

Toward a Cybernetic Site

Artist Mary Miss and architects Marlon Blackwell, Kierantimberlake Associates and Lake/Flato radically reinterpret site construction in three new projects

New York artist Mary Miss has proposed building a 1,500-ft bridge across a canal at a new 100-acre art and nature park for the Indianapolis Museum of Art. She is working with the New York structural engineer Guy Nordenson on developing the bridge as an innovative viewing device—a central platform for walking across, surrounded on either side with “ha-ha’s,” or walkways depressed 42 in. that form a sort of moat, which visitors can occupy along the bridge’s length. Imagine a “W” section through the bridge, with a wider center peak as the main path. The idea is to confront viewers with nature, lessening the force of architecture by making such things as handrails effectively disappear.

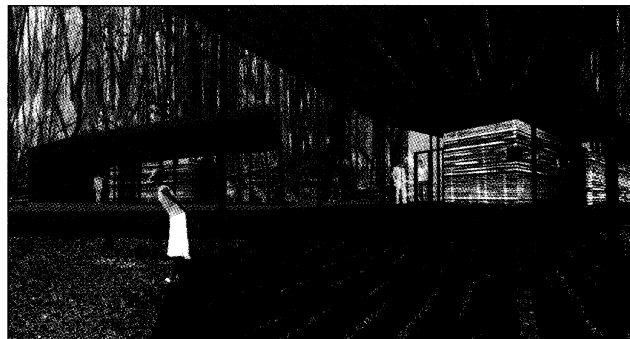
“I’m trying to get people to notice what they take for granted in a landscape, to reveal multiple aspects of the site,” Miss says. “The bridge seems to be a platform with no edges: I want you to feel free to see this place as you’ve never seen it before.”

In the 1970s, the art historian and critic Rosalind Krauss placed the work of artists like Miss in a new conceptual framework of practice, in an expanded field that included “site construction.” For Krauss, these artists did not work in

the conventions of sculpture, but in a category that existed between traditional notions of landscape, architecture, and sculpture.

An increasing number of architects and designers embrace this notion of site development spanning between the traditional roles of architect and landscape architect, and embedding a variety of interpretations of site conditions into a new performance-based architecture of sustainable principles. But an architect must be interested enough in this new scope of opportunity, in areas such as groundwater-recharge and wastewater-treatment design, since it falls outside traditional practice.

The site of the Indianapolis project lies within an elbow of the White River, which runs from north to south, looping around the western edge of the park. A 35-acre lake, the legacy of a quarry mined



▲ The proposed Interpretive Center at the Indianapolis Museum of Art.

to build a nearby highway, occupies the park. A canal dating to the 19th century slices the site off from the main museum building on a bluff to the east. The new park lies in a 100-year floodplain, though the park’s landscape architect, Ed Blake, wonders if the impact of global warming doesn’t make such considerations for a site as utterly dynamic as this one a little bit useless. Blake’s approach is not to keep water out, but to understand how it will travel.

“Because of flooding, you always have plants and soil coming into the site,” says Blake, the principal of Hattiesburg, Miss.-based Landscape Studio. “It’s always in a perpetual state of disturbance.” The trick for Miss and Blake, as well as the architect for two buildings on the site, Marlon Blackwell, AIA, is to implement designs that flexibly correspond to a man-made site colonized by forces of nature, be they water or plant.

Artificial Nature

Each designer has incorporated the site’s inescapable presence of water into the proposed designs. Water sourced at the museum flows in a channel underneath Miss’s path and bridge down to Blackwell’s first structure, called the Experiential Center, which acts as a transitional boundary between architecture and the natural world with a rooftop pool around

CONTINUING EDUCATION



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Use the following learning objectives to focus your study while reading this month’s ARCHITECTURAL RECORD/ENR/AIA Continuing Education article. To receive credit, turn to page 78 and follow the instructions.

LEARNING OBJECTIVES

After reading this article, you should be able to:

1. Explore projects categorized as site constructions.
2. Describe the concept of performance-based architecture in sustainable environments.
3. Explain how water is managed at various sites.

For this story and more continuing education, as well as links to sources, white papers, and products, go to architecturalrecord.com or enr.com.

Continuing Education

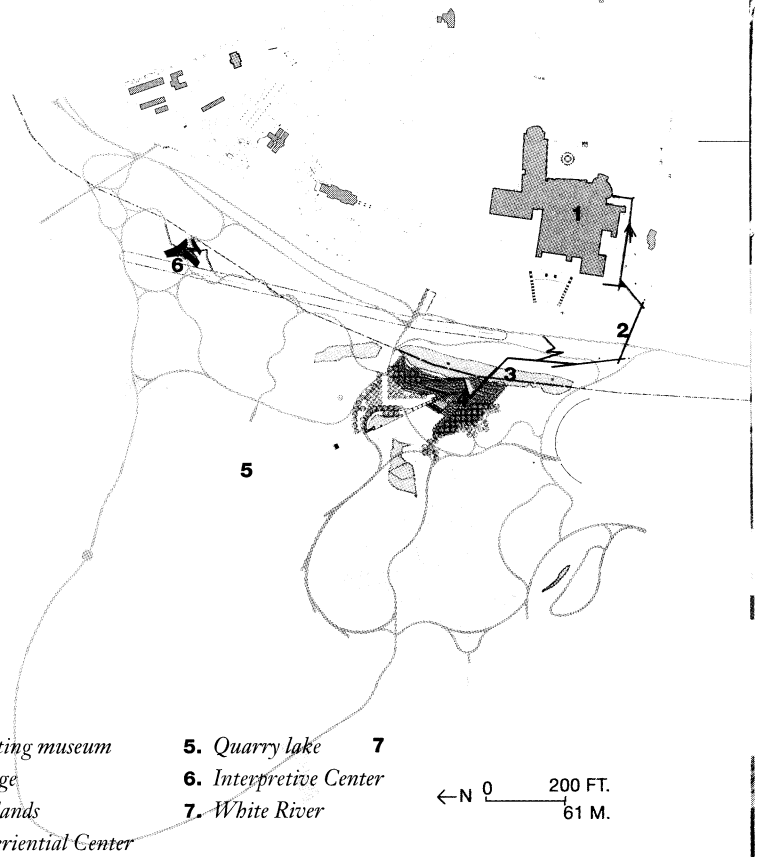
Project: Indianapolis Museum of Art, Virginia B. Fairbanks Art & Nature Park (proposed)

Location: Indianapolis

Architect: Marlon Blackwell, with Mary Miss

Landscape architects: The Landscape Studio—Ed Blake; NINebark—Eric Fulford, Ann Reed

The park lies west of the museum in a 100-year flood plain. The site's program includes a bridge, various walkways, a viewing pavilion, classroom and gallery buildings, wetlands and vegetation restoration. Ongoing, evolving, site-specific art commissions will eventually populate the site.



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|------------------------|------------------------|---|
| 1. Existing museum | 5. Quarry lake | 7 |
| 2. Bridge | 6. Interpretive Center | |
| 3. Wetlands | 7. White River | |
| 4. Experiential Center | | |

Mary Miss's proposed elevated walkway (left), constructed of perforated metal, will take visitors through the site's forests. A "runnel," or open channel, of water runs underneath the walkway, helping to connect visitors to the presence of water on the 100-acre park grounds.

which visitors descend into a pavilion defined by a forest of columns. A rectangular aperturelike space 60-ft wide by 10-ft high meant for viewing the site's expanse defines one wall of this space. The entire structure sits on what Blackwell calls the "mount," a pile of vegetated debris left from previous construction. The mount will be more soundly reconstructed as the park develops.

A path leading north from the Experiential Center follows rain gardens planned by Blake, skirting along a constructed wetland that will recycle all water used by that building and the next, which Blackwell calls the Interpretive Center. This gallery and classroom building, raised off the ground on pilotis, incorporates porous roofing and floor-decking systems to preserve groundwater recharge.

"In some ways, the building is like a giant leaf," Blackwell says. In some circles, this would be considered biomimicry, or the adaptation of natural structure and performance to the built world. Miss, Blake, and Blackwell each practice a form of this, but shy away from

using trendy terminology, including such seemingly innocuous words as sustainability. "I think of landscape as a building," Blake says. "I may put more water in or make it drier, or put pavement in to raise the temperature: all of those manipulations of nature-made materials are really human-made habitat."

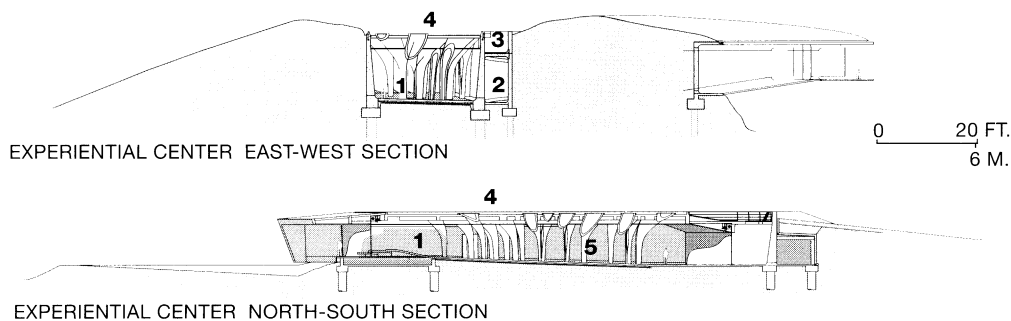
A growing body of literature supports the design approach epitomized by the Indianapolis project. *Land and Natural Development (LAND) Code: Guidelines for Sustainable Land Development* (John Wiley & Sons, 2007), written by landscape architect Diana Balmori and Gaboury Benoit, explores site design strategies based on the latest scientific studies and technical resources available, rating various options to help designers understand what would contribute most to a project. For example, the book argues for a site imperviousness of less than 10%, plainly documenting the damage of higher imperviousness on watersheds. It then recommends solutions like rain gardens or green roofs.

Randolph T. Hester's thorough *Design for Ecological Democracy* (The MIT Press,

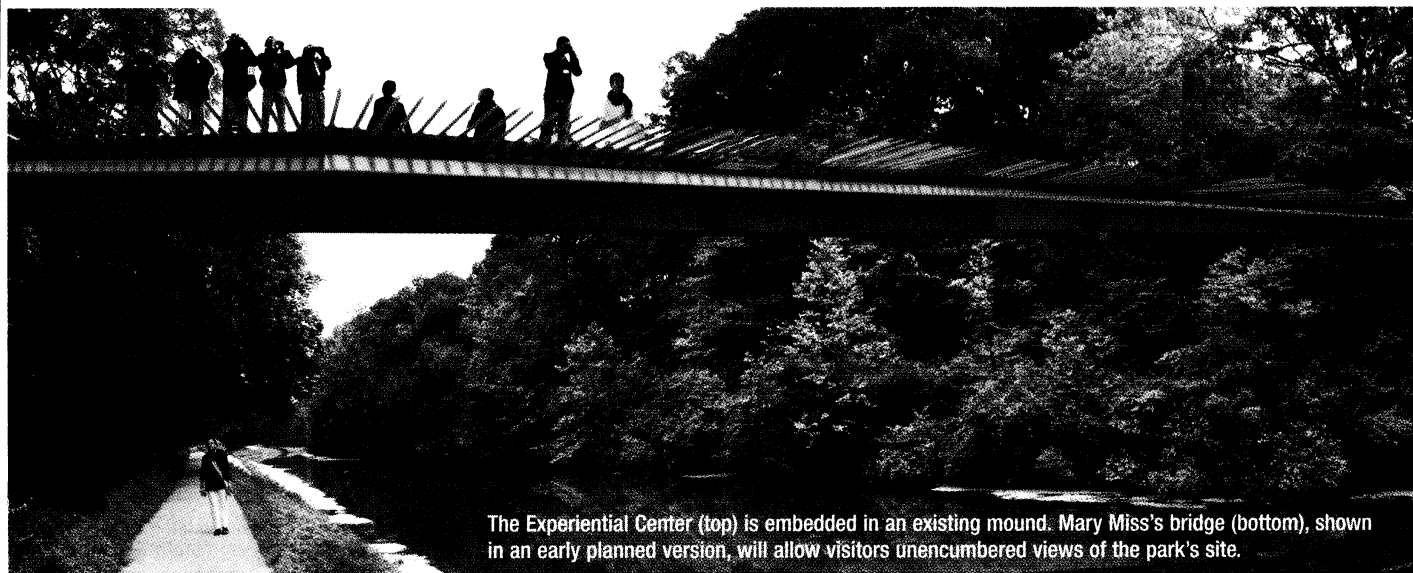
2006) artfully pleads for more of a total approach to city design based on a philosophy of community involvement and recognition of the interconnectedness of nature and urban infrastructure. Hester, a professor of landscape architecture at the University of California at Berkeley, is chiefly concerned with placemaking, long a design imperative of the landscape architect, but only rarely invoked in terms of sustainable design.

As many architects will agree, sustainable design's value depends in large part on how much a client appreciates it. Hester's book calls to mind Ian L. McHarg's 1967 *Design With Nature* (Wiley, reissued 1992), which focuses primarily on placing cities within the larger contexts of regional watersheds and geological development. Clearly, the newer books are written to be used almost as tools, more pragmatic than McHarg's philosophical meditation on the big picture. Regardless, the literature seeks to address what is perceived as the biggest challenge to the reclamation of site: rapid urbanization.

Philadelphia-based firm KieranTimberlake Associates is no stranger to site



1. Viewing hall
2. Hollow columns
3. Corridor
4. Rooftop pool
5. Exterior corridor



The Experiential Center (top) is embedded in an existing mound. Mary Miss's bridge (bottom), shown in an early planned version, will allow visitors unencumbered views of the park's site.

innovation, having developed the prefabricated Loblolly House for a sensitive coastal wetland site in Delaware. For the firm's recent expansion of the Sidwell Friends School in Washington, D.C., the architects incorporated a constructed wetland into a courtyard of the building in order to process its wastewater for reuse in flushing toilets, among other uses for nonpotable water. The district's health department has not approved the wetland's gray water for irrigation purposes, so a separate system collects stormwater runoff for irrigation.

The wetland, the first of its kind for the district, occupies a series of terraces in the courtyard—premium space the architects argued should be used as much for teaching purposes as for lessening the building's water use. Opened in fall 2006, the expansion uses 90% less water than comparable buildings, which helped it earn a LEED Platinum rating from the U.S. Green Building Council.

"Primarily, it had to pump sewage," says Stephen Kieran, FAIA, the project's architect. "But it also had to be beautiful, since it's right at the entrance to the

building. It became an environmental aesthetic."

Unlike Indianapolis, the Sidwell project is located in a dense urban site, where architects must reconcile land use with significant economic pressure and a city government less inclined to approve unconventional technology for use at a school. The urban location further obscures the effects of the project's stormwater runoff, especially sensitive since Sidwell's location in Northwest Washington places the campus in the watershed of Rock Creek Park to the east.

Sidwell's wetland was instigated by the project's environmental consultant, Bill Reed, but was designed with the guidance of Michael Ogden, a wetland expert and civil engineer with Natural Systems, Santa Fe, N. M. Ogden says Sidwell represents the first total reuse system installed in an urban site in the country, in that only negligible amounts of water leave the site via utility drainage systems.

"We don't normally think of wastewater-treatment systems as architectural elements," Ogden says, cognizant of the fact that generations of students passing

through the school will now have first-hand experience with a process otherwise invisible in the urban landscape.

The six-and-a-half-day process, which treats nearly 8,000 gallons of water per day, begins with a primary treatment tank, where sewage from the 72,500-sq-ft expansion/renovation project encounters anaerobic bacteria such as that found on the bottom of a pond. It is then pumped to a trickle filter, where it falls over rocks before moving on to the tiered wetland. Thus far, a typical gallon of water has been in the system roughly three days; the wetland itself requires another two days.

Sidwell's wetland consists of microorganisms and microinvertebrate populations attached to the root hairs of plants, mostly stalked bulrush, a form of papyrus. Ogden says the thousands of bacteria types found on the roots of such plants ensure that most compounds in the sewage can be treated, noting that wetlands are better at removing prescription medicines from water than most utility wastewater-treatment plants.

Sidwell's wetland is of the subsurface-

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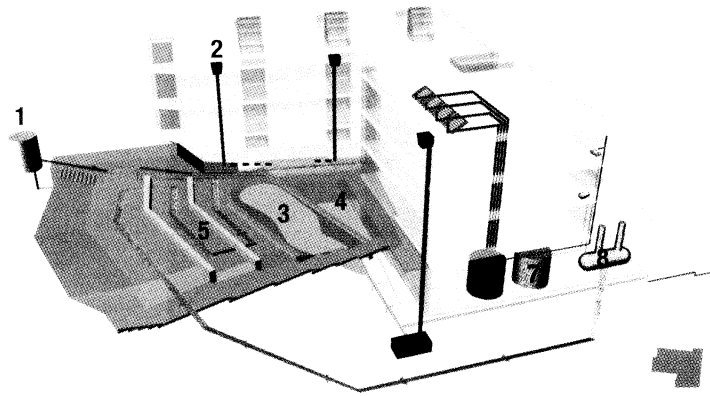
Project: *Sidwell Friends School (built)*

Location: *Washington, D.C.*

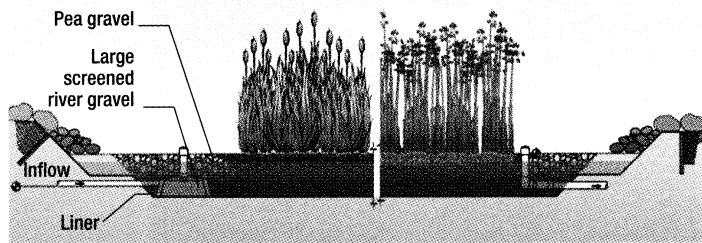
Architect: *KieranTimberlake Associates*

Landscape architect: *Andropogon Associates*

KieranTimberlake Associates added 39,000 sq ft of new classroom space for a junior high school campus. The courtyard includes a constructed wetland sewage-treatment system (right) that filters all of the water from the building for flushing toilets. A separate stormwater-collection system provides water for irrigation.



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|------------------------|---------------------------|
| 1. Trickle filter | 6. Rainwater cistern |
| 2. Roof drain leaders | 7. Gray-water storage |
| 3. Bioretention pond | 8. Primary treatment tank |
| 4. Biology pool | |
| 5. Constructed wetland | |



The plants in the terraces of Sidwell's subsurface-flow constructed wetland (left) are expected to grow in over the summer. Subsurface wetlands (above) control odors and environmental hazards by keeping water underground.

flow variety, where water lies beneath layers of pea gravel. Subsurface-flow wetlands, as opposed to the surface-flow type, are used when it would be likely for people to regularly come into contact with the water and when odors could pose problems.

Finally, the water passes through a sand filter, where anything the wetland missed is removed prior to collecting the water in a storage tank where it can be used for flushing toilets. Color-coded purple pipe, required by the Uniform Plumbing Code, indicates gray-water systems in the building, which prevents plumbers working in the building in years to come from cross-connecting with potable systems. Further, Ogden says his company injects biodegradable blue dye into the water to prevent confusion.

While a school may not pose significant challenges to a wetland, since even conventional cleaning products are generally easily filtered, Ogden has used wetlands in tough cases like landfills, refineries, food-processing facilities and slaughterhouses, all in a variety of extreme climates. "They are much better

than industrial technology, since machines break," Ogden says. "We need to rely on self-organizing, self-regulating systems that connect to the natural environment."

Gateway to an Aquifer

Establishing a connection to the natural environment impressed itself immediately on Lake/Flato Architects when the San Antonio-based firm undertook design on the Government Canyon Visitor Center in Helotes, Texas. The project, completed in October 2005 as a gateway to an 8,000-acre groundwater recharge conservation district, straddles the threshold of a watershed feeding the Edwards Aquifer, San Antonio's main source of water. The center's south side faces a parking lot, while the north side overlooks the periphery of the environmentally sensitive recharge zone.

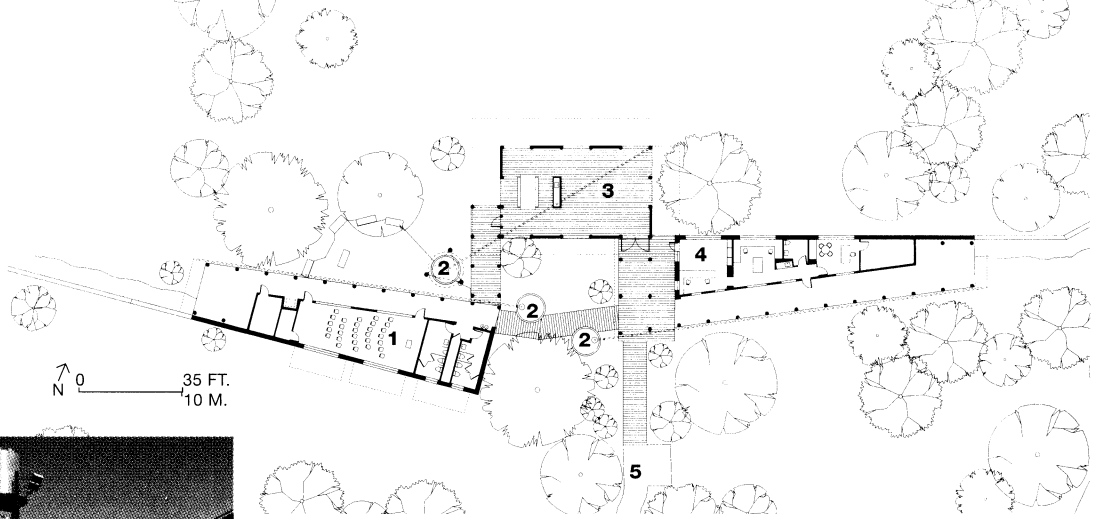
Lake/Flato designed three structures—classroom, gallery, and combination administrative/gift shop buildings—all oriented around a courtyard stormwater-collection system. The sloped, corrugated-metal roofs of each building

siphon rainwater into gutters and onto rain chains descending into two underground concrete cisterns roughly 8,600 gallons each, mimicking the naturally sloped land and percolation process of the aquifer's catchment basin. A solar-powered system pumps water to a third cistern, perched atop a tower, which creates pressure for flushing toilets and what little irrigation the center's plants need. State officials rejected the use of a constructed wetland for treating sewage, arguing it could threaten public health (a common argument in many jurisdictions), so it flows into a conventional septic tank system.

"We wanted to demarcate the edge of the recharge zone with our buildings," says Robert Harris, AIA, project architect on the Lake/Flato team. "The long wings stretching out across the landscape with dry-stacked stone walls indicate where the aquifer's preservation begins." Harris says design began with establishing the average expected annual rainfall amounts (32 in.) and then calculating how much water the roof area would collect. Once designers subtracted the amount of water

PHOTOGRAPHY: © PETER AARON FOR ENR (BOTTOM LEFT); IMAGE: COURTESY NATURAL SYSTEMS (BOTTOM RIGHT)

1. Classroom
2. Cistern
3. Gallery
4. Office/gift shop
5. Path to parking lot



Project: Government Canyon Visitor Center (built)
Location: Helotes, Texas
Architect: Lake/Flato Architects

Government Canyon, which acts as a gateway to an environmentally sensitive groundwater-recharge preserve open to hikers and bicyclists, relies on a gravity flow stormwater system to minimize the need for energy-consuming pumps. Solar-powered pumps provide what little energy is required to get water into the tower's cistern (right), which provides pressurized water for flushing toilets and irrigating the nearby landscape.

D.I.R.T. Studio's design for a new courtyard in the existing Navy Yard in Philadelphia required contractors to break up an existing concrete slab (right) and reuse the rubble as pervious paving around newly planted trees (below).



needed to flush toilets, the remaining water volume determined the area of irrigated landscape the project could support. A backup valve connection to the utility water source ensures toilets will always flush. Harris notes that some rural districts view stormwater collection as robbing a watershed, but in Texas, where rapid runoff and flooding pose serious soil-erosion problems, slowing the water down helps immensely.

While visitors can't miss the stormwater-reuse system, the subtlety of the architectural moves undertaken by Lake/Flato—like the site itself—require more careful observation. For example, the architects raised the central gallery building 18 in. above grade, supporting the wood-deck floor with rusted steel pipes high enough off the ground to allow the natural flow of water underneath. A topographical survey commissioned by the Texas Dept. of Parks and Wildlife helped the architects determine how to orient the project with minimal disturbance to the watershed.

"In urban watersheds, that work has been done for you, but in rural ones, you

often don't discover what's happening until it's changed," Harris says. "Regional planning for watersheds is just not an institutionalized part of our development process."

Impervious to Pervious

The idea of the pristine site in America is most likely a thing of the past. Even Government Canyon, as lush and bucolic as it appears, experiences the aftereffects of nearby suburban sprawl development. While Sidwell exposes the constructed nature of landscape most apparently, the Indianapolis park development cannot escape its industrial legacy, where the site's topography represents layers of decisions made for various economic reasons decades ago.

These embedded narrative threads—landscape histories made evident through the ingredients of nature—form the working methodology of Charlottesville, Virginia-based D.I.R.T. Studio. The studio's two landscape architects, Julie Bargmann and Christopher Fannin, approach each site design as an investigation of existing conditions, with the goal

of reconfiguring those into an emergent, new condition. "These postindustrial places have these echoes and we have to find in them the transformative agent that makes them relevant today," Fannin says. "We also work with the premise that nothing leaves the site."

D.I.R.T.'s design for the Navy Yard in Philadelphia, which included a courtyard for the Urban Outfitter's retail group, incorporated artfully demolished concrete chunks from an existing impervious parking lot that were reinstalled in a layer of porous gravel around newly planted trees. Water can now flow freely into the ground. Bargmann notes of the project, completed in early 2006, "This is not high technology, just a new way of building."

As American developers return to the city as the new territory of expansion, such innovative ways of designing for and building on a site—of understanding the baseline of what constitutes the inhabited natural world in a technological age—will certainly figure greatly in the success or failure of any venture. The real question is whether architects will help people see this, or construct another barrier. ■

Continuing Education



AIA/ENGINEERING NEWS-RECORD CONTINUING EDUCATION

INSTRUCTIONS

- ◆ Read the article "Toward a Cybernetic Site" using the learning objectives provided.
- ◆ Answer the questions below by darkening the box next to the correct answer.
- ◆ Fill out and submit the AIA/CES education reporting form or download the form at enr.construction.com to receive one AIA learning unit.

QUESTIONS

1. Which is not the design idea for the bridge across the canal at the Indianapolis Museum of Art?
 - a. to confront the viewer with nature
 - b. to get people to notice what they take for granted in a landscape
 - c. to keep people separated from the water
 - d. for the bridge to be an innovative viewing device
2. Since the Indianapolis park lies in a 100-year floodplain, the architect's approach was to do which?
 - a. keep water out
 - b. keep water in
 - c. construct a path for water flow
 - d. understand how water will travel
3. The architect refers to the Interpretive Center as a "leaf" for which of the following reasons?
 - a. the structural steel resembles a tree
 - b. the porosity of the roof and deck material allows water to flow through
 - c. the building's canopies collect leaves for composting
 - d. the color of the building changes with the seasons
4. What will be done with most of the water used by the Experiential Center and the Interpretive Center?
 - a. it will be channeled into the canal
 - b. it will be recycled through a constructed wetland
 - c. it will be drained into a cistern
 - d. it will be drained into a septic tank
5. The Sidwell Friends School reuses the building's wastewater for which purpose?
 - a. to water the grounds
 - b. to supply a decorative fountain
 - c. to flush toilets
 - d. for fire standpipes
6. Before the Sidwell wastewater enters the wetland, it goes through all except which?
 - a. a trickle filter of rocks
 - b. plant root systems
 - c. a primary treatment tank
 - d. a tank consisting of anaerobic bacteria
7. What color pipe is required by the Uniform Plumbing Code for gray water?
 - a. gray
 - b. yellow
 - c. blue
 - d. purple
8. The wastewater from Government Canyon flows into which?
 - a. sewers
 - b. wetlands
 - c. septic tank
 - d. river
9. The architects raised Government Canyon on pilotis to allow the stormwater on-site to do what?
 - a. flow naturally through the site
 - b. pass into moats around the perimeter
 - c. percolate into the landscape
 - d. flow into storm sewers
10. The author of this article contends which about sites and watersheds?
 - a. a pristine site most likely will not be found
 - b. most sites experience the effects of other development in the region
 - c. a site's topography may represent decisions made decades ago
 - d. all of the above

Program title: "Toward a Cybernetic Site," Engineering News-Record (07/23/07, page 73).

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Material resources used: Article: This article addresses issues concerning health and safety.

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