

REDESIGNING EMPTY

AN ALTERNATIVE APPROACH TO EQUITABLE WATER MANAGEMENT

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Flood risk and the widespread shutoff of residential water utilities are looming threats to the City of Detroit. Supplementary infrastructure as a safeguard against these shutoffs provides an exploratory alternative to water management on the premise that water access is a fundamental human right. The theoretical application of compensatory infrastructure in the North End neighborhood demonstrates the system's adaptability to differing neighborhood settings. The system is replenished by the water cycle via capture components that are integrated into community landscapes and buildings, whether they are vacant or occupied. Residents' direct access to the system maximizes opportunities for agricultural use, infrastructure extension, and most importantly, protection of the human right to safe drinking water.

THE NORTH END

The North End neighborhood, bounded by Woodward Avenue to the West, is located just beyond Detroit's urban core. Unlike the adjacent Downtown, Midtown, and New Center districts, the North End has yet to attract significant reinvestment. The population loss that has persisted in Detroit for decades has been particularly dramatic in the North End. The neighborhood's 2013 population, approximately 12,350 residents, is 30 percent less than 2000 population (U.S. Census Bureau, 2013). Most of the remaining residents have low incomes, and 38 percent of land in the neighborhood is vacant (Midtown, Inc., Vanguard CDC, 2012, p. 33). In spite of these challenges, the North End community actively preserves the neighborhood's character. Public murals, sculptures, and gardens create an inviting atmosphere and a positive sense of place.

DETROIT'S WATER CRISIS

The widespread shutoff of water services in Detroit neighborhoods, including the North End, has attracted international scrutiny. In 2014, the Detroit Water and Sewage Department shut off nearly 40 percent of customer accounts, including over 30,000

family homes, due to unpaid bills (Williams, 2015). The controversy centers on the tension between the premise that access to water is a basic human right and the difficulty of providing costly services via Detroit's inadequate water infrastructure. Amid community protests, DWSD proposed raising service rates in Detroit by 3.4 percent in the 2015-2016 fiscal year (Ramirez, 2015). Officials insist that service rate increases are unavoidable due to the need to cover operating costs, even though many Detroiters struggle to meet these payments.

Just as the shutoff crisis reached its peak in the summer of 2014, record rainfalls caused unprecedented flooding in Metropolitan Detroit. The ensuing damages cost more than \$1 billion (Crain's Detroit, 2014). Federal Emergency Management Agency (FEMA) relief funds have bolstered local recovery efforts, but the issue of future storm water management remains unresolved. Addressing the extensive disrepair of Michigan's roadways has become a priority for state and local governments in 2015, leaving little political focus on storm water infrastructure upgrades.

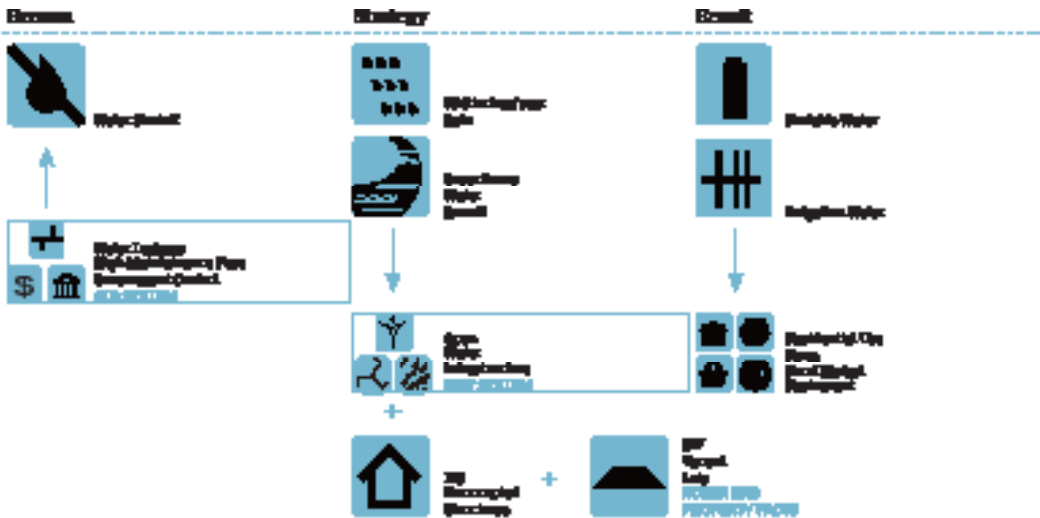
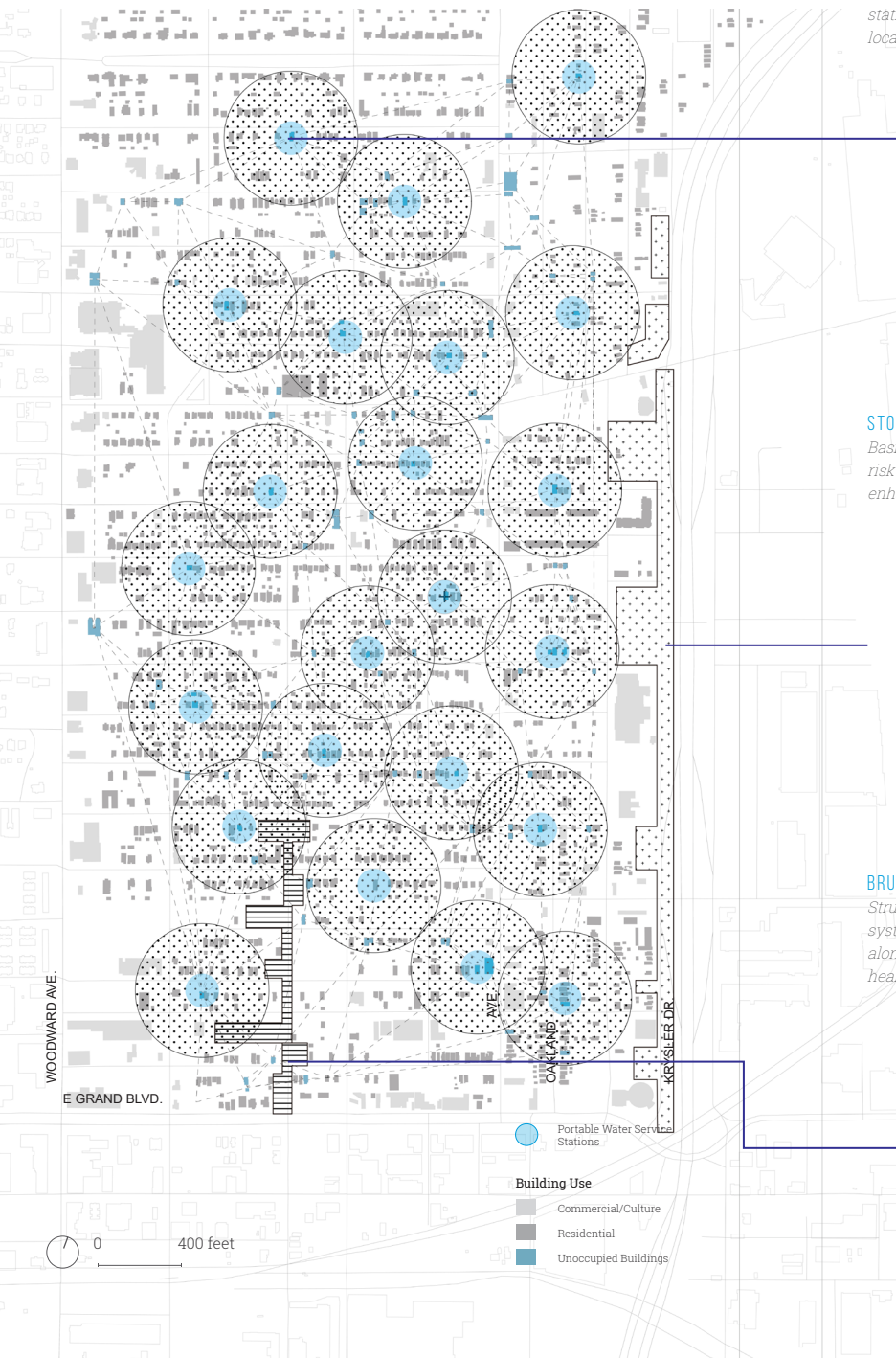


Figure 1
Transformation of Detroit's
Water Infrastructure

NORTH END WATER MANAGEMENT MODEL



PORTABLE WATER SERVICE STATIONS

Residents can fill portable water vessels at these stations for their daily needs. Stations will be located within 400 feet of homes.



STORM WATER BIORETENTION BASIN

Basins are an ecological option for mitigating flood risk and facilitating water recharge. Vegetation can enhance their effectiveness.



BRUSH STREET AGRICULTURAL NETWORK

Structures with incorporated water catchment systems will anchor local farms and food markets along Brush Street, uniting ecology and public health.



A POSSIBLE SOLUTION: COMPENSATORY WATER INFRASTRUCTURE

The hypothetical implementation of compensatory water infrastructure in the North End demonstrates the potential for an ecologically designed water system that meets Detroit's water needs. Neighborhood-based infrastructure that uses existing structures and the natural water cycle can provide drinking water and manage runoff without

the oversight or costs of a closed system. The compensatory model also creates opportunities for symbiosis with urban agricultural programs, which are on the rise in the North End and throughout the city. Ecologically integrated water and agricultural systems can produce more food, manage storm water more efficiently, and preserve water access.

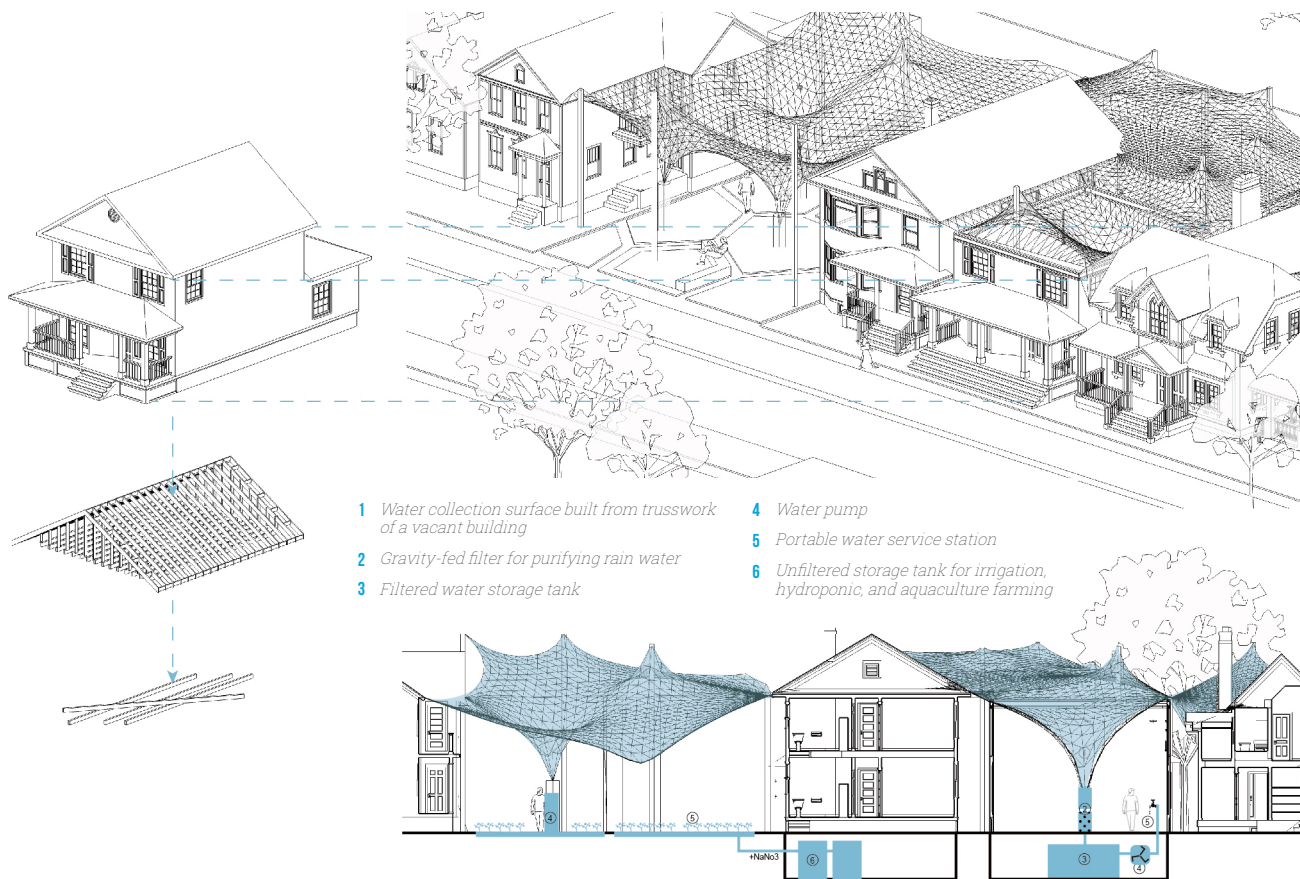


Figure 2
The roof trusswork of the vacant house is recomposed on-site to support a rain catchment structure for household drinking water and agricultural infrastructure.

OPEN WATER INFRASTRUCTURE

The fundamental feature of the compensatory model is infrastructure that the public can both easily access and customize. The catchment and storage components will be integrated into the vacant lots and structures that dot the landscape of the North End and other Detroit neighborhoods. If possible, materials from vacant structures will be repurposed to build the infrastructure components. These facilities will be self-sustaining and open to all residents. Unlike users of traditional systems, residents will choose the extent of interconnectivity between collection and distribution components based on the needs of the neighborhood. Households can link to a shared system to draw water for day-to-day use, and agricultural operations can build their own catchment units to accommodate greater need for water. Public water service stations will ensure water is always available. The system has countless possibilities for shared or independent operation, growth, and reduction.

BRUSH STREET NETWORK

The flowing water of the compensatory system will add to the natural character of the North End's landscape and be adaptable for future neighborhood needs. If any of the neighborhood's agricultural organizations expand, like the Michigan Urban Farming Initiative or the Detroit Shrimp aquaculture farm on Brush Street, additional infrastructure can accommodate increased food production. Growth of agricultural operations and community gardens will increase the availability of healthy food and improve the neighborhood landscape. Additional infrastructure will also provide basic services to new residents expected to arrive as development in Midtown continues and the M-1 Rail and Midtown Loop Greenway are completed (Eligon, 2014).

Open water infrastructure would enhance the quality of life in the North End beyond the provision of drinking water. Neighborhood-based system management will create the opportunity for residents to choose how the water system will

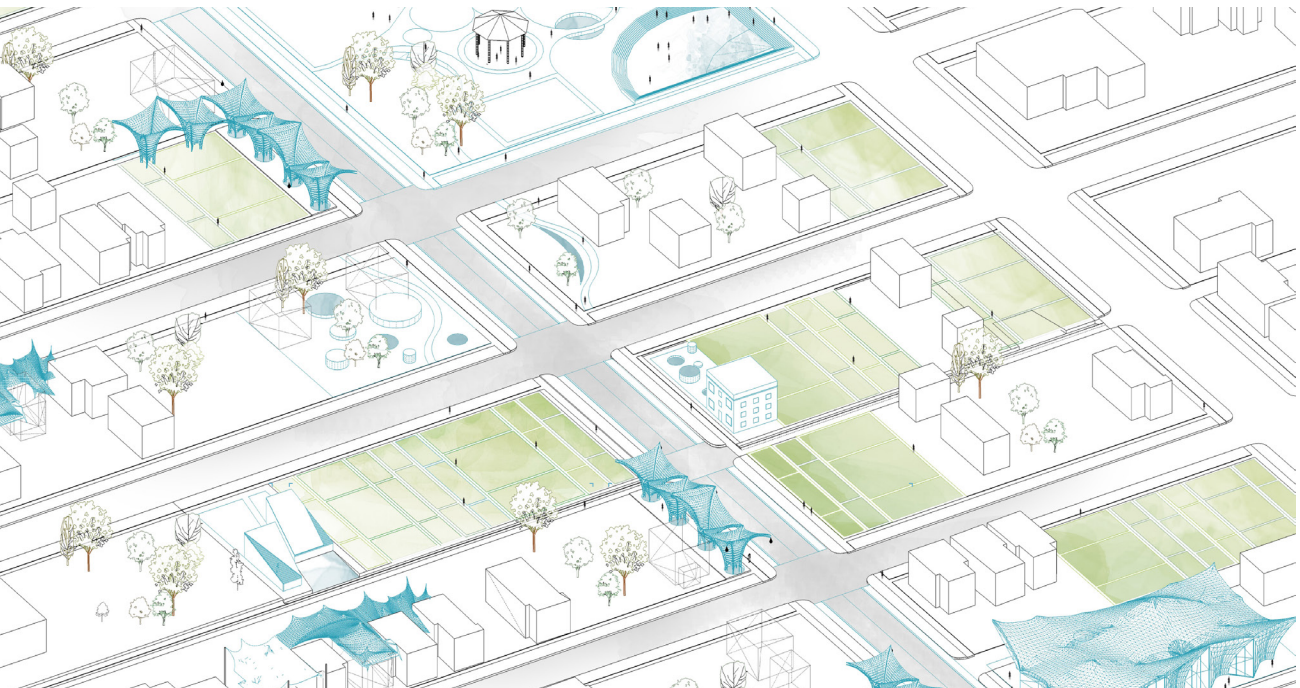


Figure 3
The Brush Street Network

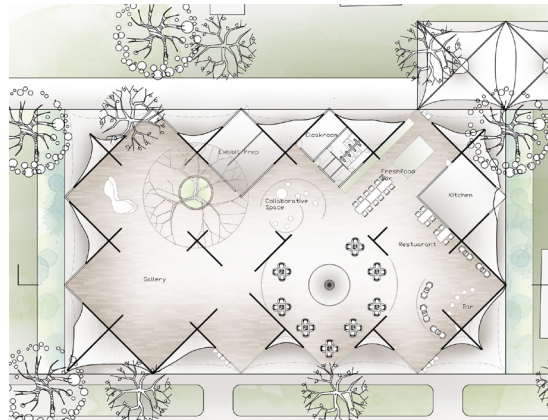


Figure 4
Community Center Floor and Site Plan

contribute to public space. Running water and gardens can provide a scenic amenity, enhancing the pedestrian experience of neighborhood streets. Beautified streetscapes can also be designed to invite patrons from the shops and bodegas planned for Brush Street and Oakland Avenue (Midtown Detroit, 2012).

COMMUNITY CENTER

A new community center, architecturally inspired by the compensatory infrastructure design, will anchor the Brush Street network and the developing mixed use district along East Grand Boulevard. The center will feature a multipurpose community space, an art gallery, and a restaurant

linked to a food market. North End residents, farmers, and artists can use the space to share their crafts and hold social events. As private development eventually follows the M-1 Rail to the North End, the community center will maintain a permanent space for public use. It will also connect the North End to the surrounding districts. The building's unique design, in addition to its culinary and artistic offerings, will draw Detroiters from across the city, as well as out-of-town visitors. Greater non-motorized transit connectivity can also be established by including the center along the proposed Detroit Greenway routes. Overall, the center will exhibit dedication to community and natural ecology. ■

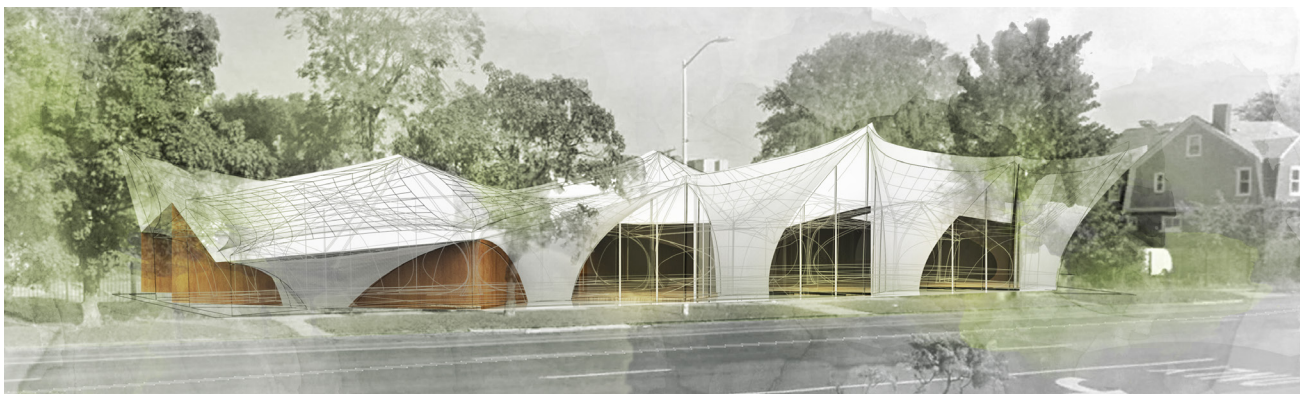


Figure 5
Community Center on Grand Boulevard





Figure 6
Community Garden and Gathering Space

REFERENCES

Crain's Detroit Business. (2014, December 22). Aftermath of August flooding: 10 billion gallons of sewer overflows, \$1 billion in damages. Crain's Detroit. Retrieved from <http://www.crainsdetroit.com/article/20141222/NEWS/141229993/aftermath-of-august-flooding-10-billion-gallons-of-sewer-overflows>

Eligon, J. (2014, July 6). Testing ground for a new Detroit. The New York Times. Retrieved from http://www.nytimes.com/2014/07/07/us/mayor-mike-duggans-pledges-echo-in-detroits-north-end.html?_r=0

Midtown Detroit Incorporated, Vanguard Community Development Corporation. (2012). North End neighborhood investment strategy. Detroit, MI. Midtown Detroit Incorporated, Vanguard Community Development Corporation.

Ramirez, C. (2015, February 26). Detroit water customers protest rate hikes at hearing. The Detroit News. Retrieved from <http://www.detroitnews.com/story/news/local/wayne-county/2015/02/25/water-rates-detroit/24017427/>

U.S. Census Bureau. (2013). Retrieved from total population, census tracts 532200, 532300, 532400, 533900, 511400, 511900, 511200, 985100, 2009-2013 American Community Survey 5-Year Estimates. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_5YR_B01003&prod-Type=table

Williams, D. (2015, February 6). Letter: Detroit Water Brigade part of larger struggle. The Detroit News. Retrieved from <http://www.detroitnews.com/story/opinion/2015/02/06/letter-detroit-water-brigade/22943273/>