Houston's Hydrotopographic Horizon

Water run-off speeds unflatten Houston

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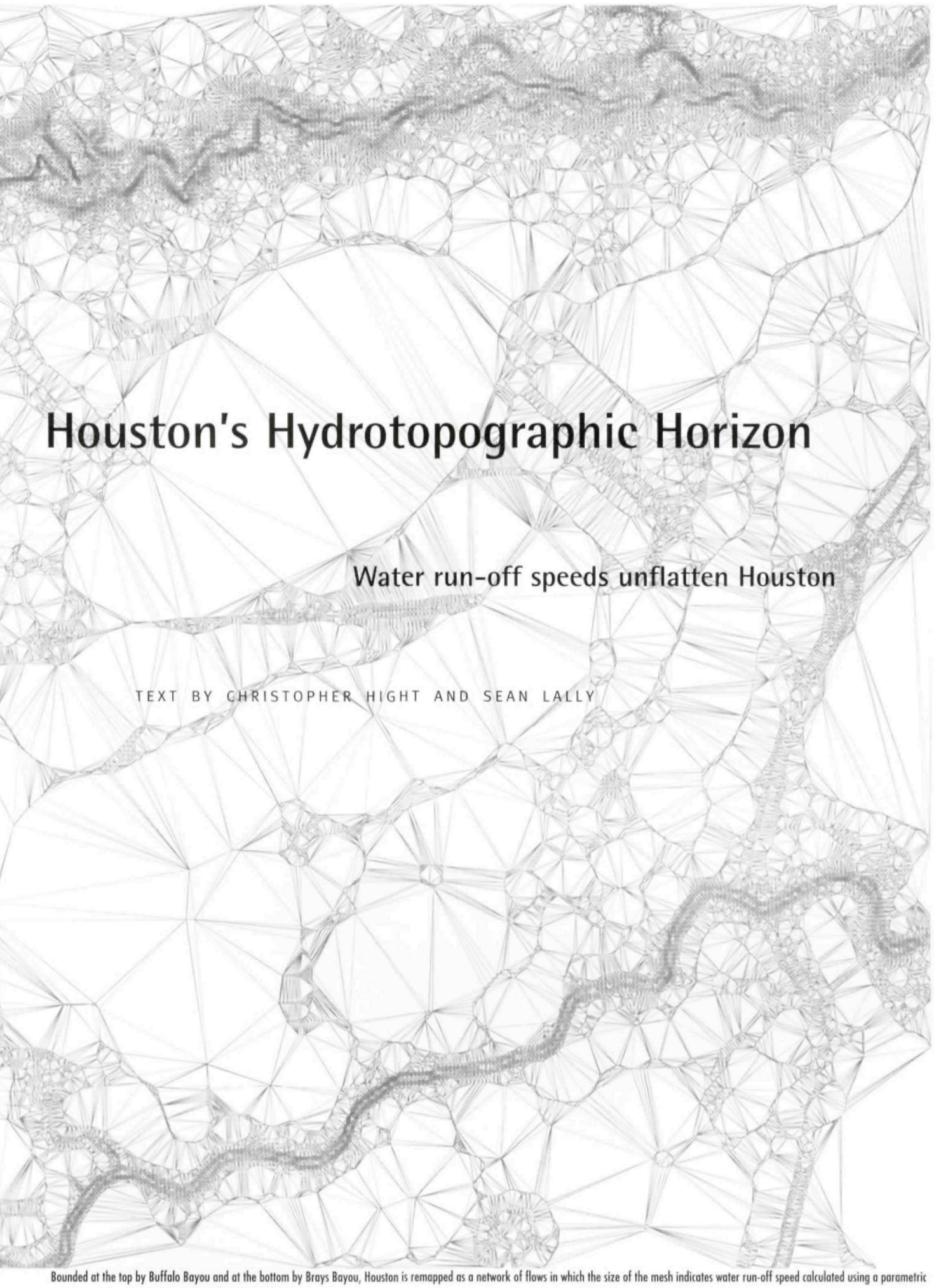

Bounded at the top by Buffalo Bayou and at the bottom by Brays Bayou, Houston is remapped as a network of flows in which the size of the mesh indicates water run-off speed calculated using a parametric modeling of the web of relationships that underlie this topography at any given point. Map by Joel Gilliam, Anthony Sinkewich, and Ricardo Supiciche.

[Networks] are not objects as such but projects, dreams, endeavors, even entire societies.

– *Bruno Latour*

Infrastructure networks are involved in sustaining what we might call "sociotechnical geometries of power."

– *Graham and Marvin*

MODES OF MAPPING and representation determine the way we understand and operate within our world. Yet the tool kit available to architects and urbanists is mostly derived from figure-ground gestalts epitomized by the 18th-century Noli plan. Such tools favor the city as an artifact, whose order is understood and planned around a dialectic of the public and private. But the territories of the contemporary metropolis are delineated not simply by walls, streets, and envelopes, but by access points, baud rates, and signal attenuation. Today's built environment literally radiates and pulses with information.

Moreover, vast top-down infrastructures (transportation, sanitation, electrification) are now complemented by the sublimity of miniaturization, molecularization, and the proliferation of bottom-up organizations. Monumental typologies are being displaced by peer-to-peer communities; the public replaced by demographically targeted smart mobs of consumers at wi-fi Starbucks stores, RFID tagging of every product from televisions to chewing gum, and "smart dust" (tiny information-collecting robots) dropped from airplanes to instantly set up vast surveillance networks.

This suggests that the urban field should be approached as a network of heterogeneous, discrete systems—"small worlds" of social, political, and economic organizations that are linked by different degrees of connectivity and velocity across the globe and locally. Unlike the Noli plan's supposition of public contiguity, network systems are determined by degrees of separation between nodes. It is possible under these criteria that two buildings that stand adjacent to each other geographically actually operate within incongruous networks. The "accidental" relation between these geographically adjacent but effectively disjunctive local-globals and global-locales is a shear space. More than a metaphor, shear is a material, dynamic model for the spatial relationship of social, economic, and political forces that cannot be understood simply through the 18th-century categories of private and public.

The relevance of a network process approach is not limited to the "new" information infrastructures; it is equally important for renovating our understanding of existing material systems. "Hydrotopography" is a project within the research agenda of the graduate urban research studio at the Rice School of

Material and Programmatic Alterations

Zone 1

> Housing
> Transportation Infrastructure
> Public areas
> Parks
> Plastic
> Metals
> Carbon Fibers
> Concrete

Zone 2

> Environmental infrastructure
> Parks
> Fields
> Marsh/Pond
> Tallgrass
> Meadow
> Lawn Grass

Zone 3

> Housing
> Transportation infrastructure
> Commercial
> Walking areas
> Parking Lots
> Concrete and asphalt.
> Permeable pavement
> Gravel/Rocks
> Sand

Zone 4

> New Bayou
> Lawn Grass
> Concrete

Architecture, Shear Space: global locales, local global (the complete project and other projects of the studio are available online at www.arch2.rice.edu/wiki). Noting that Houston's success has been forged from successive natural disasters,[1] the team researched the sciences and politics of flooding as well as so-called flood management. Seemingly flat Houston, it turns out, has a topography when one considers it not as a static terrain, but as a hydrodynamic process.

Flood management is itself a hybrid network of practices—science, engineering, politics, and economics—putting the architect in a prime position to intervene. Historically, as many of Houston's artificially banked and straightened bayous evidence, flood management has meant top-down engineering of water flow based on efficiency. This project seeks to develop the potential of bottom-up approaches to create global transformation. In the wake of the epochal flooding caused by Tropical Storm Allison, the Harris County Flood Control District (HCFCD) has redrawn flood maps based on probability of flooding and aggressively buying properties within developed areas of the flood plain, converting them to different uses. At the same time, it is acquiring property in undeveloped fringes of the county in what is called the Frontier Program. This gives HCFCD non-regulatory power to leverage subsequent private development. The student team proposed synthesizing these two strategies by defining a frontier within the city based on thresholds of water speed and flooding probability (suggesting that HCFCD become Houston's largest real estate developer).

This research and its projections required supplementing the conventional architectural and urban representations of the city. The hydrodynamic topography diagram (opposite page) remaps Houston as a network of flows—literally water run-off speeds. In this drawing, the smaller patches of triangulated mesh indicate high-velocity flow and vice versa. Variations of the mesh record changes in speed, force, viscosity, and flow. Formal systems of description are thus embedded within the material processes they describe. The group used a parametric generator equation to calculate the web of relationships between the forces that underlie this topography at any given point. Altering certain parameters in particular order at a number of key points can radically transform the global figure. Thus, discreet alterations at a small scale can have global effects.

The problems of flooding can be engines for innovative urban design and can renew the agency of the architect within social and political networks. Under the team's speculations, the power exercised along this intensive frontier could radically transform the organization of Houston real estate development and its civic spaces (see figure, this page).

The instruments of Houston's hydrotopography demonstrate that seriously confronting urban problems requires a fundamental re-conception of the built environment as a complex network of highly interdependent dynamic systems, wherein design decisions made on the most local of scales can have global effects. ■

Project Credits
Course: Shear Space: local globals, global locales (Architecture 504, Rice University, Spring 2004)

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1. An observation made by Barrie Scardino, "H_2OUSTON," *Cite 46*.