

Bicycle Promenade Ecological and Cultural Braids

A 10-foot wide asphalt bicycle trail would squander the potential of the 50-foot wide CSX right-of-way. Bicycle Promenade utilizes the entire right-of-way width to promote an infinite number of movement itineraries.

Ecological and cultural braids woven among the promenade's mosaic of habitat islands constitute multiple itineraries for circulation, gathering, parking, information, and environmental restoration.

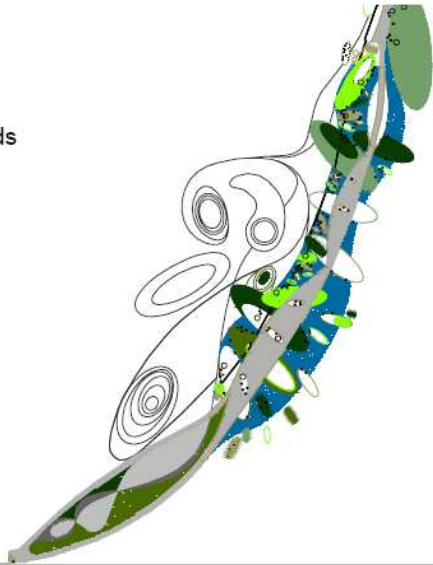
Bicycle Promenade then, is a responsive infrastructure that accommodates various paces of movement, forms of social exchange, and adjacent urban landscape ecologies.

Bicycle Promenade is a feasible alternative to typical rails-to-trails asphalt paths and vegetative caps that sequester leftover hazardous wastes, and confine public access to only 25% of the right-of-way. Instead, Bicycle Promenade employs proven phytoremediation ("phtyo" meaning plant) technologies to remove contaminants, allowing 100% use of the ground surface within the same budget. The ground will be surfaced with a combination of shaded habitat islands and granular stone currently being specified for new cycling trails (less than 1/2 the price of asphalt with equivalent maintenance). Functioning more like a garden than a corridor, Bicycle Promenade accommodates different stakeholders. The promenade responds to sports enthusiasts who see the right-of-way as an ideal extension to the regional bicycle network. The promenade responds to African-American neighborhoods that once drew their livelihoods from the railroad, and see the right-of-way as an interpretative pedestrian space celebrating their heritage in Gainesville's development. The promenade responds to those who desire a greenway dedicated to enhancing biodiversity compromised by industrial and urban growth. In braiding multiple programmatic claims, Bicycle Promenade promotes greater participatory decision-making in its maintenance and administration. While the design outcome remains open-ended, the organization is precise, maximizing interconnectivity within and outside the boundaries of the promenade.

Location:	Gainesville, Florida.
Site	Abandoned CSX Rail Right-of-Way through urban and suburban minority neighborhoods.
Constraints:	Site contains high levels of industrial contaminants to be remediated before public use.
Client:	Winner of a national design competition sponsored by the National Endowment for the Arts Public Works Program, The City of Gainesville, and the University of Florida. Client is the City of Gainesville Public Works Department.
Program:	<i>The Gainesville Eco-Trail Design Competition</i> called for a bicycle trail incorporating interpretive elements commemorating the site's railroad legacy, landscape features to help neighborhood redevelopment, transportation facilities to enhance intermodality between, bike, car and pedestrian, and standard trail amenities
Technologies:	1) Phytoremediation and other bioremediation technologies to naturally eliminate industrial contaminants; 2) granular stone with plant-based resin for promenade surface; 3) vegetative clad metal framing for promenade pavilions; 4) metal-grated wetland boardwalks; 5) LED street lights with projection templates for outdoor museum.
Funding:	State of Florida, City of Gainesville, and various public and private sponsors. Budget: \$4.5 million
Schedule:	Fall 2002-Spring 2003: property purchase and fundraising; Fall 2003-Winter 2004: Construction.



Fluvial Braids



Depot Ave.

Depot Park

South Main St.

West University Ave.

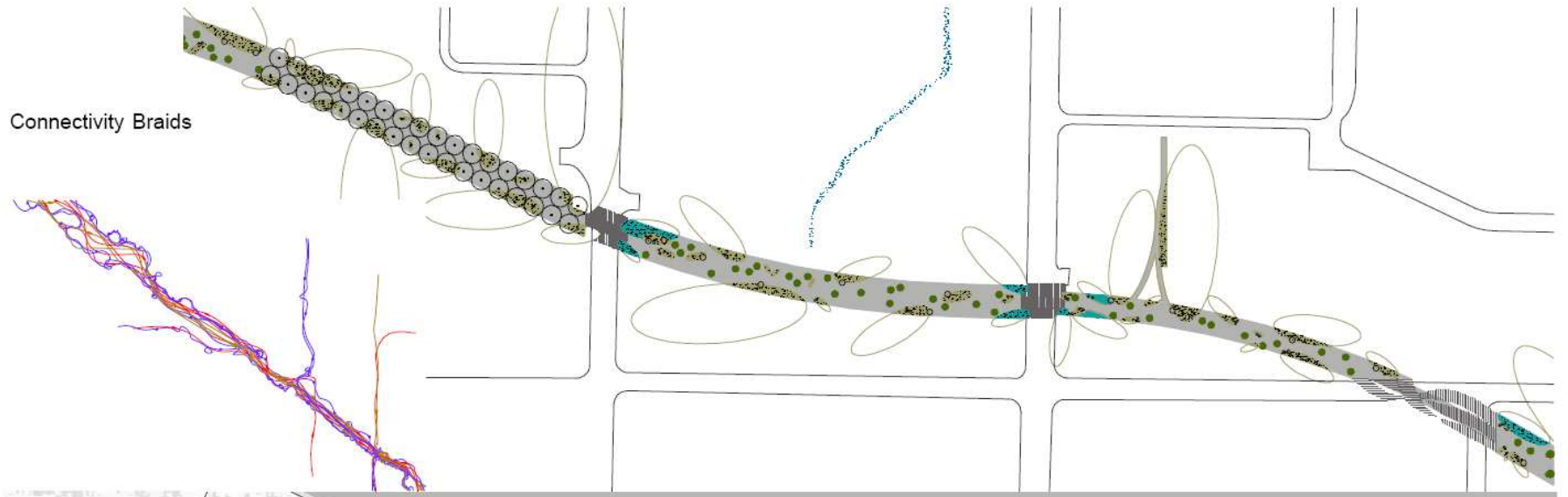
SW 2nd St.

SW 6th Street

- ① Promenade Foyer and Interpretive Center
- ② Fern Mounds and Habitat Islands (entire promenade)
- ③ Connector Meadows (typical)
- ④ 18th Street Poplar Allee
- ⑤ Stormwater Block Gardens (at crossings)
- ⑥ Farmer's Market
- ⑦ Memorial and Outdoor Museum
- ⑧ Park-and-Ride Meadow
- ⑨ 6th Avenue Grove Rest Area
- ⑩ Integrated "Green Street"
- ⑪ Parking and Vegetative Braids
- ⑫ Bus Stop
- ⑬ Stormwater Braids
- ⑭ Bicycle Facilities
- ⑮ Porter's Community Oak Allee
- ⑯ Skateboard Braids
- ⑰ Picnic Hammock
- ⑱ Constructed Wetland as Fluvial Braids
- ⑲ Industrial Processing Facilities
- ⑳ Spanish Moss Wall
- ㉑ Depot Park



Connectivity Braids



Vegetal Foyers



The second aspect of ecological regeneration is the implementation of successive landscape management schemes to grow the promenade. The pioneer stage of succession is bioremedial in order to remove contaminants and restore hydrological and habitat systems disrupted by the area's industrialization. Phreatophyte trees (deep-rooting trees like willows and poplars), through natural hydraulic control known as "solar pump and treat", will capture contaminated groundwater plumes for transpiration at rates of 50-300 gallons/day. The right-of-way's arsenic laden topsoil will be scraped into conical mounds and seeded with brake fern—the only known hyper-accumulator of arsenic. Once several harvests of ferns have sufficiently removed the arsenic, the fern mounds can be incrementally reshaped and/or replanted with pioneer grasses and shrubs as new habitat islands. Planting schemes consist of indigenous, rare plant communities able to withstand drought and inundation cycles, strong direct sun, requiring little maintenance. Subsequent mid-succession and mature plant communities will emerge over the long-term to provide more shade and increase the ecological complexity of the promenade.

Bioremediation Infrastructure

From the industrial to the public

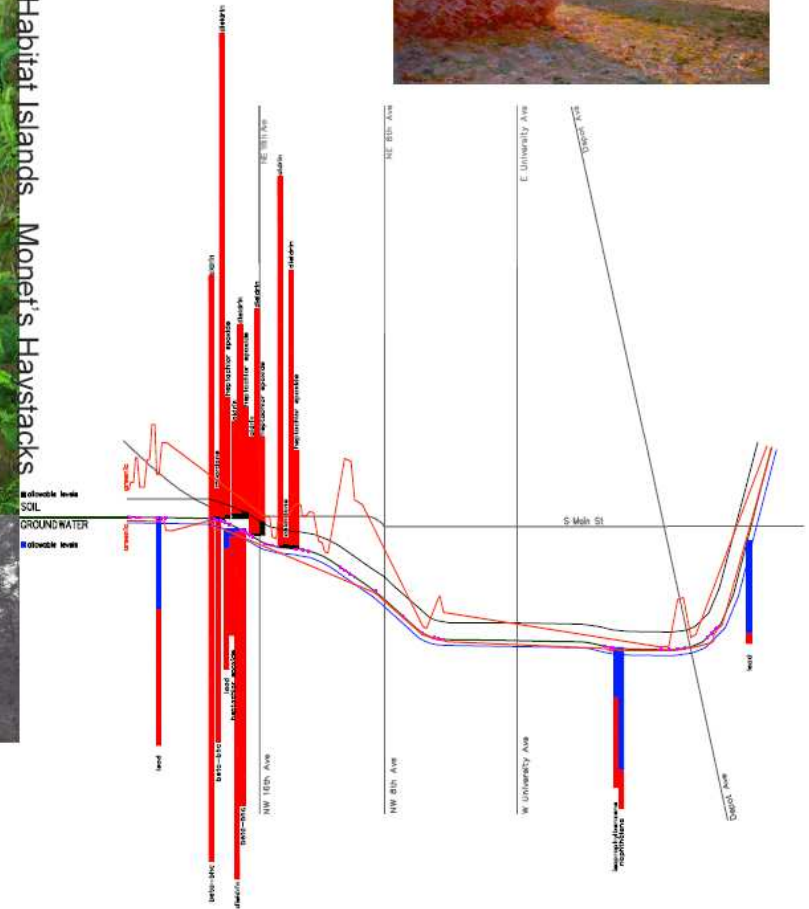


Fern Mounds, Habitat Islands, Monet's Haystacks



Restoration of Ecological Processes

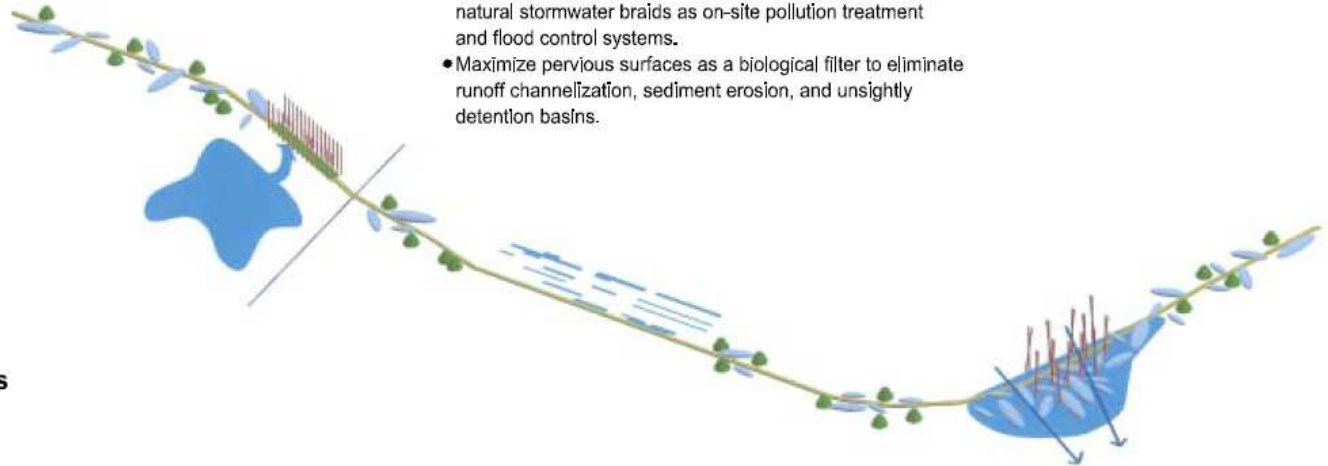
The promotion of social diversity is mirrored in the proposal's twin objective to renew the site's biodiversity. Contrary to traditional patterns of industrialized urbanism, the restoration of ecological processes as an urban redevelopment strategy makes sense in terms of economic, aesthetic and health benefits. Bicycle Promenade operates as a regenerative ecological infrastructure in two ways. First, the proposal calls for bioremediation of contaminants—mostly arsenic and chlorinated solvents—accumulated from the right-of-way's industrial history. Core bioremediation strategies rely on innovative phytoremediation technologies developed over the last decade. Phytoremediation is a natural process combining microbial and plant enzymes to remediate soils and waters of both contaminated organic and inorganic compounds. Depending on the type of contaminant and prescribed plant, treatment regimens can involve hyper-accumulation, transpiration, stabilization, extraction, rhizofiltration, or neutralization of contaminants. Phytoremediation averages 1/5th the cost of conventional treatment technologies that rely on heating, vacuuming, or carbon filtering.



Contaminant Inventory

Phytoextraction of Arsenic

- Soil along the entire right-of-way is contaminated with arsenic.
- Brake ferns, *pteris vittata*, accumulate arsenic at 200 times the concentration in surrounding soils.
- Plant *pteris vittata* - the only known hyper-accumulator of arsenic - in fern mounds to extract arsenic.
- Harvest and recycle brake fern mounds to avoid capping technologies that require paving or prohibit use of entire right right-of-way.



"Green Street" Treatment of Urban Stormwater

- Construct an integrated street (modeled after the Dutch woonerf) incorporating stormwater treatment gardens into the space of the street.
- Replace costly, engineered catchment infrastructure with natural stormwater braids as on-site pollution treatment and flood control systems.
- Maximize pervious surfaces as a biological filter to eliminate runoff channelization, sediment erosion, and unsightly detention basins.

Phytostabilization of Chlorinated Solvents

- Chlorinated solvents interact with soil and other organic media to create carcinogenic components in groundwater.
- Phreatophyte trees capture contaminated groundwater plumes and evapotranspiration at rates 50-300 gallons/day through natural hydraulic control known as "solar pump and treat".
- Phreatophytes create a cone of depression underground preventing migration of contaminated subsurface water into the aquifer.

Phytostabilization of Waterborne Contaminants

Phreatophyte Trees, such as poplars, cottonwoods and willows, have vigorous rooting systems that reach the groundwater table and pump water upward for transpiration into the atmosphere. A poplar's evapotranspiration rates are .4-1.0 million gallons/acre/year.

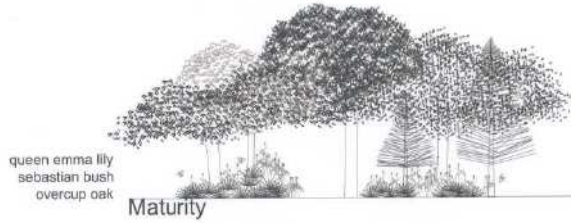
Phytoextraction of Arsenic Through a Hyper-Accumulating Fern

EPA Threshold for Industrial Hazardous Waste:	1 ppm	Clinton Threshold
	5 ppm	Current Bush Threshold
	1 ppm	Expected New Threshold
Gainesville Eco-Trail Soil:	1-12 ppm	
Brake Fern Absorption of Arsenic:	136-22,360 ppm	

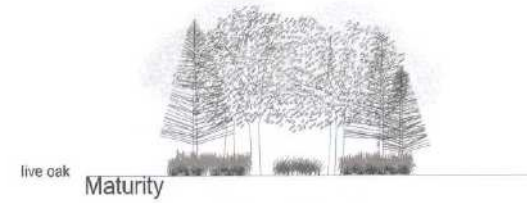
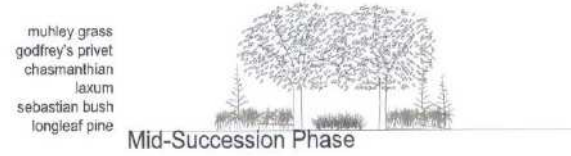
Wetland Braids Treatment of Industrial Runoff

- Construct a ridge and furrow treatment wetland to filter runoff migrating from adjacent industrial processing facilities.
- Use local emergent and submergent aquatic plants to treat wastewater, stimulate microbial communities and neutralize metals in groundwater.
- Restore integrity of natural aquifer recharge.
- Introduce bats and mosquito fish as integrated pest management control - bats can consume up to 1,000 mosquitos per evening.

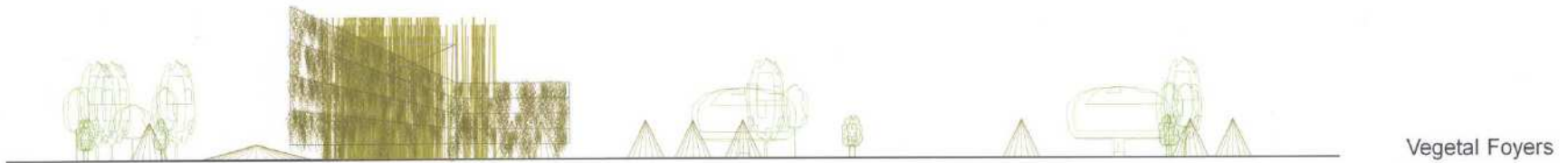




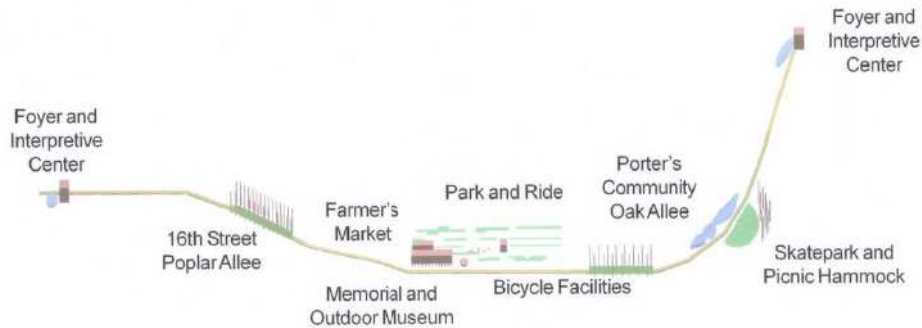
Fern Mounds & Habitat Islands



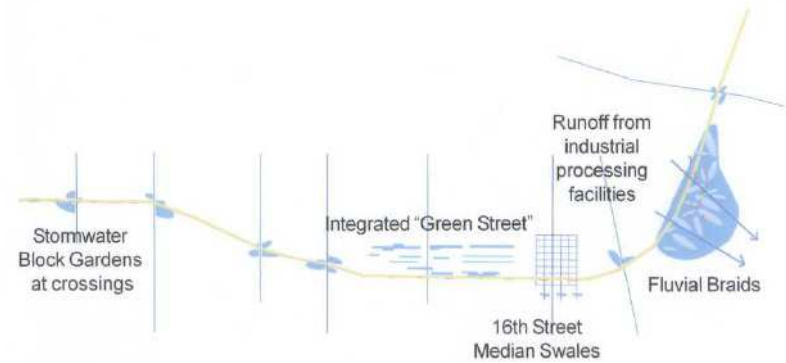
Groves



Vegetal Foyers



Cultural Amenities



Stormwater Infrastructure



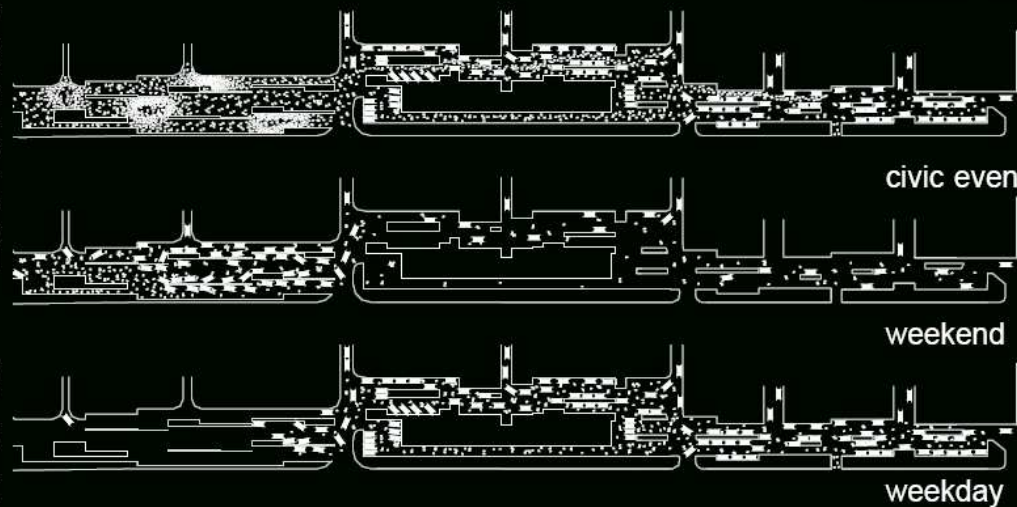
Railroad Ghosts

Civilizing Mobility

Greater interconnectivity within transit infrastructures encourages mobility that allows for slowness and social engagement. Vitality in urban greenways (as opposed to rural trails) depends more on the presence of the *flâneur*—the idling pedestrian. Hence, the role of the promenade in its qualified notion of forward movement—civilized by the decorum of pleasure and display intrinsic to civic space. While Bicycle Promenade accommodates fast speeds and the rationalized mobility of walkers and runners, its organization celebrates the nonlinear stroll and “laziness” of picnickers, activists, dandies as well as sunbathers. The braided promenade is more amenable to various forms of occupation and its resulting social diversity than standard trail typologies.

Recombinant Landscapes

The recombination of landscape, infrastructure, and city proposes a new family of planning types in Bicycle Promenade, from habitat islands, green streets, parking meadows, stormwater block gardens, to industrial wetlands. For instance, the proposed “green street” between University and NW 7th Avenues utilizes the railroad right-of-way and adjacent oversized city parking lots to create an integrated matrix of parking, stormwater gardens, pedestrian spaces and bicycle paths.

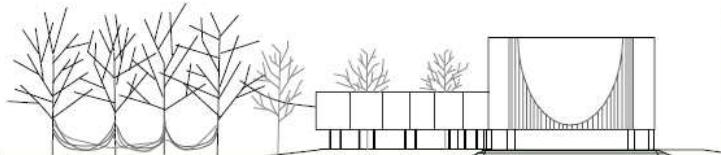


civic event

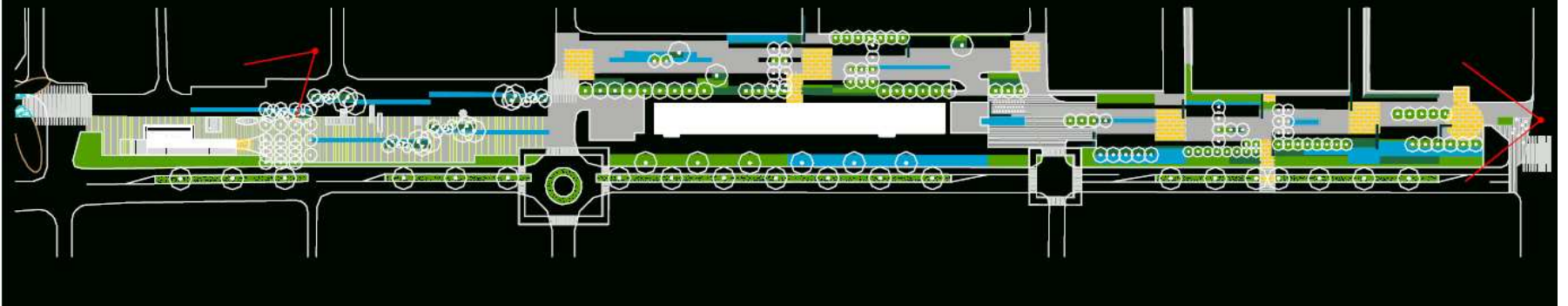
weekend

weekday

The Integrated "Green Street"



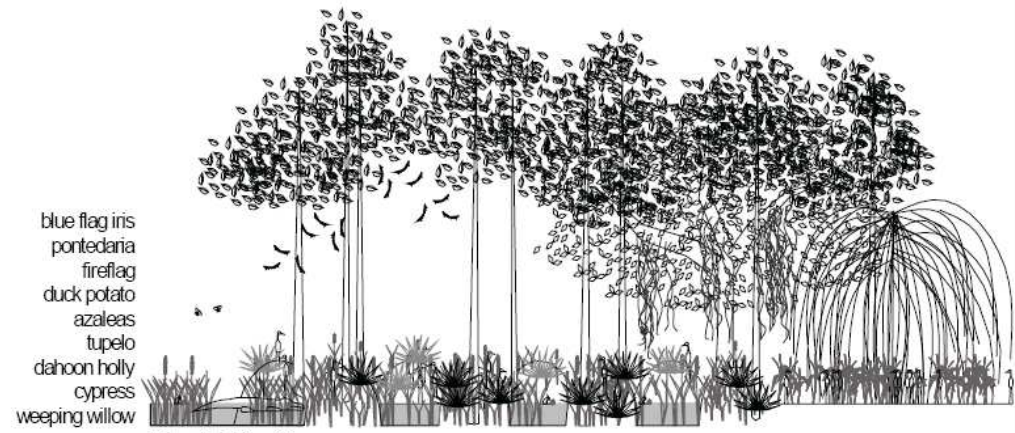
The Integrated Street: Infrastructure as Ecology



Skateboards and Picnics

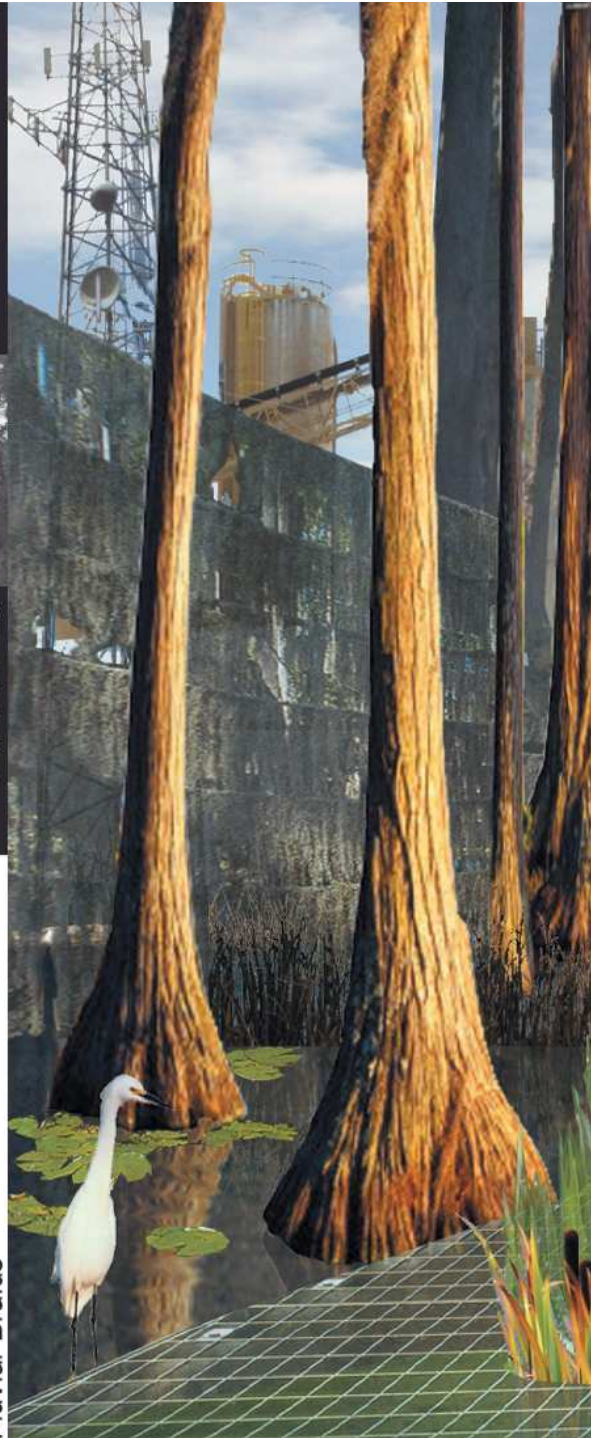


While reducing hard pavement by 40%, the green street provides shaded parking, space appropriate for civic assembly, greater connectivity between institutional facilities and neighborhoods, and natural stormwater management without the use of costly, engineered catchment infrastructure. Security is enhanced through the promenade's porosity to surrounding neighborhoods and attending "eyes on the street". Ultimately, Bicycle Promenade, an adaptable, participatory, technological—and most importantly—recombinant infrastructure, will engender redevelopment of surrounding neighborhoods and greater connectivity with Gainesville's other cultural resources.



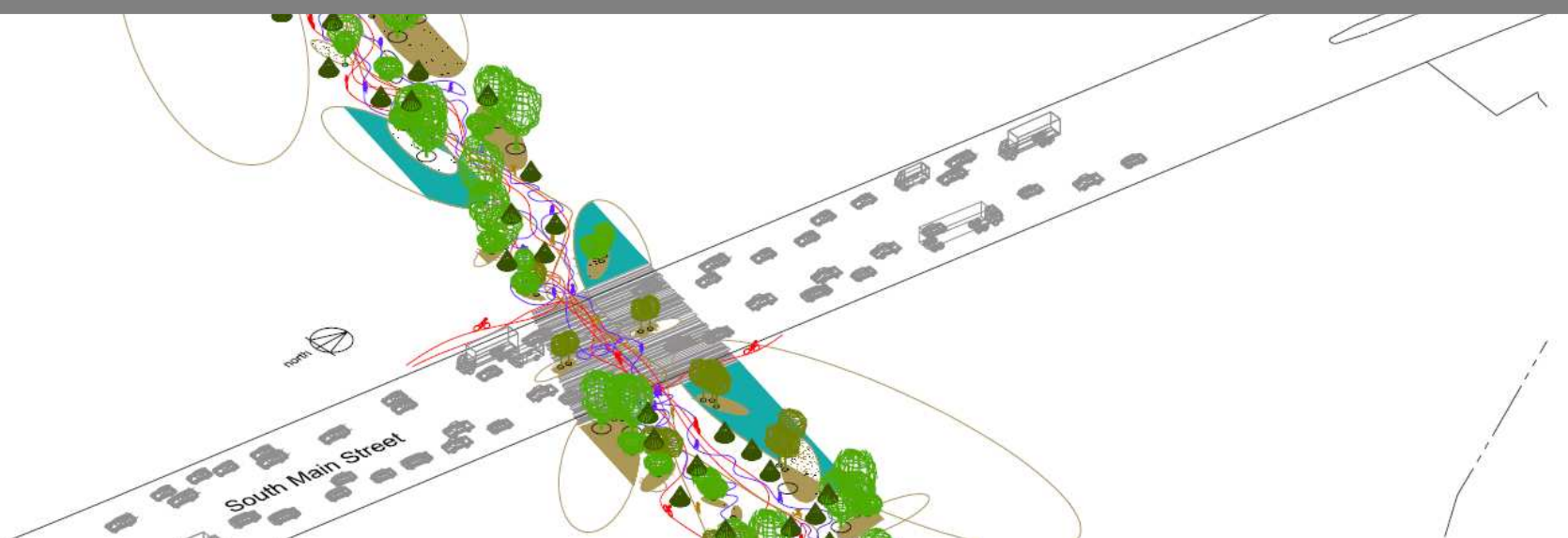
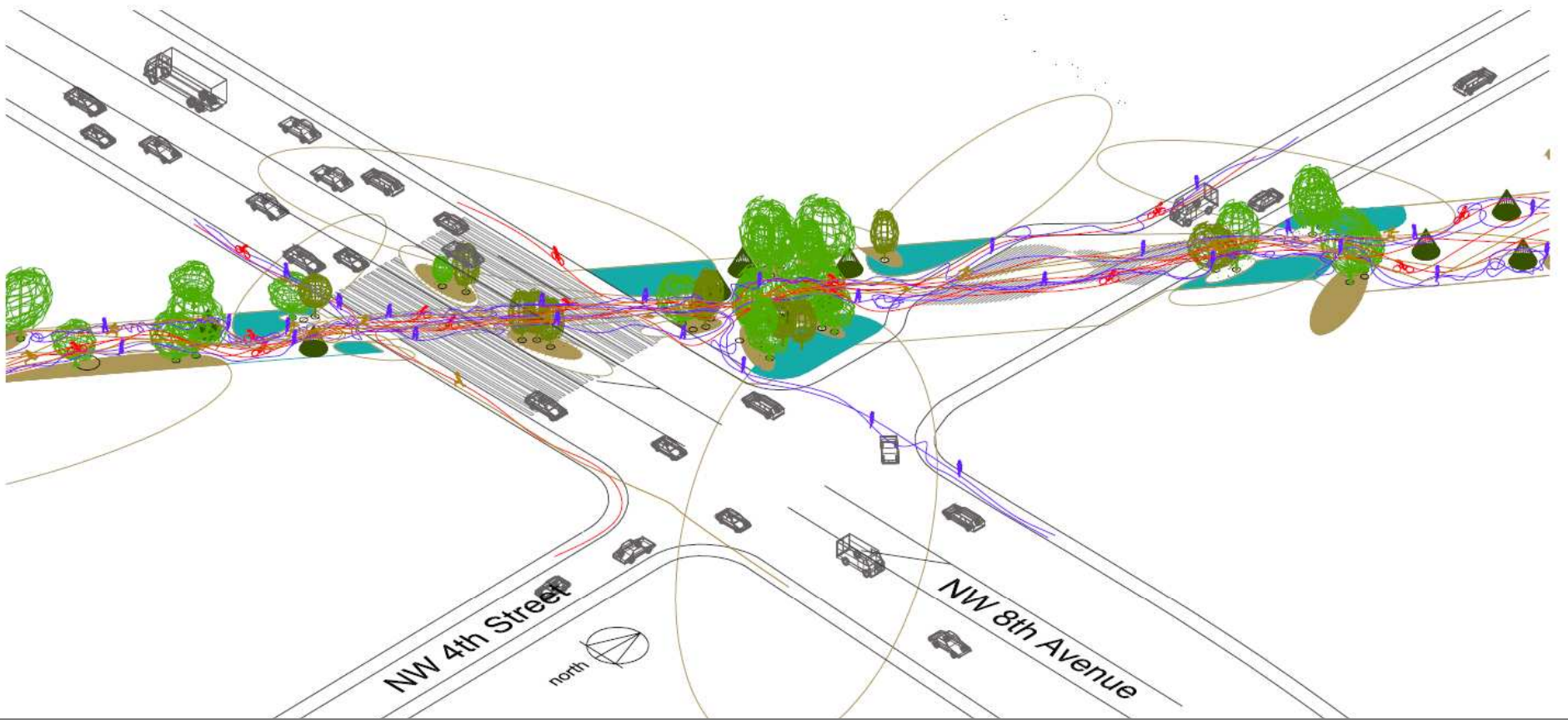
- blue flag iris
- pondedaria
- fireflag
- duck potato
- azaleas
- tupelo
- dahoon holly
- cypress
- weeping willow

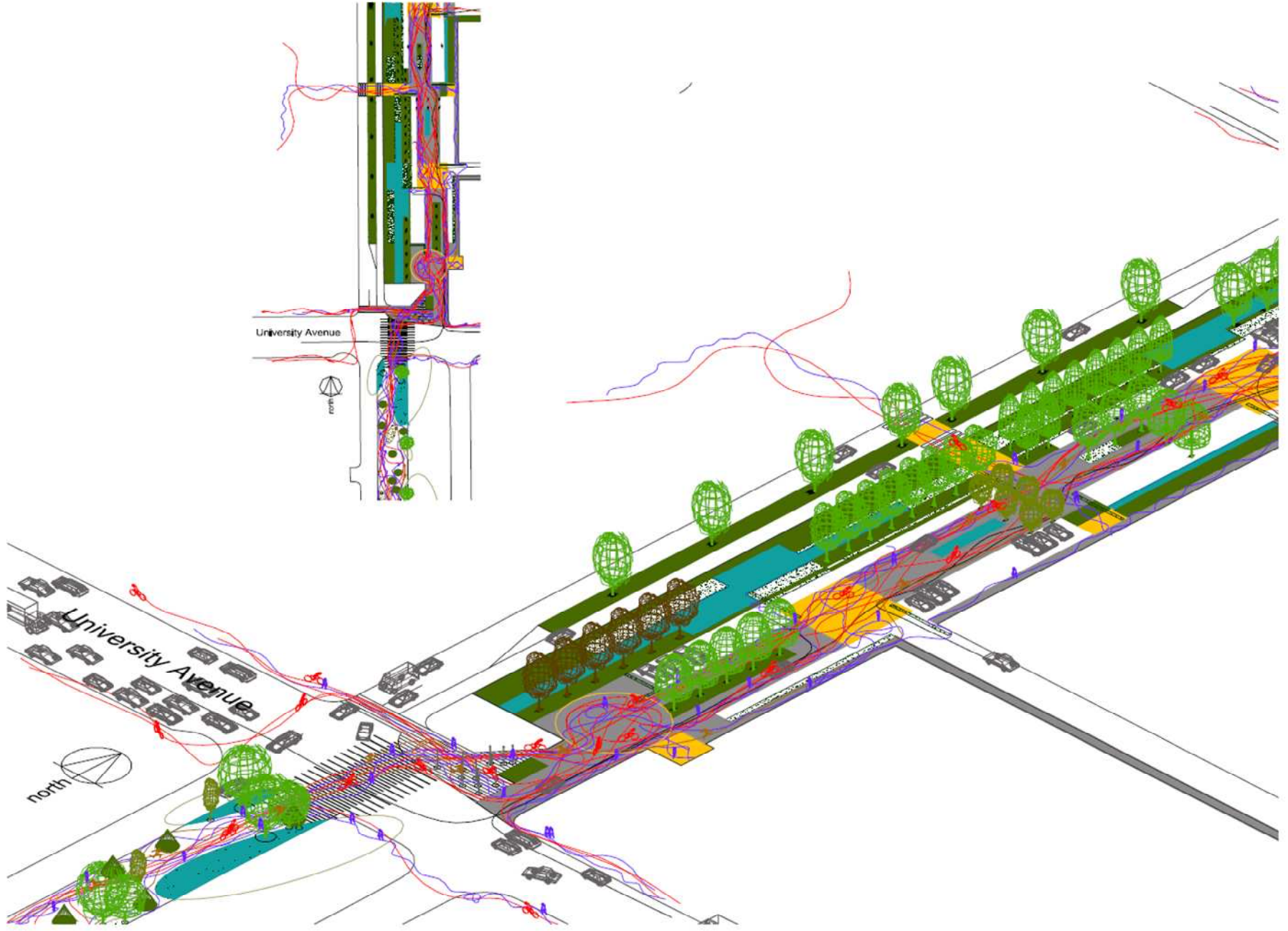
Fluvial Braids



Fluvial Braids







Sponsorship Braids

Leveraging Connectivity and Funding



Because it is a stormwater system

Because it is a recreational system

Because it is a brownfield remediation system

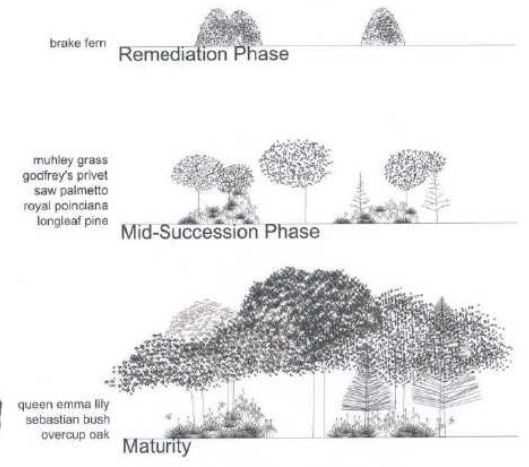
Because it is a neighborhood redevelopment system

Because it is an intermodal transportation system

Because it is an environmental system

National Design Competition for Bicycle Trail

1.2 million dollars initial budget



Fern Mounds & Habitat Islands



Gainesville Eco-History Trail (proposed), Gainesville, Florida
 Winning with Rail Trails, "Planning,"
Landscape Architecture 6/04, pp. 68, 70