

Buffalo Bayou Promenade



Landscape Performance Benefits

- Increases the flood storage capacity of the promenade section of the Buffalo Bayou by 18.65 acre-feet through the excavation of 23,013 cubic meters of soil.
- Improves the channel's ability to withstand stormwater velocity (shear stress) by 400%, thus reducing the damaging effects to the stream channel. Prior to development the channel was able to withstand less than 2lb/ft² shear stress, post development the channel is able to withstand 8lb/ft² of shear stress.
- Sequesters 29.74 tons (59,480 lbs) of CO₂ annually in 641 newly planted trees, equivalent to CO₂ emitted from driving approximately 79,226 miles in a single passenger vehicle. These trees also intercept 337,411 gallons of stormwater run-off.
- Provides recreational, interpretive and education opportunities for an estimated 22,500 visitors per year based on 2009 counts, not including everyday users. Activities and events include the KBR Kids Day on Buffalo Bayou and the Regatta boat race that attracts over 500 participants and hundreds more in spectators. 71% of 108 park users surveyed were aware of the arts events in the park, and 68% were aware of other events such as concerts and sports events.
- Improves the quality of life for 99% of 108 park users surveyed, primarily through increasing their physical activity, providing a place to be outdoors, and reducing mental stress.
- Increases outdoor activity for 88% of the survey respondents, by providing space for cycling, jogging/running, and other activities.
- Creates a feeling of safety & security for 66% of the survey respondents, primarily through the lighting design, visibility, and the planting scheme.
- Contributes to the emergence of downtown Houston area surrounding the promenade. In the Census Block Group where Buffalo Bayou Promenade is located, employment increased between 2008 and 2012. Similarly, the number of establishments increased from 54 to 236 and total retail sales increased from \$10,467,000 to \$57,281,000.

Designer

SWA Group

Land Use

Greyfield
Park/Open space

Project Type

Park
Stormwater management
facility
Stream restoration

Location

1113 Vine Street #200
Houston, Texas 77002

Size

23 acres (1.2 miles)

Budget

\$15 million (construction cost:
\$14 million)

Completion Date

2006

Overview

Buffalo Bayou Promenade is a 23-acre urban park and recreation area that transformed an overgrown, trash-soaked urban greyfield into a thriving waterfront. The \$15 million landmark project both improved flood control capacity and transformed a marginalized space beneath the freeway into a safe, welcoming place for pedestrians. The project was one of the City of Houston's largest-ever investments in parkland, financed by both public and private sources. Improvements to the site included naturalization of gently sloping banks, extensive native landscaping, hike and bike trails, public art, dramatic lighting, 12 street-to-bayou entryways, interpretative signage and a new pedestrian bridge which connects the north and south sides of the bayou for the first time. 1.4 miles of paved trails through Buffalo Bayou Promenade link to over 20 miles for the entire revitalized Bayou. The activated space now provides an urban amenity for visitors and the growing downtown population.

Sustainable Features

- Gabion sacks and cages in the 91.5% water-permeable river edge allow water egress and mimic the natural conditions of the channel. These gabion cages are filled with 14,000 tons of

100% recycled crushed concrete.

- Native and naturalized riparian plantings improve the erosion control problems by anchoring the previously exposed 50% slope faces, also enhancing the overall aesthetics of banks underneath the overpasses. Native perennials include *Ruellia brittoniana* (Mexican petunia), *Thelypteris kunthii* (river fern), and *Iris brevicaulis* (Louisiana iris).
- The park system connects to the downtown area through 12 new ADA-compliant entries, with each portal highlighted by public sculptures by John Runnels, artistic lighting and perennial gardens.
- A lighting system with 188 light fixtures makes evening use of the promenade possible. The lighting design is based on a three-tier system, including tightly-spaced trail lights, bright lights that illuminate the crevices and dark spaces under the freeway, and artistic lighting. Each fixture includes two LED light-bulbs to ensure that lights are always functioning.
- A new 189-ft long, 10-ft wide pedestrian bridge allows for safe access between the parking lots on the north side of the promenade and the theater district. This alleviates the need to cross on Rusk & Capitol St., which is a heavily used intersection at the entrance to Houston's downtown district.

Challenge

Working in and around the existing freeway infrastructure was a key challenge of the project. The freeway covers about 40% of the promenade, and creates an extreme condition of deep shade. Designing to accommodate this infrastructure and create an inviting, pedestrian-friendly space in an area previously perceived as unsafe was a main focus for the design team.

Solution

Innovative construction methods enabled the team to work around the existing freeway. For example, barges allowed heavy construction equipment to access the bayou banks for gabion system installation. To create inviting spaces under the freeway infrastructure, the design team selected plant species that can grow in deep shade, and created an extensive lighting system for the entire promenade. The overall park masterplan also enhanced the site's connections to the surrounding downtown district by creating stronger linkages, including a new pedestrian bridge. Finally, after the completion of the park, the Buffalo Bayou Partnership created a heavily programmed schedule, to draw crowds to the site. The combination of a comprehensive lighting plan and consistent human presence began to erase the perception of this space as inaccessible and dangerous to the average pedestrian.

Cost Comparison

- Saved \$1.4 million in disposal costs by using recycled, concrete gabion walls instead of traditional methods for bank stabilization. Gabions were placed in a wet condition, without coffer dams. Total cost of the gabions and gabion mattress installation was \$3,199,229. In comparison, bank stabilization using traditional methods of concrete bulkheads and foundations was estimated at \$4,400,000.

Lessons Learned

- Governmental and civic leaders in Houston recognized that concrete channelization may not be an effective flood mitigation measure after Tropical Storm Allison caused \$5 billion in property damages in 2002. The Buffalo Bayou Promenade project then emerged as a means of both providing flood control and a green amenity for downtown Houston, gaining funding from a variety of sources including \$9.3 million from the City of Houston, \$3 million from philanthropic organizations, \$2.2 million from the State of Texas and \$500,000 from Harris County Flood Control District.
- The Buffalo Bayou, and later the freeway infrastructure, created impenetrable edge conditions separating midtown from downtown for the City of Houston. Green infrastructure projects with a recreational emphasis like the Buffalo Bayou Promenade can activate these edge conditions and catalyze urban development through connectivity, accessibility, and urban improvements. As a result of the promenade improvements, the Midtown District, an upcoming urban neighborhood, is connected to destinations such as the Houston Aquarium, the Theater District, Bayou Place, Wortham Center, and others.
- A deliberate design, lighting and programming strategy allowed the Bayou to greatly shift in public perception, transforming from an unsafe space into a highly valued amenity. Previously, many property owners along Buffalo Bayou opted to orient their buildings away from the neglected waterway. The reinvigoration of landscape at the promenade catalyzed a change in perception, and land along this greenway is now viewed as viable real estate investment, especially for the growing housing market in downtown Houston.
- As one of the first capital improvement projects (CIP) in Houston, the Buffalo Bayou Promenade became a catalyst for upstream and downstream urban green infrastructure projects. Besides

BBP, additional capital improvement projects like Allen's Landing, North York Boat House, East End Trails, and Buffalo Bend Nature Park have since developed. As a result of the success of the promenade, the \$50 million Buffalo Bayou Park, located directly west of the promenade, is the next major greenway being implemented in Houston to provide park space to the west of the city.

Project Team

Landscape Architecture: SWA Group
Civil Engineering: United Engineers, Inc.
Geotechnical Engineering: Fugro South, Inc.
Structural Engineering: Ken Tan and Associates
Electrical Engineering: Ferguson Consulting, Inc.
Lighting Design: L'Observatoire
Artist: Stephen Kornis
Planting Design: Mary L. Goldsby Associates
Irrigation: Ellis Glueck and Associates
Contractor: Boyer Inc.

Role of the Landscape Architect

SWA designed the park masterplan and provided full landscape architectural services, determining the strategy for the slope banks, trails, plantings, public art and lighting scheme. Kevin Shanley, a landscape architect from the Houston office of the SWA Group, has been involved with Buffalo Bayou since the 1990's. He became involved with the Bayou Preservation Association on a pro bono basis and eventually became the principal designer of the park for SWA.

Case Study Prepared By:

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Additional Images















