

Blue Tree, Meet Green Grid

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Introduction

The history of the City of Houston can be told through a few major disruptive yet transformative moments, from the building of the Ship Channel to the approval of Bayou Greenways, and now the Houston Area Greenways planning project will act as a further catalyst and opportunity to direct the vision of the future Houston. More than simply trails projects, Bayou Greenways and Houston Area Greenways have the potential to fundamentally direct the development of the urban fabrics of the city. A more integrated and comprehensive transportation system can transition dependence away from the automobile towards a more carbon-neutral way of life critical to the health of the 21st century. Paralleling the reimagining of the city's bus and bike networks, the greenways plans could augment and catalyze these systems to create a robust framework for residents in terms of recreational and commuting options.

Background/Literature Review: Landscape Infrastructure

The emergence of Landscape Infrastructure parallels contemporary developments in architecture and urbanism as a reaction to 20th century Modernism's paradigm of separation. Urbanistically, the separation of residential areas from commercial areas from industrial areas meant that one must always utilize an automobile or other mode of transportation to travel between the different domains of one's life (live/work/play). This produced social segregation, and now urbanism, in response to this, advocates the mixing of uses as a remedy. Typical landscape architecture practices have tended to segregate scales of design thinking, from the large scale of planning to the more detail considerations of particular sites (Hung et al., 2013). The emerging discourse of Landscape Infrastructure promotes a synthesis of these two scales; by using the two scales to inform one another, one may solve problems at multiple scales simultaneously.

Stan Allen, in his essay "Infrastructural Urbanism", outlines seven propositions detailing a framework of using infrastructure as a model of design (Allen, 1999). He shifted the emphasis in design from pure aesthetic and representational issues (an effect of designers working in abstraction; i.e., our products of practice are representations of things and not the things themselves) to instrumental and affective techniques that would embed

representational approaches with new agency over simply what things look like. Further, he elaborates on infrastructure's role as a mediator between the geography of a place and local site conditions, its ability to be both fixed yet flexible, and its ability to organize the collective subjectivities of the city (Allen, 1999). It is through this critique and defining of principles that allows infrastructure to be both a subject and a model of the evolution of landscape architecture practice.

Goals and Objectives

Landscape Infrastructure proposes ideas of combining hard and soft systems. We will translate these ideas into working principles and illustrate their application at site- and planning-scale projects, and discuss why these two scales should be considered together for large-scale projects.

Method(s)

We can begin by understanding the mutual inflection that happens through the pairing "landscape" and "infrastructure". The term "landscape" originated in painting, thus there is always the latency of the scenographic and compositional when using the term. "Infrastructure" denotes a system that modulates a particular type of flow, usually mono-functional, rationalized to its highest degree of efficiency, and uses repetitive and differentiable elements to construct the system and respond to environmental changes as it passes through a territory. "Landscape" modifies "infrastructure" by introducing scenographic and ecological qualities, and "infrastructure" modifies "landscape" by introducing performance criteria, systematicity of design, and repetition with differentiation. Thus Landscape Infrastructure integrates processes and frames them in a scenographic manner while adhering to strict and measurable performance criteria. Now let's define some attributes of Landscape Infrastructure:

1-Linearity and Continuity

Infrastructure operates as a network at a large scale, but typically registers as a line against a larger field at the site scale. As a complementary organizational system at the same scale, Landscape Ecology proposes the patch/corridor/mosaic model (Dramstad et al., 1996). This model acts in two ways within Landscape Infrastructure: first, as an analogy of integrating a corridor into a larger matrix, and second, of actual integration; landscape infrastructure actually synthesizes these natural and artificial structures into its overall form and functioning.

2-Multi-functionality

Again drawing from Landscape Ecology, the five functions of a corridor within the patch/corridor/mosaic model are habitat (things live in it), conduit (things move along it), filter (things change as they move through it), source (things originate from it), and sink (things terminate in it) (Dramstad et al, 1996). Applying these functions to a linear corridor that interfaces with an urban field can immediately provide a creative means to dealing with the Modernist aftermath of separation. Indeed, many infrastructures from the 20th century were designed as monofunctional systems, such as channelizing a river to maximize its drainage capacity, which simultaneously destroys its habitat and recreational values.

3-Hierarchical Systems

Freeways, pipelines, and bayous all operate according to systems of repetition, differentiation, and hierarchy. Each one has a logic of smaller tributaries flowing into larger main lines, as well as logics of branching and directionality. More interestingly, there is a “meta” system, or a system of relating these systems to one another, which is ultimately the potential of the designer: what is the system by which one introduces and integrates a system of “public-ness” into highly demanding, yet monofunctional, systems of material movement?

Results: SWA Projects

The Houston office of SWA has been advocating for and implementing projects that reclaim and restore the vast network of bayous and small urban streams and tributaries from their channelization and concretization (and ultimately confiscation from the public domain) that started in the mid-twentieth century upon the Army Corps of Engineers’ (the lead United States federal civil works agency) attempt to maximize their flood-reduction potential. Houston, a very flat city, is subject to the extreme storms associated with the Gulf of Mexico region and is frequently threatened with the possibility of sudden and severe rainfall. The flatness along with the vast impervious cover in the broader watershed increasingly mean that even a less-severe rainfall has the potential to cause flooding in neighborhoods adjacent to the bayous, no longer capable of adequate conveyance capacity.

Site-Scale Implementation: Buffalo Bayou Park

Buffalo Bayou, the bayou associated with the founding of Houston, remains one of the only bayous in Harris County to escape concretization, however, it was still subjected to clear cutting and straightening to increase its conveyance

capacity. Over time, the straightened channel eroded its banks while invasive species colonized it. Simultaneously, the urbanizing adjacent neighborhoods created a social desire for a cultural landscape. These forces combined to create pressure for a new public park that could simultaneously manage storm water discharges, restore native habitat, and provide cultural amenities for the growing population.



Figure 1. Buffalo Bayou Park

Completed in 2015, Buffalo Bayou Park (Figure 1) creates a cultural resource within this existing flood-prone bayou corridor. The park provides multiple access points, separate trail systems for bikes and pedestrians, and bridges over the bayou that lessen the commitment of jogging or cycling from four miles to as little as one mile, greatly broadening the spectrum of user groups that can interact with nature and the bayou. A large lawn at Eleanor Tinsley Park is a city-wide gathering space frequently used for concerts and festivals. Special activity areas punctuate the rhythm of restored meadows and forests along the corridor, and gardens provide moments of delight that enhance existing settings and civic art works.

The park's hydrologic design integrates principles of fluvial geomorphology to reintroduce greater sinuosity into the channel and restore the natural section of the bayou (steeper on the outside bends and shallower with silt deposition benches on the inside bends). What makes this an infrastructural landscape is an unnatural condition upstream. Two large detention basins, the Barker reservoir and the Addicks reservoir, periodically release storm water that raises the bayou elevation up to four feet or more for up to several weeks at a time. This produces heavy silt deposits on submerged areas during these events. It is not uncommon to have several torrential rainfalls in a season, and just one of these events has the ability to deposit up to several feet of silt in as little as one day. This covers trails as well as cuts off visual connection to the water as several of these events together can produce a silt berm up to 10 feet tall. Maintenance routes have been integrated into the plan for access to specially designed silt benches for silt removal several times a year. The project therefore illustrates the problems associated with designing and maintaining a park in a floodway and the consideration of landscape as a work of infrastructure.

Planning-Scale Implementation: Bayou Greenways

Spurred by the momentum generated by Buffalo Bayou Park and other projects along the bayous, as well as the changing perception of the public to the potentials of the bayou system, the Houston Parks Board in 2012 initiated the Bayou Greenways 2020 plan (Figure 2, left). In 1912 Arthur Comey, a landscape architect, presented the idea of transforming Houston's bayous into linear parks, and it was not until a hundred years later that the political will materialized to implement the plan. The plan calls for ten bayous to serve as conduits that will connect a multitude of existing public parks and thus would become one of the largest greenspace systems in the world, adding approximately 4,800 acres to the Houston inventory of parks.

The plan also includes the acquisition of properties adjacent to the bayous that could serve as parkland and natural areas and in many cases additional storm water detention and water quality enhancement facilities. Recent trends in greenspace usage suggest linear types (supporting movement such as walking, biking, and jogging) have greater usage than block types (supporting activities including informal games, sitting, and relaxing), so the integration of linear recreational uses within the bayou corridors is a logical decision.

Additionally, over half of the Harris County population lives within one and a half miles of the proposed Bayou Greenways system, so upon its implementation this means that half the population will be within a ten minute bike ride (or twenty minute walk) of a major uninterrupted trail system. This has the potential to create a mass transit system in a dispersed city where eventually development re-orient back to the bayous (Pope, 2015).

Site Scale + Planning Scale: Green Grid

Officially known as the Houston Area Greenways, the green grid planning project proposes to transform the extensive network of power line corridors and utility easements into linear parks. Predominantly oriented north-south, the green grid forms a complement to the east-west bias of the Bayou Greenways plan (Figure 2, right). The Houston Area Greenways will further connect the system by providing linkages to neighborhoods not immediately adjacent to the bayous. The city of Houston is made up of a discontinuous fragmented fabric of different identities, and providing connectivity between these will only strengthen the city's social fabric without diluting those identities.

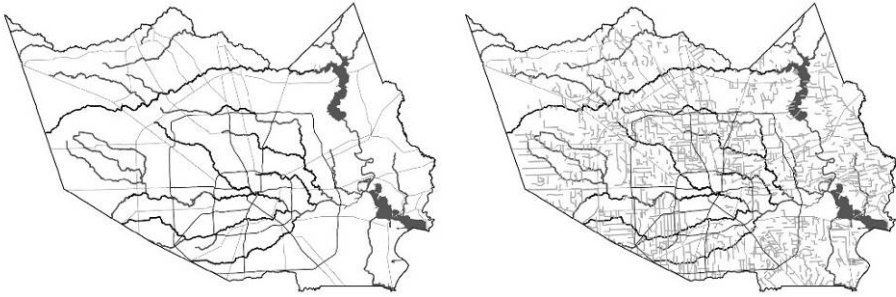


Figure 2. Blue Tree, Meet Green Grid

Whereas Bayou Greenways has the potential to elevate the quality of the riparian ecosystems within Houston, the Houston Area Greenways plan, with its corridors connecting across watersheds, has the opportunity to engage and amplify multiple ecosystem types. The landscape ecology approach will emphasize the interrelationship between urban landscape patterns and ecological and socioeconomic processes. Achieving these objectives will require a balance between consideration of the broader patterns of ecology, and the small scale opportunities to create or enhance habitat and cultural value.

We propose a + sign as a graphic identity and a conceptual diagram for the project (Figure 3). This focuses attention on the many critical intersections of the east-west network of Bayou Greenways and the north-south network of the Houston Area Greenways. We can quantify the types of east-west corridors (bayous, freeways, roads, railroads) and multiply them by the types of north-south corridors (power lines, pipe lines, ditches, railroads) to create a catalog of crossing types. Each of these corridor types also has a range of types of adjacent development that can be catalogued (suburban single-family, multi-family apartment structures, big box retail, and open space/detention basins). Multiplying corridor types by adjacent development types yields a finite number of possibilities and suggests a design approach of producing versions that are repeatable yet locally specific depending upon the geometries of the local site (Figure 4). Thus a robust design logic becomes both systematic and highly specific.

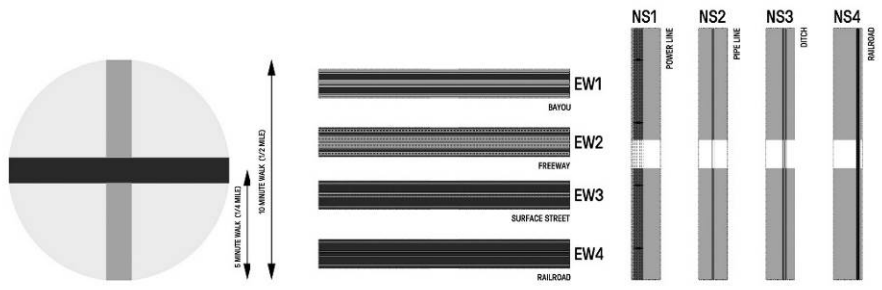


Figure 3. Framework to Approach

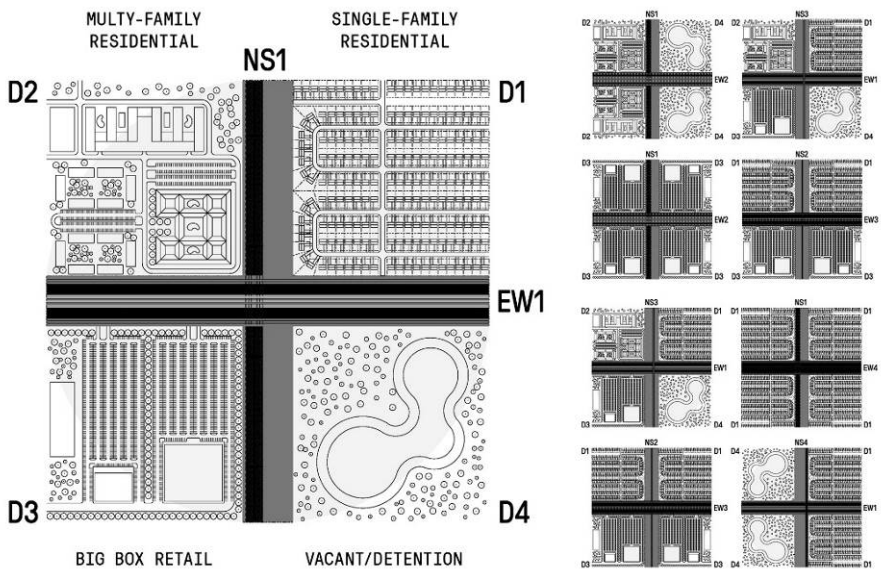


Figure 4. Crossing Types with Adjacencies

Discussion and Conclusion

According to the essay “Green Functionalism” by Thomas Hauck and Daniel Czechowski, a transformation of the roles and relationships of landscape and the city can be traced in the twentieth century through the contributions of Frederick Law Olmsted, Ian Mcharg, and James Corner. Hauck and Czechowski associate major themes to each of these figures: Olmsted promoted health and democracy in his work, Mcharg introduced the ecological method to the discipline, and Corner emphasizes the cultural imagination. In terms of health, Olmsted advocated to provide parks for physical recreation to improve the actual bodies of the citizens as well as connectivity to these for all

citizens. McHarg advanced the integration of ecological thinking and processes into the profession. His focus on regional analysis and planning as creating frameworks within which designed sites are situated led to a more comprehensive role for landscape architects. Corner shifts the frame to include cultural identity and expression within the design of landscape spaces through what he calls the cultural imagination (Hauck and Czechowski, 2015).

While the progression and evolution of these ideas of health, democracy, ecology, and imagination represent changing ideals over the last, they are not mutually exclusive. The potential of the blue tree and the green grid is that they catalyze these four domains with one another. Health is improved by providing trails and greenspace. Democracy is promoted by providing connectivity to under-served neighborhoods and gathering spaces for collective activities. Ecology is enhanced by restoring native ecologies at the local scale and ecosystem connectivity at the larger scale. The cultural imagination is amplified by engaging communities across the city to produce local aesthetic expressions and providing staging grounds for community participation. Integrating these ideas reinforces the need for multi-scalar design approaches (the scale of planning and the scale of site design) as discussed in the Background section; at the large scale landscape architects now consider how ecological systems both structure and give identity to a city, and at the site scale they use these ecological interventions to modulate flows across the site and simultaneously frame and enable collective social experiences.

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