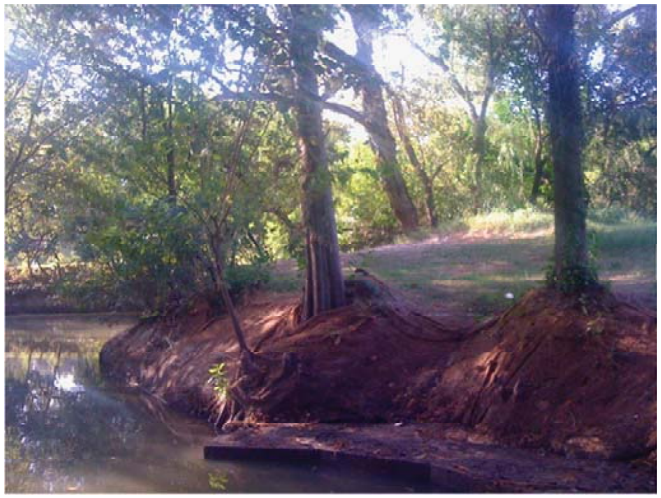
1. Removal of alluvial sediment buildup along bank and 3 to 1 slope grading
2. Seeding and installation of erosion control blanket
3. Riparian planting of upper canopy trees and understory species

Task One: Sediment Removal and Riparian Re-vegetation - Complete

Once covered in over three feet of sediment, the majestic bald cypress are revealed and the Indian Ring is restored. The Indian Ring marks a pool near where Tapley Tributary feeds into Buffalo Bayou.

The granite weir at the Indian Ring is uncovered allowing both water and people to flow through the site and restoring the pool-run feature. The riffle-pool-run hydrologic model is important for healthy stream ecology providing habitat and nutrients.

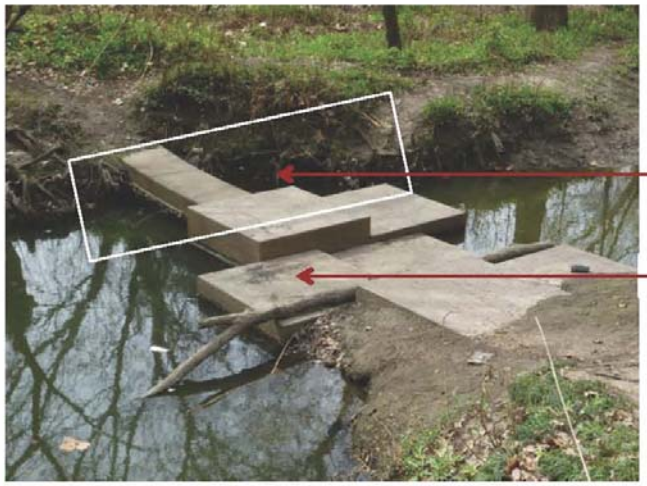
Fiber mat utilized in other locations along Buffalo Bayou is wrapped around the base of the bald cypress. Grass seed was sprayed.

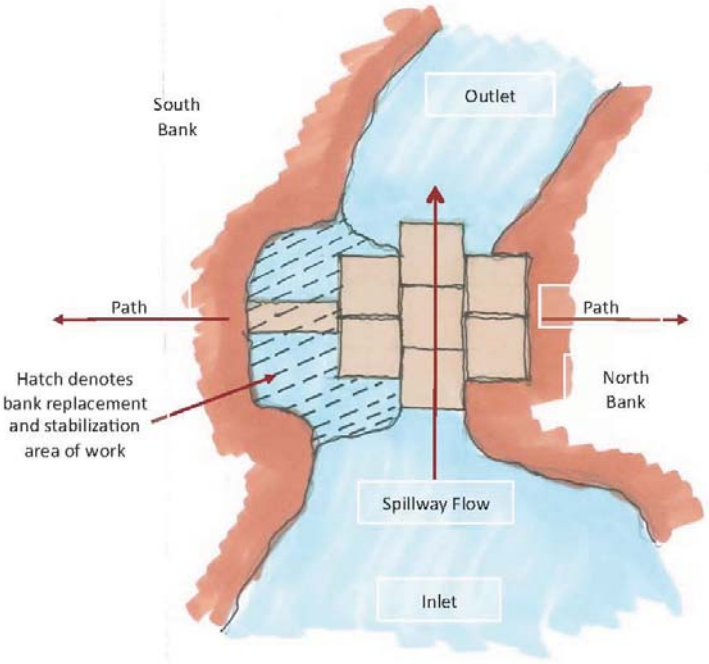


Matching funds were provided by a project being completed in conjunction with Harris County Flood Control District to the main channel of Buffalo Bayou, near the mouth of the Tapley Tributary. This image showcases the bayou greenway before invasive species and sediment removal. Limited to no access to the water. Invasive species and vines trap sediment and cause issues with flooding.

Buffalo Bayou after invasive species and sediment removal. Incredible native trees revealed. New native tree plantings included. Access to the water allows people to view the water and sediment to move through the channel in times of heavy flooding.

Task Two: Turtle Pond Restoration - Before





Plan

Restoration to the granite riffle feature of the Turtle Pond was successfully completed by stabilizing the bank on the south approach. Repairing the granite riffle feature allows stormwater to aerate as it passes over the spillway. The new structure also keeps the pond water level at a higher capacity providing ongoing habitat for turtles, frogs, gambusia fish and other water born wildlife that inhabits the bayou. Sediment fences were installed throughout construction.

Due to steep slope, a new path was excavated in lieu of a granite step, on the north slope. With the existing staircase set in the south slope the riffle “bridge” feature down to the pond will allow pedestrian traffic to move through and across the tributary safely.

Spillway repairs at Turtle Pond . Installation of gravel fill and rubber backing.

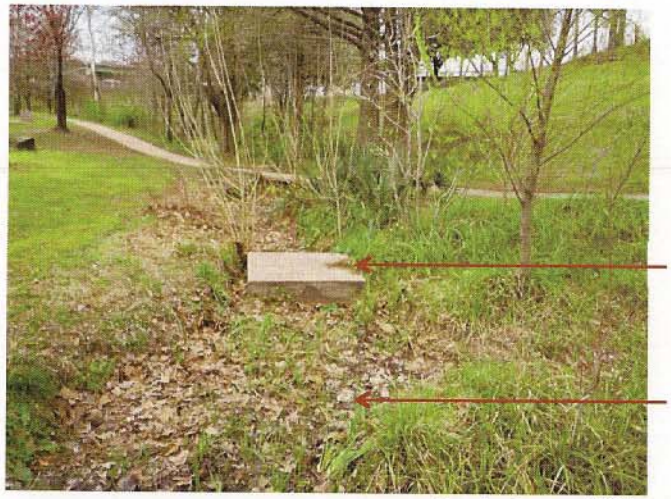
Granite step excavated and a new trail path has been configured in lieu of a stair because of steep slope.

Deliverable(s):
1. Removal of stone, form setting and concrete pour for the new retaining wall
2. Replacement of the granite riffle slabs, earth replacement and securing the stones
3. Installation of railroad tie access staircase on either side of the tributary
4. Cleanup and removal of silt fence

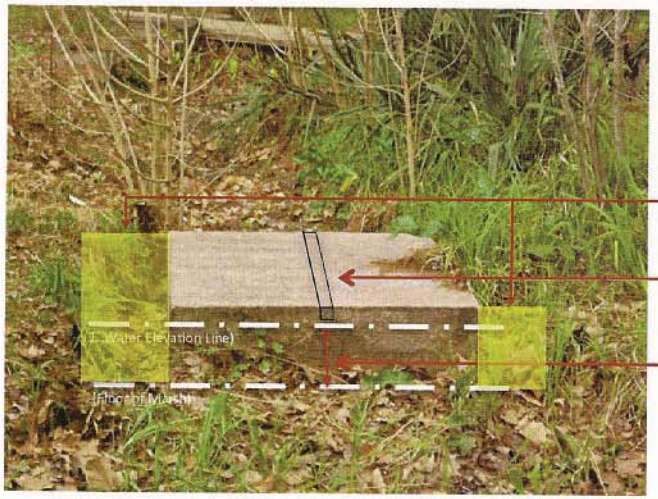
Task Two: Turtle Pond Restoration - Complete

Water is now forced to flow over the top of the weir rather than cutting and eroding along the edge of the granite weir. The weir doubles as a pathway for people, allowing them to access the Turtle Pond. A new stair was built into the side of the hill.

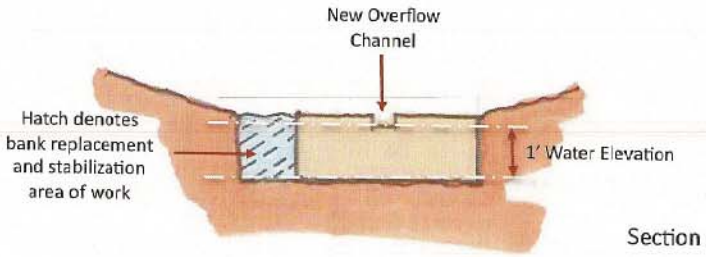
Task Three: Wetland Stabilization - Before



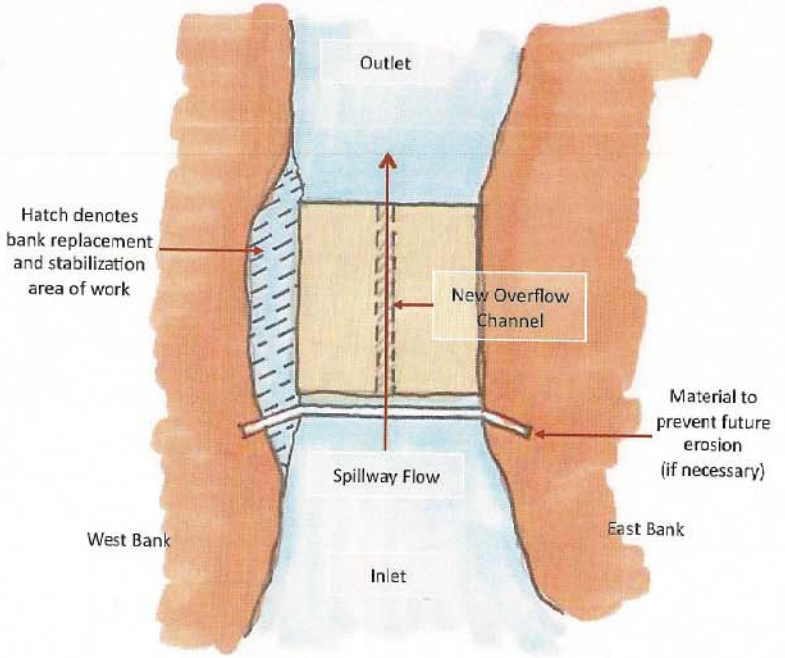
Headwater and Weir



Weir Stone Detail



Section



Plan

Task three installed a new weir system in hopes of retaining a constant water level in the wetland pond. Originally, we hoped to cut a channel in the granite slab, but it was determined it would be better to reinforce the bank edges. This was included in a no-additional cost change order.

Deliverable(s):

1. Remove existing granite dam structure, excavate earth, frame and pour concrete weir footing
2. Install rubber seal around new weir and reinstall the granite slab on top with the center channel cut into it for water flow
3. Send granite to stone cutter to create the center channel
4. Use volunteer force to install additional marsh and riverine native plants.

Task Four: Installation of Pedestrian Bridge, Drain, and other safety measures - Before

Remove approximately 25' of Trail and Bridge (Realign trail and bridge as necessary to minimize impact on two trees north of trail.)

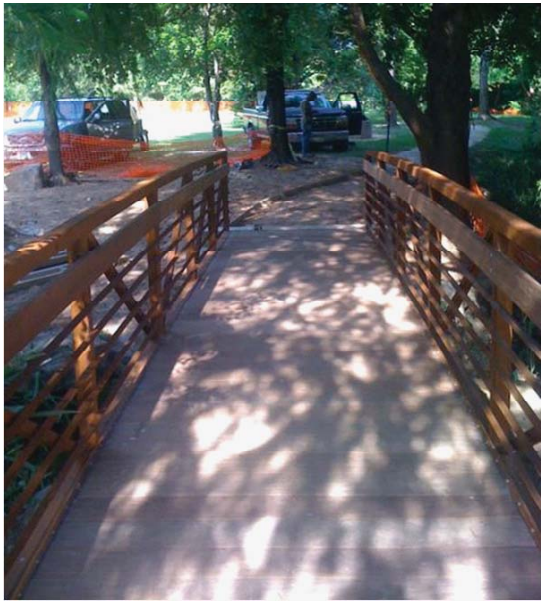
Remove existing sidewalk bridge

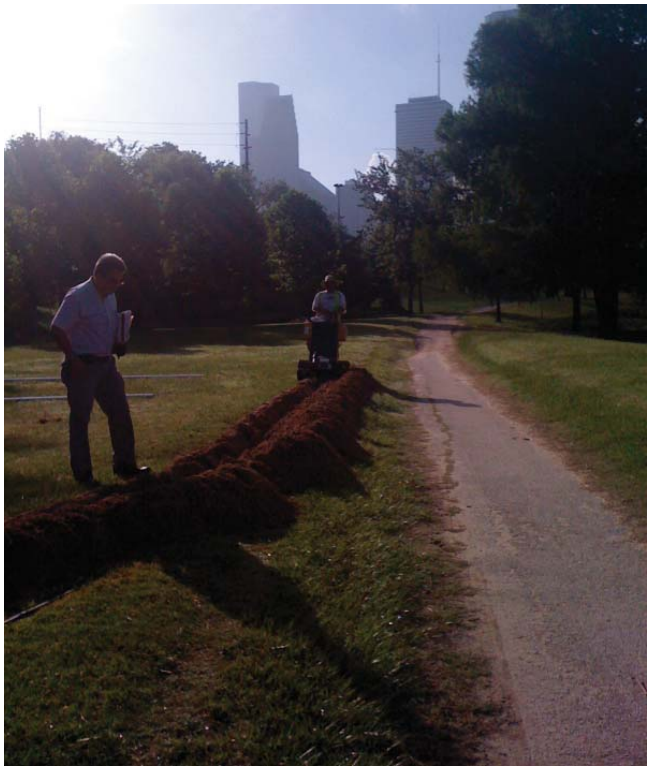
Install new edge stones under new bridge to maintain consistent tributary edge condition. Stones to match existing edge stones.

12 'Specimen Bridge at Tapley Tributary (just west of new bridge location)

Task Four removed a spillway being used inappropriately as a trail segment, installation of a pedestrian bridge and French drain. On the secondary hike and bike trail that divides the pre-existing tributary from the more recent headwater extension, the narrow concrete path creates several dangerous conditions for trail users. As the trail approaches the tributary it dips down often becoming covered with stormwater after normal rain events. Over 25-feet of existing trail was removed and a Con-tech bridge was installed. French drain installed to improve safety on trail after rain events.

Task Four: Installation of Pedestrian Bridge, Drain, and other safety measures - Construction





Deliverable(s):
1. Install environmental controls and removal of 30 foot section of concrete path
2. French drain installation
3. Footings and bridge installation

Pedestrian bridge and new pathway being installed. A small section of the existing trail was removed and realigned to safely connect the new bridge and existing pathway. New Con-tech bridge matches another bridge located nearby. The elevated pathway will allow pedestrians to move safely across the site and water to flow from the wetland headwaters to the tributary and exceeds expectations.

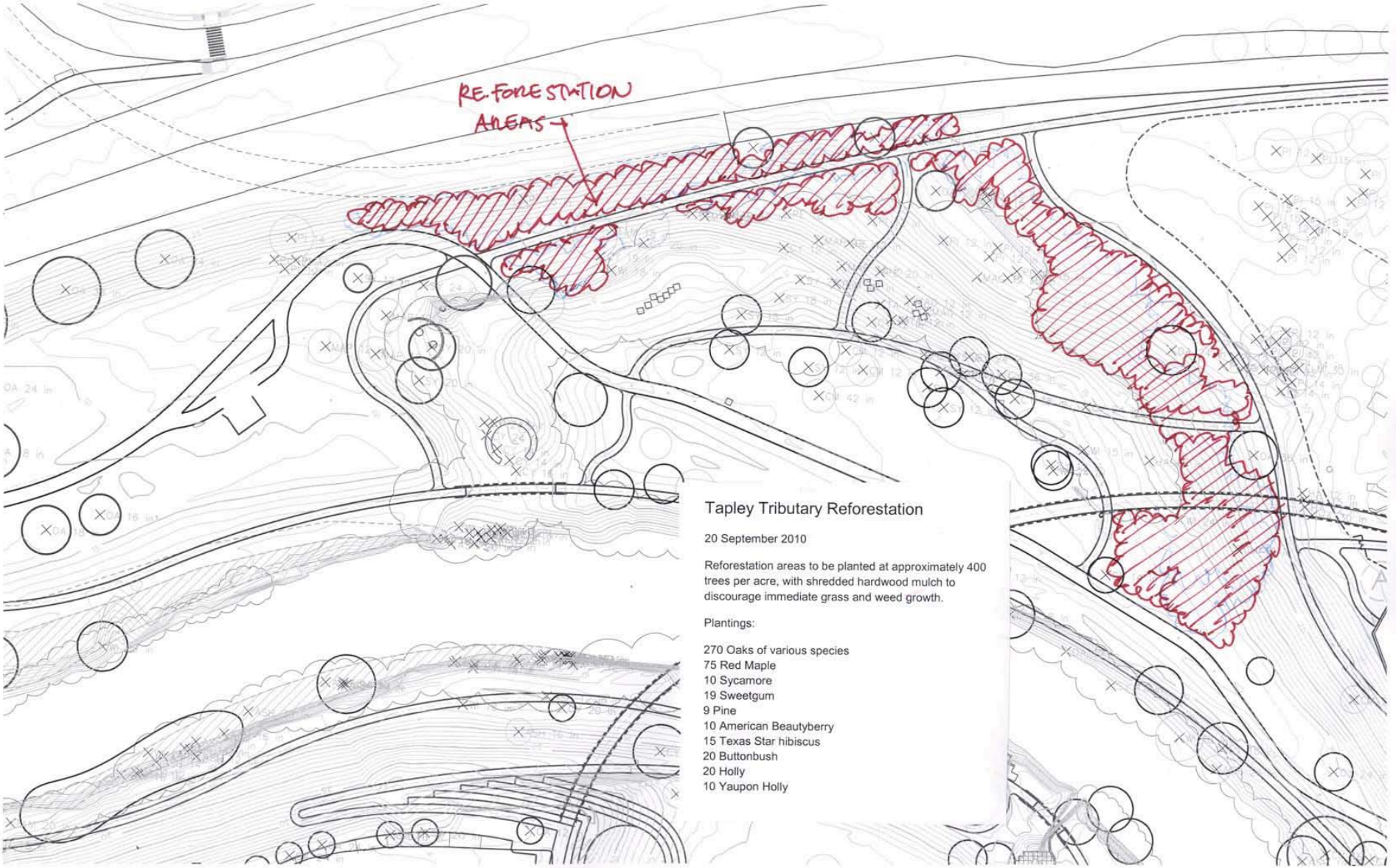
New drainage being installed.

Task Four: Installation of Pedestrian Bridge, Drain, and other safety measures - Complete

New bridge after installation. New bridge exceeds expectations

New standpipe

Task 5 Description: Installation of Tree Canopy and Niche Habitat Features



Task 5 Description: Installation of Tree Canopy and Niche Habitat Features

Two projects influenced the location of the tree planting: Future Texas Department of Transportation funded trail realignment and the Sabine to Shepherd Master Plan. Both of these projects will be let for construction in 2011. The trail project specifically impacted the area planned for tree canopy reforestation because much of this area would be impacted by construction. Consulting with the Master Plan design team, a planting plan was designed that incorporated the new trail realignment and also considered the Shepherd to Sabine Greenway Project proposed design for this area. In addition, the design team consulted with the Disc Golf organization and the Houston Parks and Recreation Department, which maintains the area. The Memorial Disc Golf Course runs through Tapley Tributary. Specifically, three tees were impacted by the proposed planting. Two of the tees were slightly adjusted to accommodate proposed Master Plan recommendations. These modifications were amendable by all parties.

On October 16th, over seventy five volunteers helped plant nearly 1000 trees and understory plants.

Buffalo Bayou Partnership, in cooperation with Trees for Houston, will be watering the trees.

Day in the Dirt - Corporate Outreach Event at Tapley Tributary to remove invasive species, including non-native Turk's Cap and vines.