

greeninfrastructure



5- Portland: In a Portland, OR, neighborhood, green street planters occupy curb bump-outs. The lush vegetation is tended by neighbors, while rock check dams slow water. (Photo by Adam Regn Arvidson: Treeline)



6- Portland: Water running downhill in the street gutter enters the bump-out planter through a curb cut. (Photo by Adam Regn Arvidson: Treeline)

7- Indianapolis: Intersections have colorfully painted crosswalks to calm vehicular traffic and give priority to pedestrians and bicyclists. (Photo by Adam Regn Arvidson: Treeline)

8- Indianapolis: To create space for the Cultural Trail, existing roads were narrowed by reducing lanes. (Photo by Adam Regn Arvidson: Treeline)

While with the City of Portland’s Bureau of Environmental Services, landscape architect Kevin Perry devised a system for purifying rain runoff from the city’s roadways. He calls his invention “green streets.” Essentially, green streets create vegetated basins within the street right-of-way that improve water quality in three ways: they filter the water by moving it through plants, they slow the water down, and they infiltrate some of the water into the underlying soil, thereby removing it from the storm sewer system.

Two pilot projects were installed between 2003 and 2005. The SW 12th Street project, in the heart of downtown Portland, consists of four rectangular basins between the street curb and the public sidewalk. Water is directed into the first basin, where it moves slowly through lush plantings of a native rush and soaks into the soil. Any excess water can exit the basin back out into the street and then enter the second basin, and so on down the line. The gaps between basins allow access between parked cars and the sidewalk, and low curbs prevent pedestrians from falling into the sunken gardens.

The NE Siskiyou project sits in a middle-class residential neighborhood. It consists of basins on each side of the street built within new curb bump-outs. Water traveling down the street gutters, instead of dropping directly into a storm sewer catch basin, moves through gaps in the curb and into the basins. Rock check dams and lush plantings slow the water, encouraging it to infiltrate into the soil. These new gardens (which also have a traffic calming effect) are tended by nearby neighbors.

Perry, now with Portland-based landscape architecture firm Nevue Ngan, has just begun to oversee construction on perhaps the most ambitious green street project to date. Located in downtown Portland, the SW Montgomery project consists of eight very different blocks (full access streets, pedestrian only streets, urban plazas, etc) all linked by what Perry calls a “stormwater spine.” Most of the streets have no curbs. Instead, the planted spine defines the boundary between vehicle and pedestrian space. This also allows rain from the street, sidewalk, and adjacent buildings to run into the spine for purification and infiltration. Some blocks give

primary consideration to pedestrians and bicycles, making even the use of this retrofitted infrastructure more green.

TRAILS AND WALKWAYS

It is true that when it comes to transportation infrastructure, most projects are designed primarily for the car. This is usually the case in the U.S., as well as in the new cities of the Middle East. One



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9- Chicago: The City of Chicago is converting its alleys into green infrastructure showcases. This alley's surfacing includes permeable pavers on a recycled aggregate base. (Photo by Adam Regn Arvidson: Treeline)

10- Chicago: In addition to letting water sink into the soil, Chicago green alley goals also include installing energy-efficient, dark sky compliant lighting and encouraging adjacent landowners to plant vegetation to shade the street. (Photo by Adam Regn Arvidson: Treeline)

lesser-known American city, however, is taking space away from cars and giving it to pedestrians and bicyclists. Indianapolis, a central U.S. city best known for automobile racing, is removing traffic lanes to create the 7.5-mile Cultural Trail. It was designed by landscape architect Kevin Osburn of Rundell Ernstberger Associates and will link all the city's downtown museums, galleries, and stadiums. The first blocks are complete and the entire (privately-funded) system will likely be in the ground by 2010.

The Cultural Trail forms a large loop through the city's downtown area. It features separate pedestrian and bicycle pathways, shielded from the streets by planted areas and bollards. Where the trail crosses roadways, brightly-colored pavement markings slow traffic and give priority to non-motorized travelers. In addition, the intersection planters are green street-style stormwater basins, directly inspired by Perry's work in Portland. The project will install 500 new trees and will add 16,000 square feet of new landscaped areas, which will help combat the urban heat island effect, as well as beautify the city.

GREEN ALLEYS

When it comes to the utilitarian nature of infrastructure, nothing is more functional than the alley or access roadway. These are homes to garbage cans, delivery trucks, recycling bins, garage entrances, utility poles, and other back-door services. They are probably the messiest, ugliest, most polluted locations in a city, and for these reasons they deserve some consideration.

Chicago recently began a program it calls "green alleys." It's an effort to reconstruct (eventually) the city's nearly 19,000 miles of alleys as environmentally-sound spaces. The recommendations are described in the expertly rendered Chicago Green Alley Handbook, designed by locally-based Hitchcock Design Group under the leadership of landscape architect Bill Schmidt. The 45-page book (available online at www.cityofchicago.org, search for "green alleys handbook"), outlines four goals of the program, which could easily serve as overarching goals for green infrastructure:

stormwater management, heat reduction, material recycling, and energy conservation and glare reduction.

Stormwater management is accomplished in Chicago by replacing asphalt or concrete with permeable paving, either pavers, permeable asphalt, or permeable concrete. Heat reduction is addressed by using high albedo (light colored) paving to reduce the heat island effect, and also by recommending homeowners plant trees in their rear yards to shade the alley. Recycled materials used in Chicago include aggregate base and rubber-, slag-, or fly-ash-based pavements. Lastly, Chicago is installing high-efficiency, full-cutoff light fixtures, to save energy and reduce the amount of light that spills onto adjacent properties and up into the sky.

Four pilot projects were constructed in Chicago in 2006, and more than 20 alleys have been converted since. The program has been successful enough that today no alley reconstructions take place without some elements of the green alleys program.

IRRIGATION

"In the Middle East, water is a precious resource," says Jason Fening, senior landscape architect at Halcrow in the UAE. "Water consumption continues to grow as the region develops and shows no sign of slowing down." Fening sees water use as another opportunity for green infrastructure improvements. He suggests using native and drought tolerant plants with high salt tolerance to reduce irrigation demand; and using recycled waste water and efficient drip irrigation systems to reduce potable or desalinated water use.



He is currently working on a private island resort in the Persian Gulf that preserves natural areas and will incorporate his ideas on xeriscaping and water re-use. The marina will be surrounded by earthworks of sand and different types of gravel studded with desert trees, flowering shrubs, and groundcovers such as Acacia, Agave, Bougainvillea, and Ipomoea. Marina and hotel wastewater will be recycled for irrigation, and the watering system will employ computerized control, with moisture sensors, to ensure the correct amount of water is being applied.

Infrastructure is always being built, retrofitted, revised, and reconstructed. Every time that happens, there is an opportunity to improve a city's environmental and aesthetic quality by thinking of roads, sewers, and utilities not just as functional necessities, but as landscape architecture projects. In Portland, Indianapolis, Chicago, and the Middle East, landscape architects are helping infrastructure go from grey to green. Though these certainly are not the only world-wide examples of this trend, they together illustrate the key principles of green infrastructure: manage water, reduce the heat island effect, recycle materials, conserve energy, and encourage non-motorized transportation.

Halcrow UAE's Fening mentions the recent report that Dubai plans to increase green space by 8% and plant a million trees. He pictures a new trail network linking all existing parks and shaded by flowering desert shrubs and trees irrigated with recycled wastewater. Now that would certainly be green infrastructure.