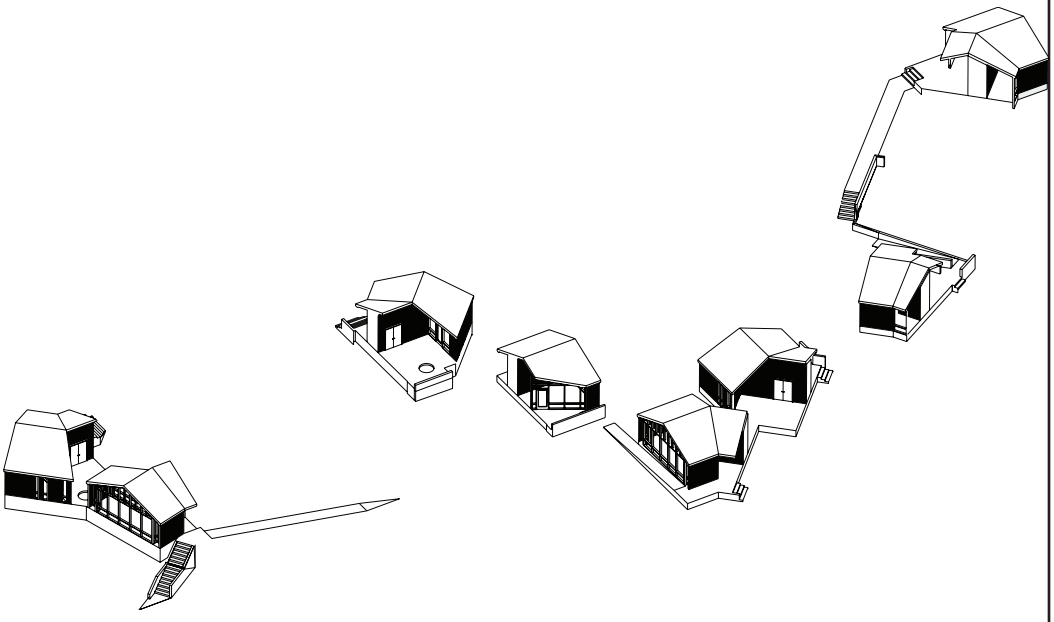
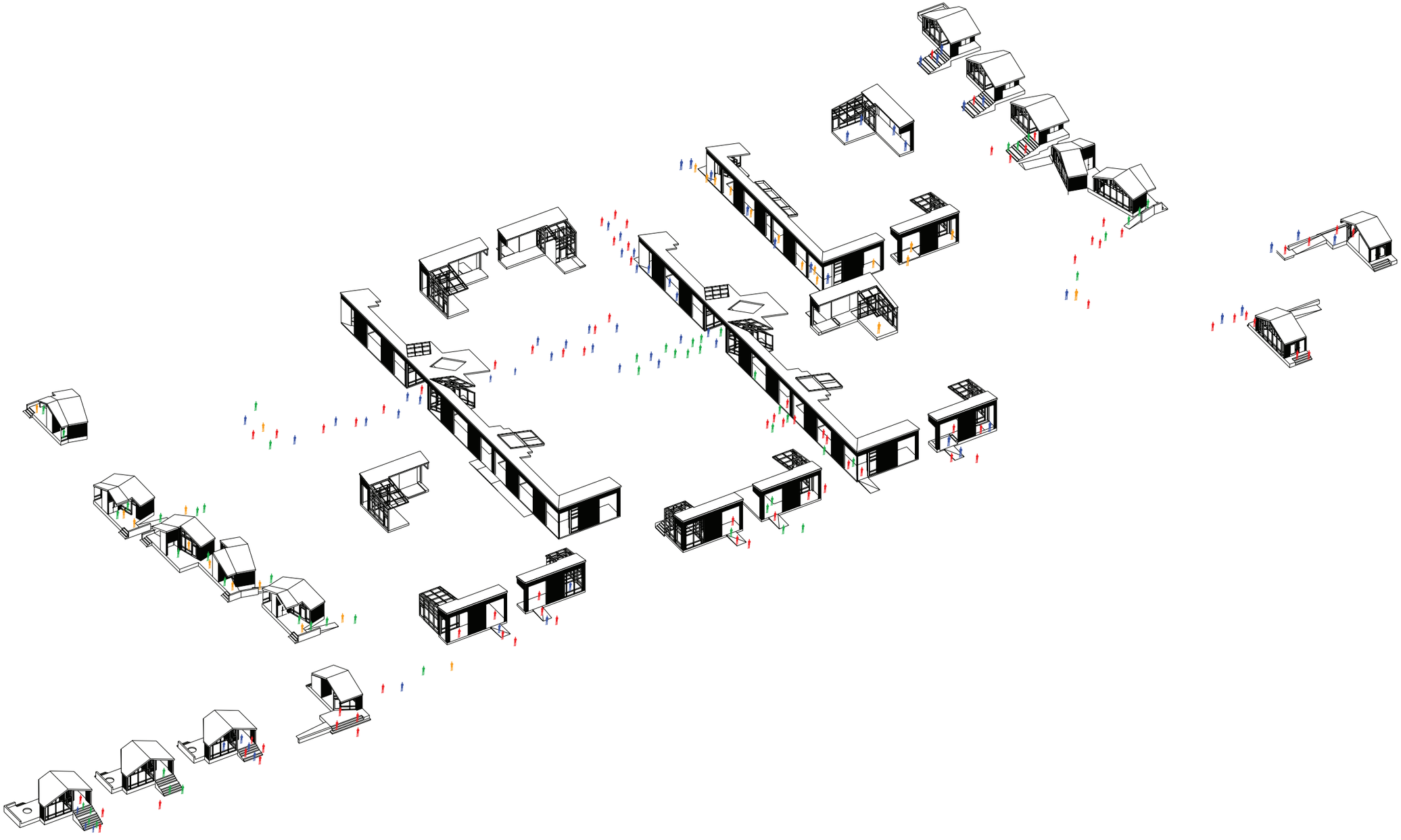


PORCHSCAPES
between neighborhood watershed and home

a project for Heritage Meadows, a Habitat for Humanity
neighborhood in Fayetteville, Arkansas



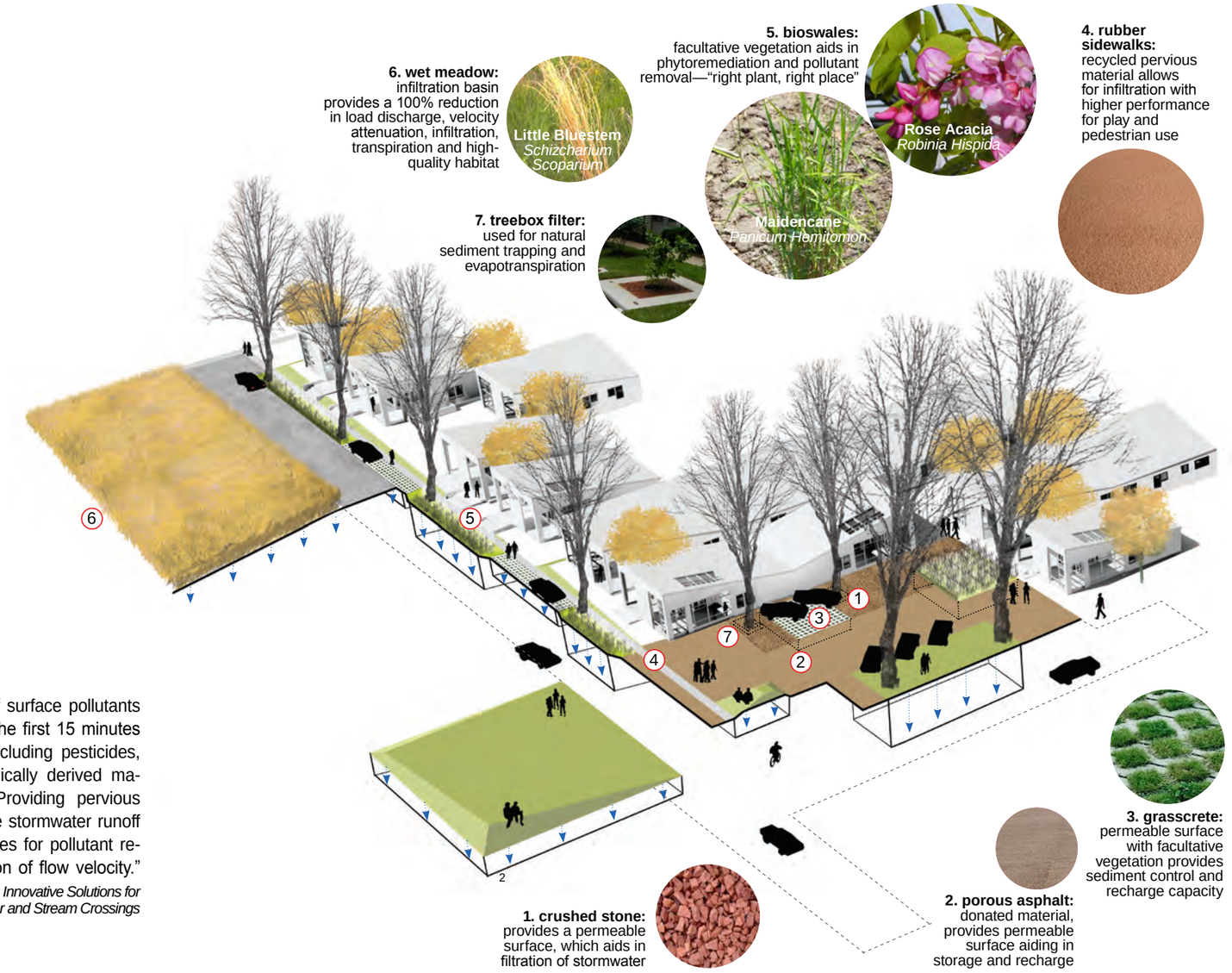
introduction
botanizing the street

Solving for Affordability, the Environment, and Social Capital

This 43-unit Habitat for Humanity residential project is a pilot LEED-Neighborhood Development (LEED-ND) to be built for $60/sq ft plus infrastructure costs. The objective is to design a demonstration project that combines affordability with best environmental practices as designated by the U.S. Green Building Council. *Porchscapes* is a Low Impact Development (LID) project funded under the U.S. Environmental Protection Agency's Section 319 Program for Nonpoint Source Pollution. The project introduces the "shared street" as a green infrastructure to amplify ecological services delivered by site planning. Inspired by the robust social life defining the Dutch "living street" or *woonerf*, shared streets are designed as parks, combining pedestrian gathering spaces, parking, landscape systems, and stormwater facilities with traffic throughways. The primary goal is to provide an affordable, high-value, 10-acre housing development from modest one-story structures on a greenfield site. A complementary policy goal involves barrier busting: mainstreaming LID technology (illegal in most cities) in place of conventional pipe-and-pond stormwater management solutions.

"Up to 47 percent of surface pollutants can be removed in the first 15 minutes of a storm event, including pesticides, fertilizers and biologically derived materials and litter... Providing pervious surfaces that capture stormwater runoff increases opportunities for pollutant removal and attenuation of flow velocity."

Green Streets: Innovative Solutions for Stormwater and Stream Crossings



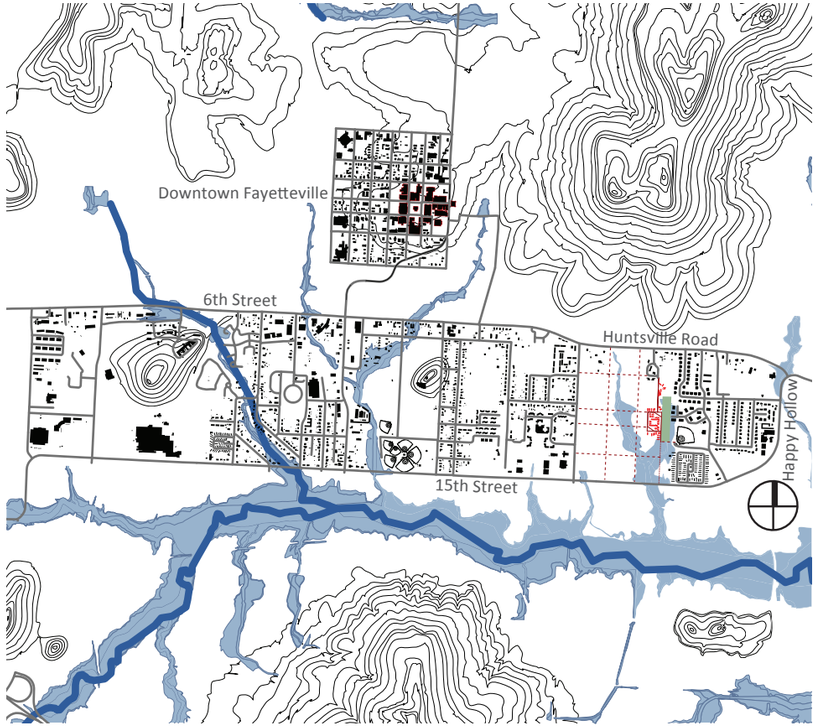
An Affordable LEED-Neighborhood Development (LEED-ND)

Using LEED-ND as a planning platform, *Porchscapes* maximizes southern exposure—the optimum solar orientation in the southeast. *Porchscapes* increases density through small lot development and arranges each house to front a public green space. LID supports LEED-ND by incorporating hydrological processes that organize the neighborhood into subgroupings. LID is an ecological stormwater management approach with a basic principle modeled after nature: manage rainfall locally through a vegetated treatment train that keeps water on the site.

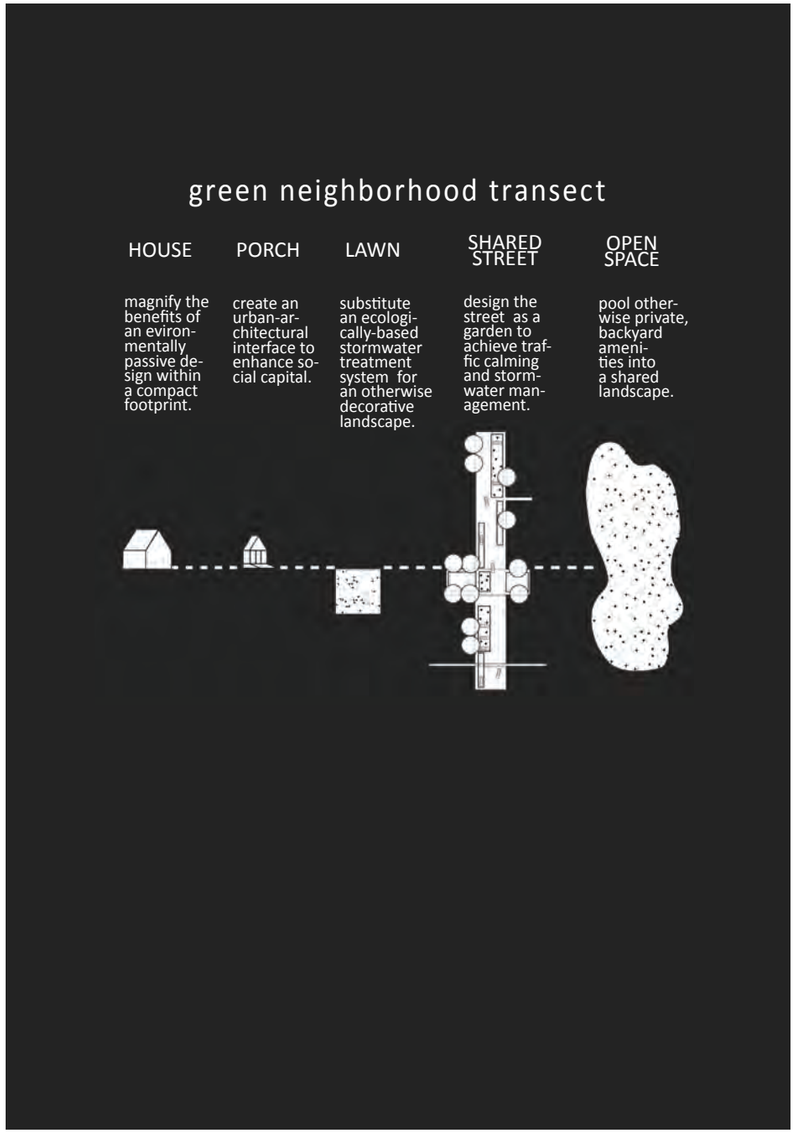
The goal of LID is to sustain a site's predevelopment hydrologic regime by using techniques that infiltrate, filter, store, and evaporate runoff close to its source. Instead of using conventional civil-engineered "pipe and pond" solutions serviced by pipes, gutters, and catch basins, LID addresses runoff management with treatment landscapes distributed throughout the project—Parks, Not Pipes. Pipes simply transport polluted water elsewhere. A contiguous network of rainwater gardens, bioswales, infiltration trenches, sediment filter strips, tree box filters, and wet meadows will clean water using biological processes. This is critical since the first hour of urban stormwater runoff has a pollution index much higher than that of raw sewage. Thus, neighborhood sectors are developed as subwatersheds, combining hydrologic performance with open space design.

The Green Neighborhood Transect: Integrating Urban and Ecological Services

Planning begins with a Green Neighborhood Transect, leveraging urban and ecological services in the house, porch, yard, street, and open space, which ensures synergies among the five components. Conventional residential development separates horizontal infrastructural planning from individual property development, which are financed autonomously, creating subdivisions rather than neighborhoods. Porch aggregations delineate macro and micro-scaled landscape systems in neighborhood subwatersheds while expanding interior home space. The transect features the shared street as a primary neighborhood armature, amplifying social and environmental capital with lower construction and operation costs. Since stormwater management is the single greatest infrastructural expense, the soft engineering of shared streets facilitates a 40% savings in construction costs compared to conventionally-engineered streets.



south fayetteville context plan

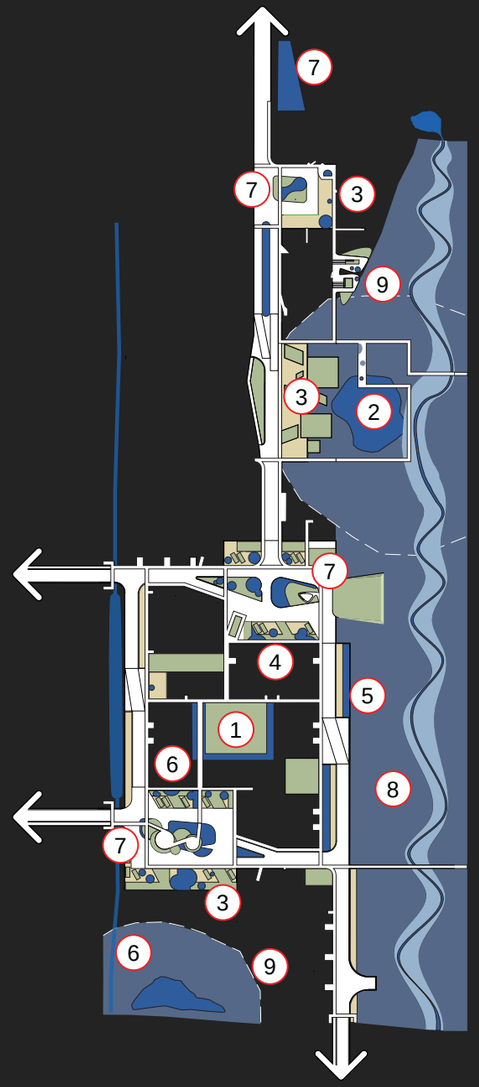


The Shared Street: From a Traffic World to a Social World

Streets are designed as multipurpose landscapes to calm vehicular traffic, provide LID management functions, and reclaim social functions lost to the automobile's dominance. Modeled after the Dutch *woonerfs*, shared streets have a remarkable record of safety where they are implemented. Streets are key components of the stormwater runoff treatment train, incorporating bioswales, sediment filters, and infiltration trenches. This eliminates costly curbs, gutters, pipes, and catch basins in conventional civil-engineered systems, which often flood at a 50-year event. Streets and attending green spaces are recombined as a treatment network to create "productive park" spaces, sponsoring active passive and active recreation. Since coverage of more than 30% of the site by hard surfaces for walks, roads, and roofs leads to irreversible watershed degradation, pervious surfaces for parking and walking are used in place of asphalt. The site is essentially designed to function like a sponge, recharging and evapotranspiring treated runoff after its initial absorption during a storm event.

"The site is essentially designed to function like a sponge, recharging and evapotranspiring treated runoff after its initial absorption during a storm event."

Shared streets deliver numerous social services (e.g., traffic safety, recreation, aesthetics, crime prevention, conviviality) and, unlike conventional streets, do not constitute an environmental liability. The street becomes a net producer of ecological and urban services. Solving for such multiple bottom lines represents the next frontier of housing affordability: regenerative neighborhood infrastructure. Since individual property value is contextually created through collective environmental and social forces, neighborhood infrastructure is the key to sustained homeownership. What better way is there to leverage the investment of low-income home owners and ensure the same rate of equity appreciation enjoyed in other market grades of housing?



Storage

1 Underground Storage
2 Detention Pond

mechanical

Pre-treatment

3 Pervious Paving
4 Tree Box Filter
5 Filter Strip

biological

Treatment

6 Infiltration Trench
7 Bioswale
8 Infiltration Basin
9 LEED-ND wetland buffer

WELL-POORLY DRAINED


Smooth Alder
Alnus Serrulata


Maidencane
Panicum Hemitomon


Roughleaf Dogwood
Cornus Drummondi


Elderberry
Sambucus Canadensis


Groundsel-Tree
Baccharis Halimifolia

WELL DRAINED


Beautyberry
Callicarps Americana


Lanceleaf Buckorn
Rhamus Caroliniana


Deciduous Holly
Ilex Decidua


Blackhaw Viburnum
Viburnum Prunifolium


Witch-hazel
Hamamelis Virginiana


Rose Acacia
Robinia Hispida


Hawthorn
Crataequs sp.


Red Buckeye
Aesculus Pavia


Indiangrass
Sorghastrum Nutans


Indigobush
Amorpha fruiticosa


Smooth Sumac
Rhus Glabra


New Jersey Tea
Ceanothus Americanus

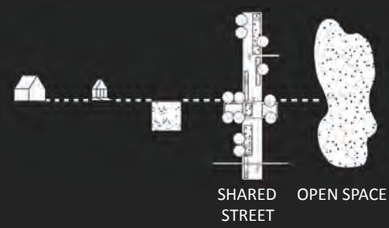

American Plum
Prunus Americanus

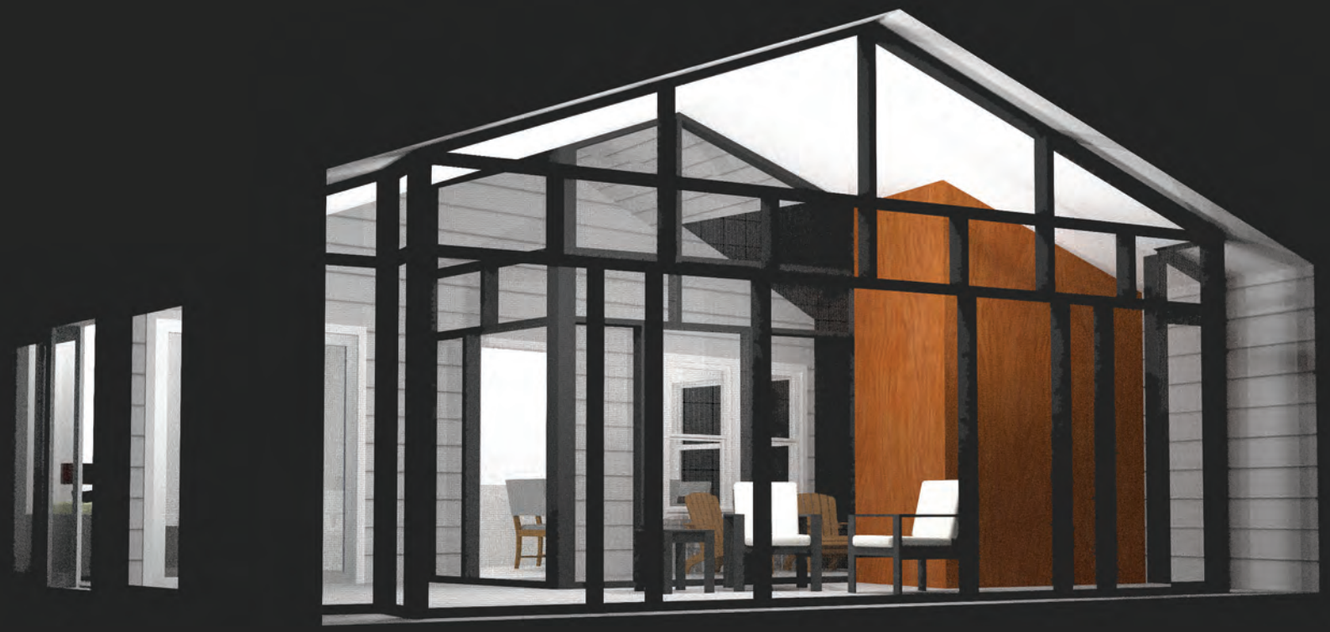

Little Bluestem
Schizcharium Scoparium


Big Bluestem
Andropogon Gerardii

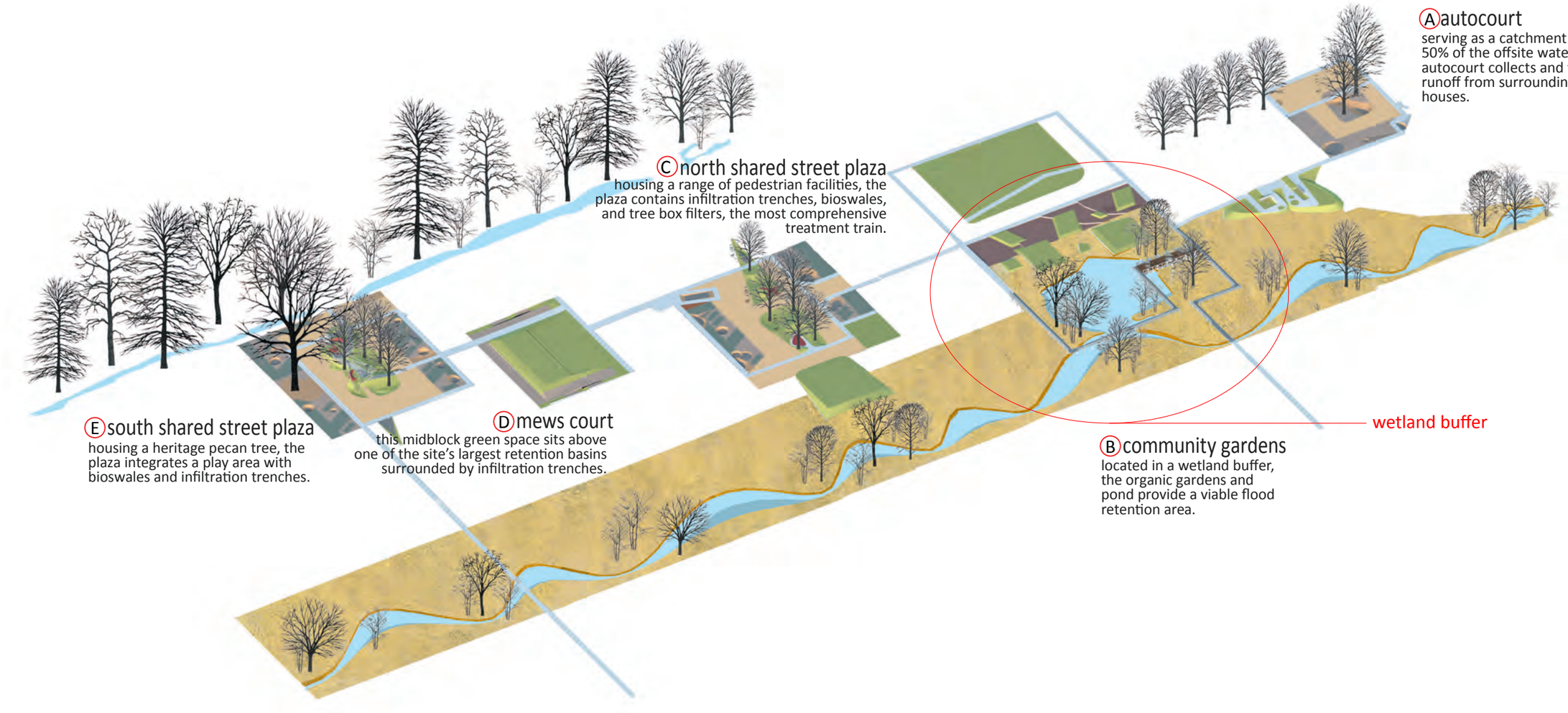
WELL-EXCESSIVELY DRAINED

stormwater facilities menu


SHARED
STREET
OPEN SPACE

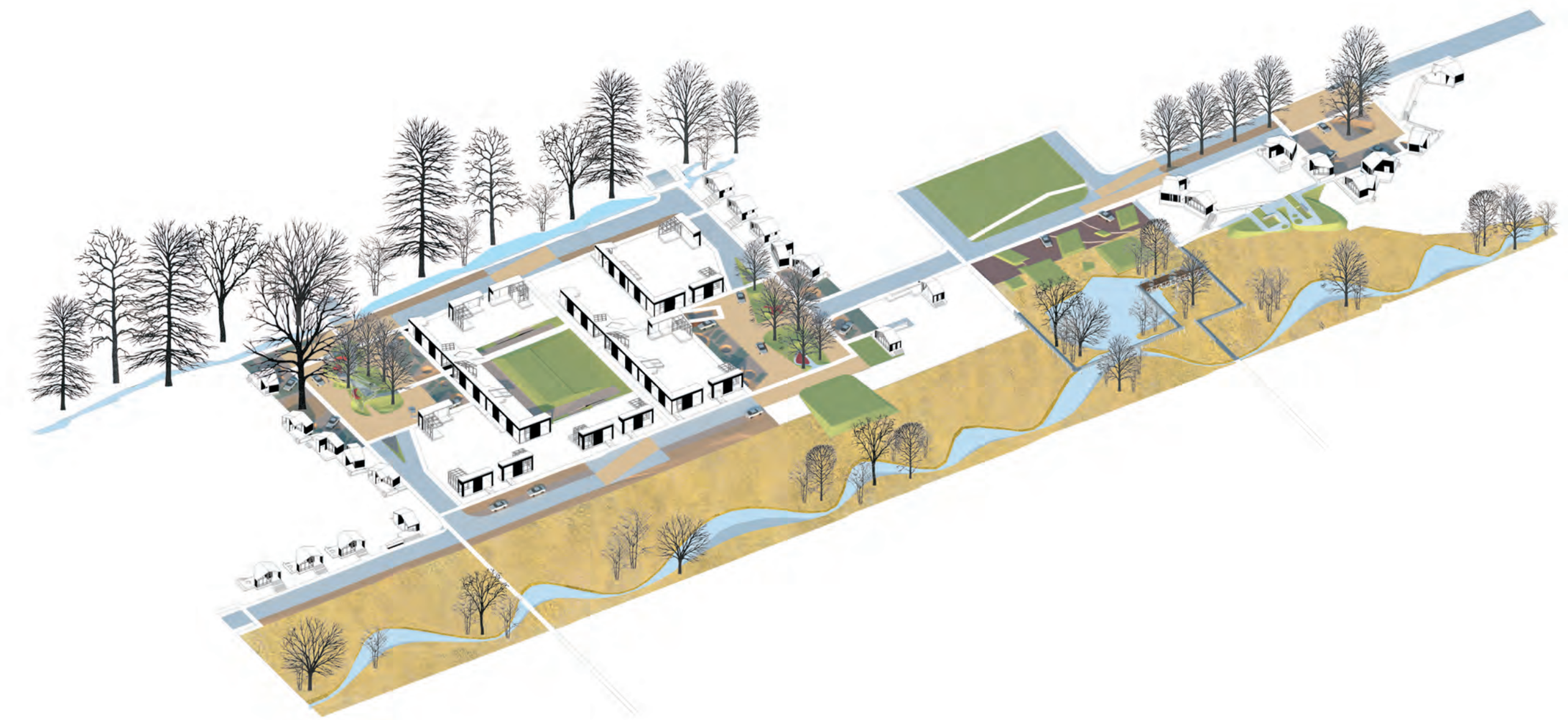


shared street to open space

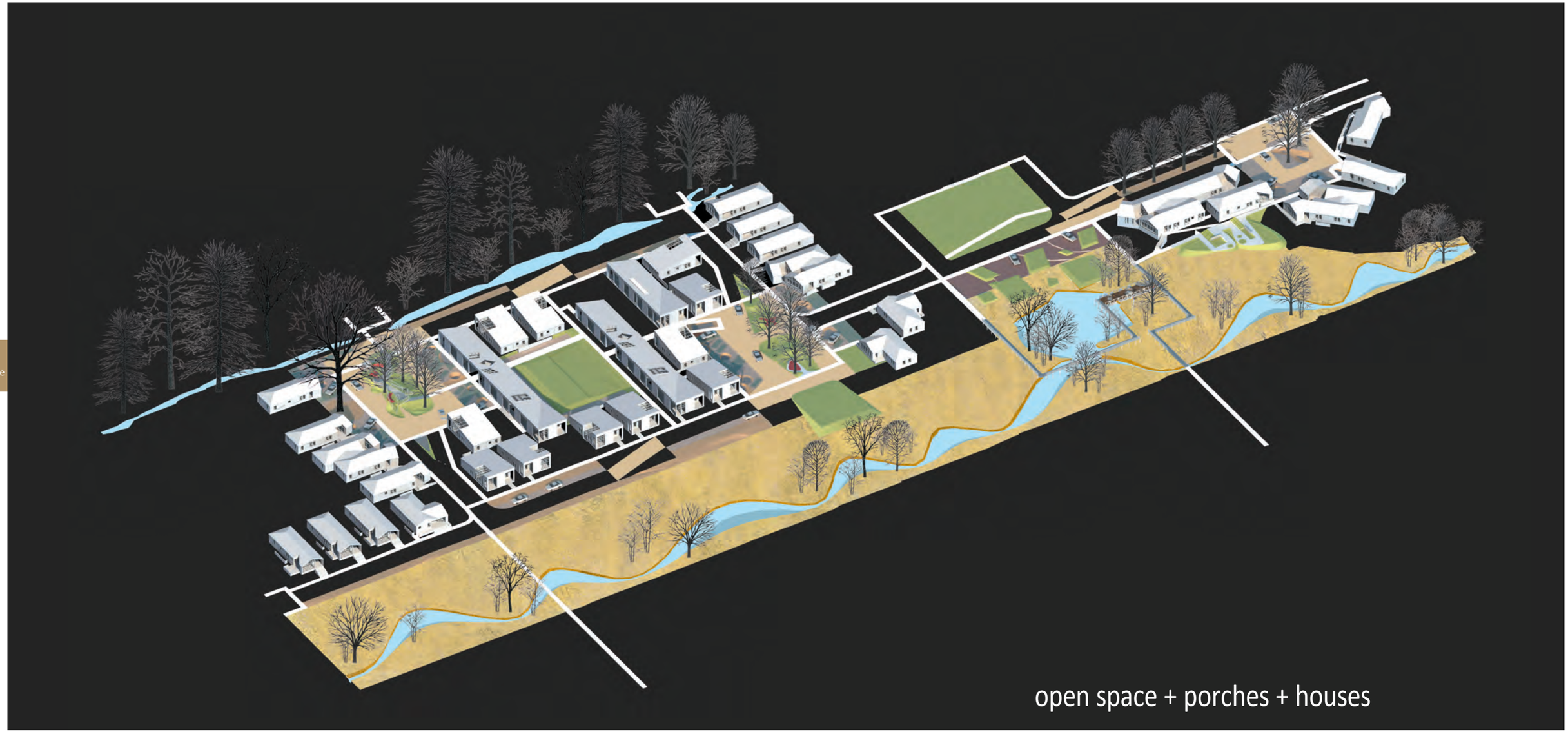


open space

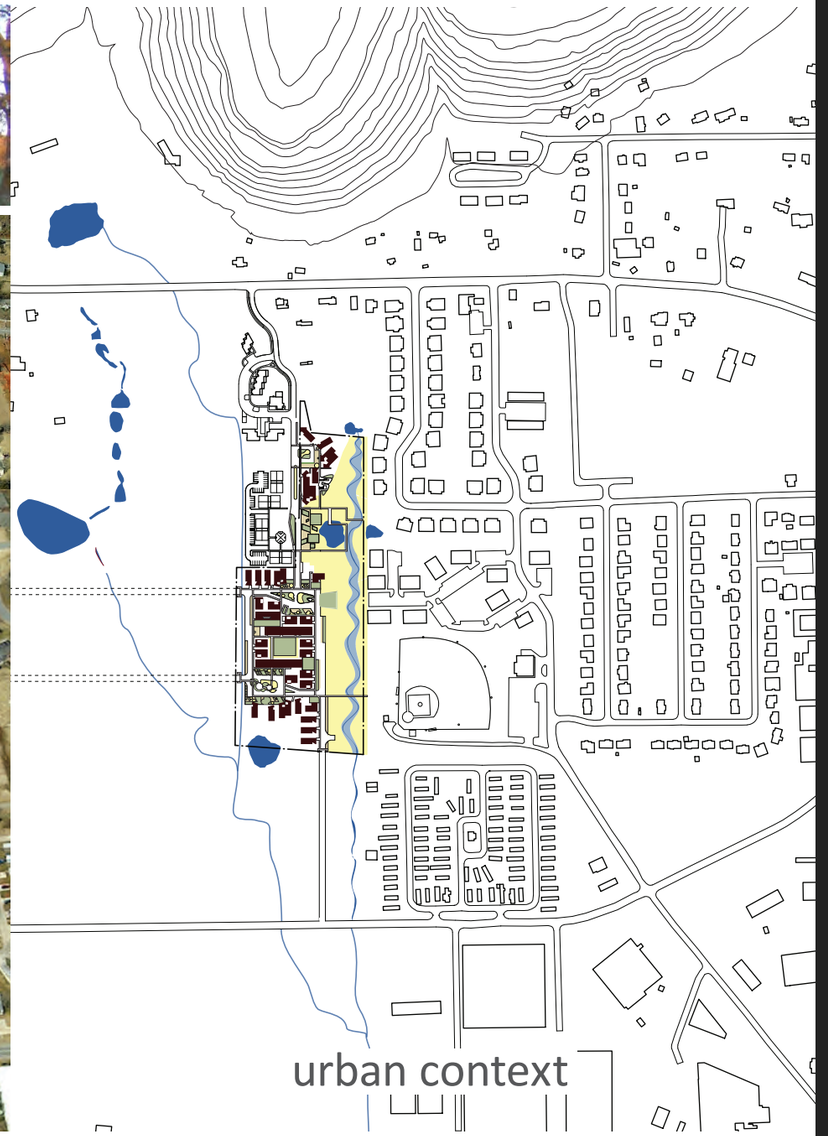
shared street to open space

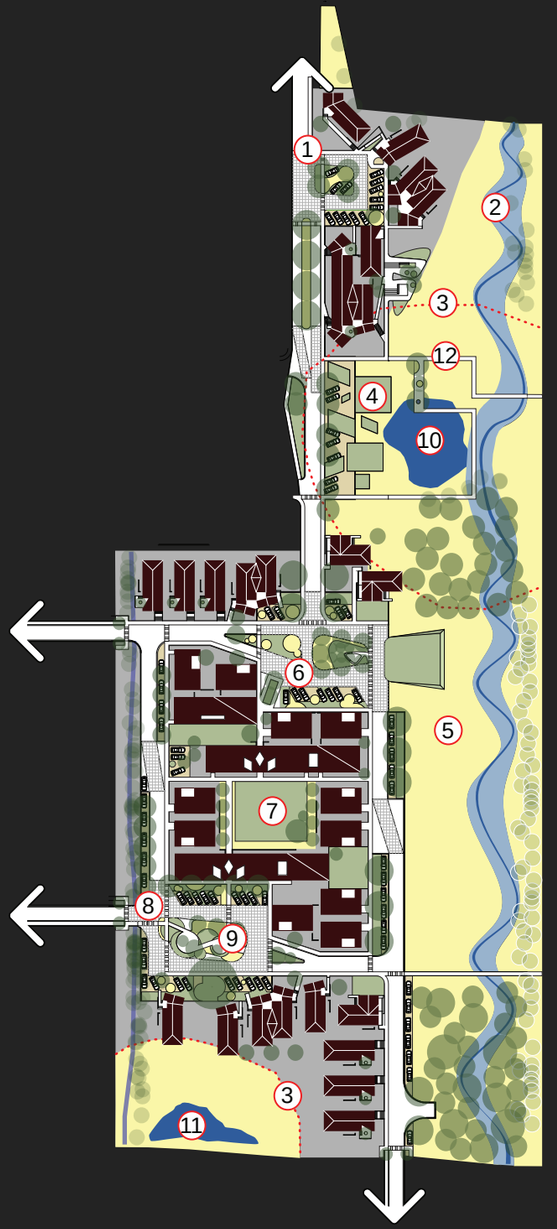


open space + porches

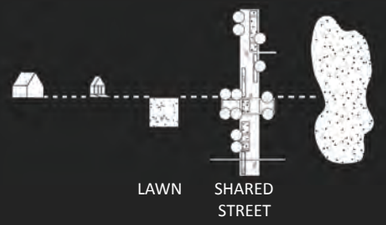

shared
street to
open space
open space + porches + houses

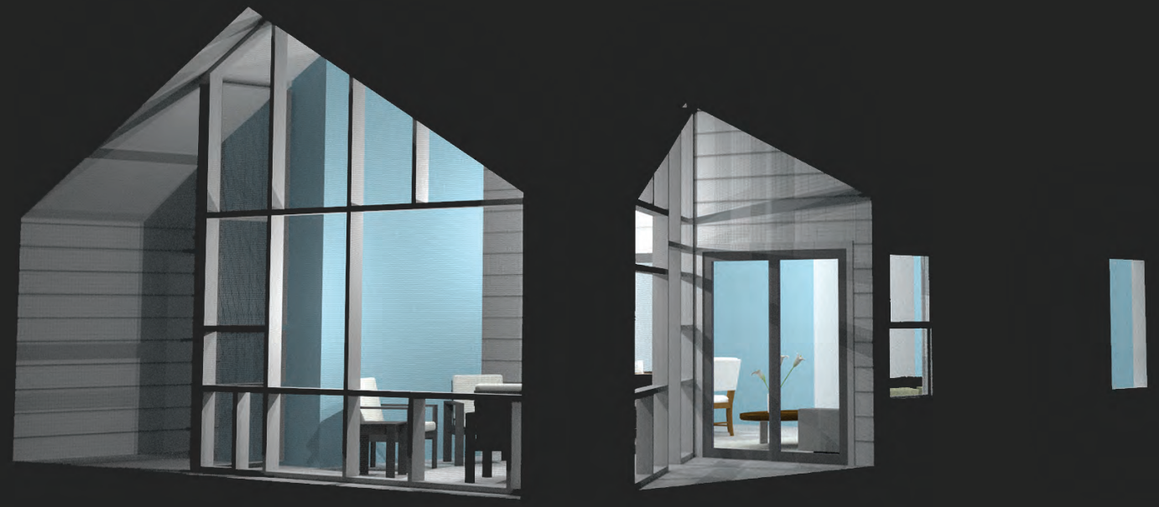
shared street to open space

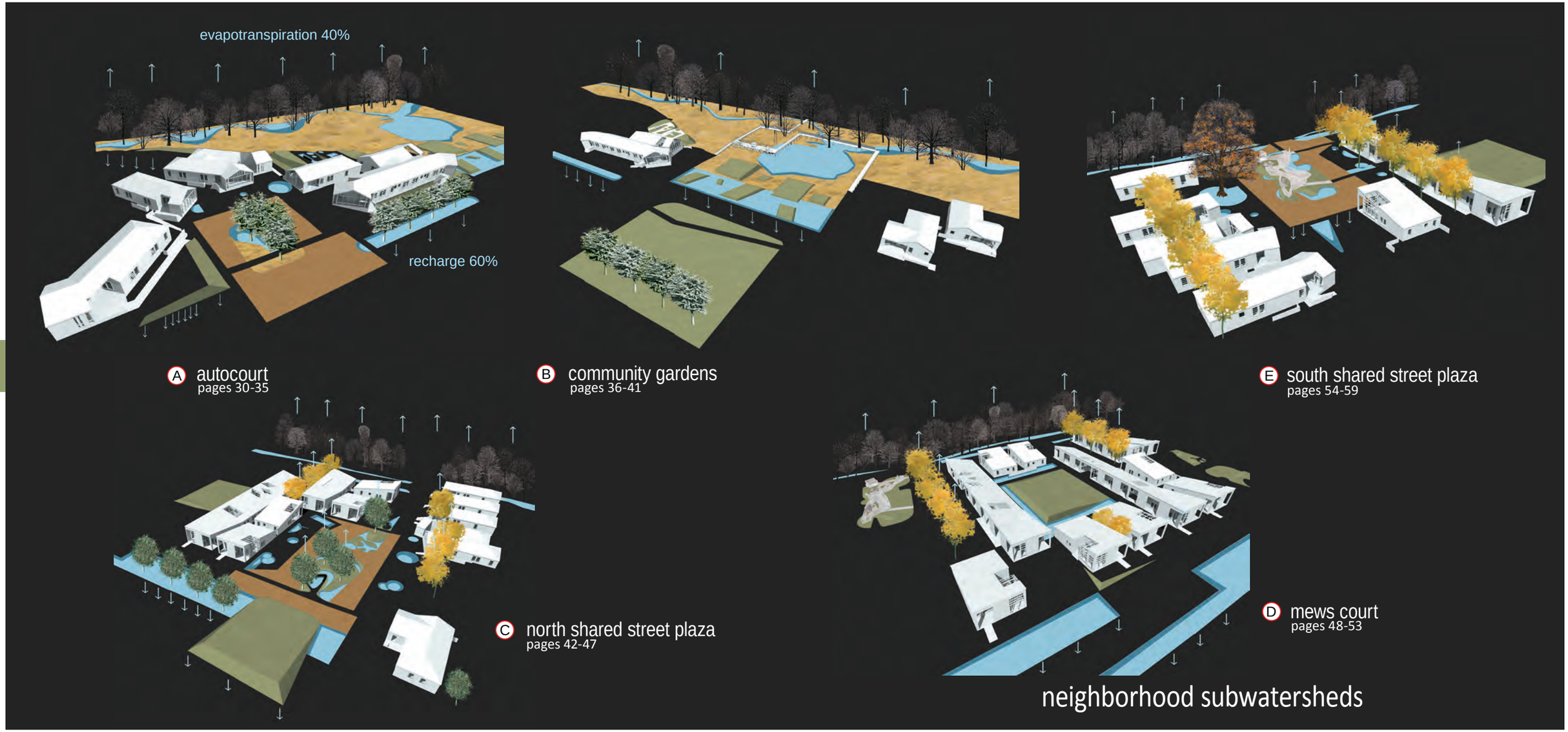




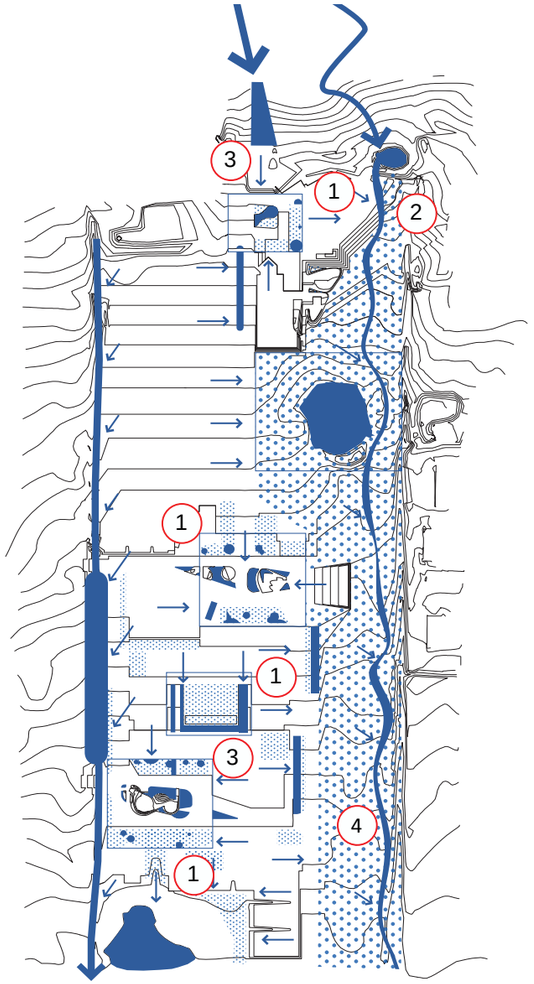
autocourt 1
constructed stream 2
LEED-ND wetland 3
buffer
community gardens 4
city park 5
north shared 6
street plaza
mews court 7
south shared 8
street plaza
play area 9
existing farm pond 10
existing wetland 11
boardwalk 12


LAWN
SHARED
STREET



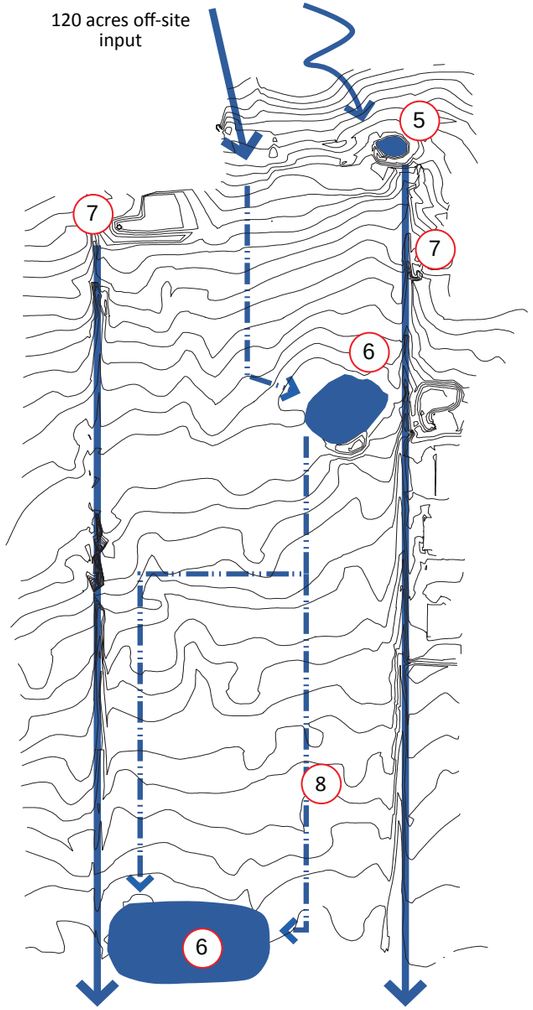

evapotranspiration 40%
recharge 60%
A autocourt
pages 30-35
B community gardens
pages 36-41
E south shared street plaza
pages 54-59
C north shared street plaza
pages 42-47
D mews court
pages 48-53
neighborhood subwatersheds

lawn to shared street



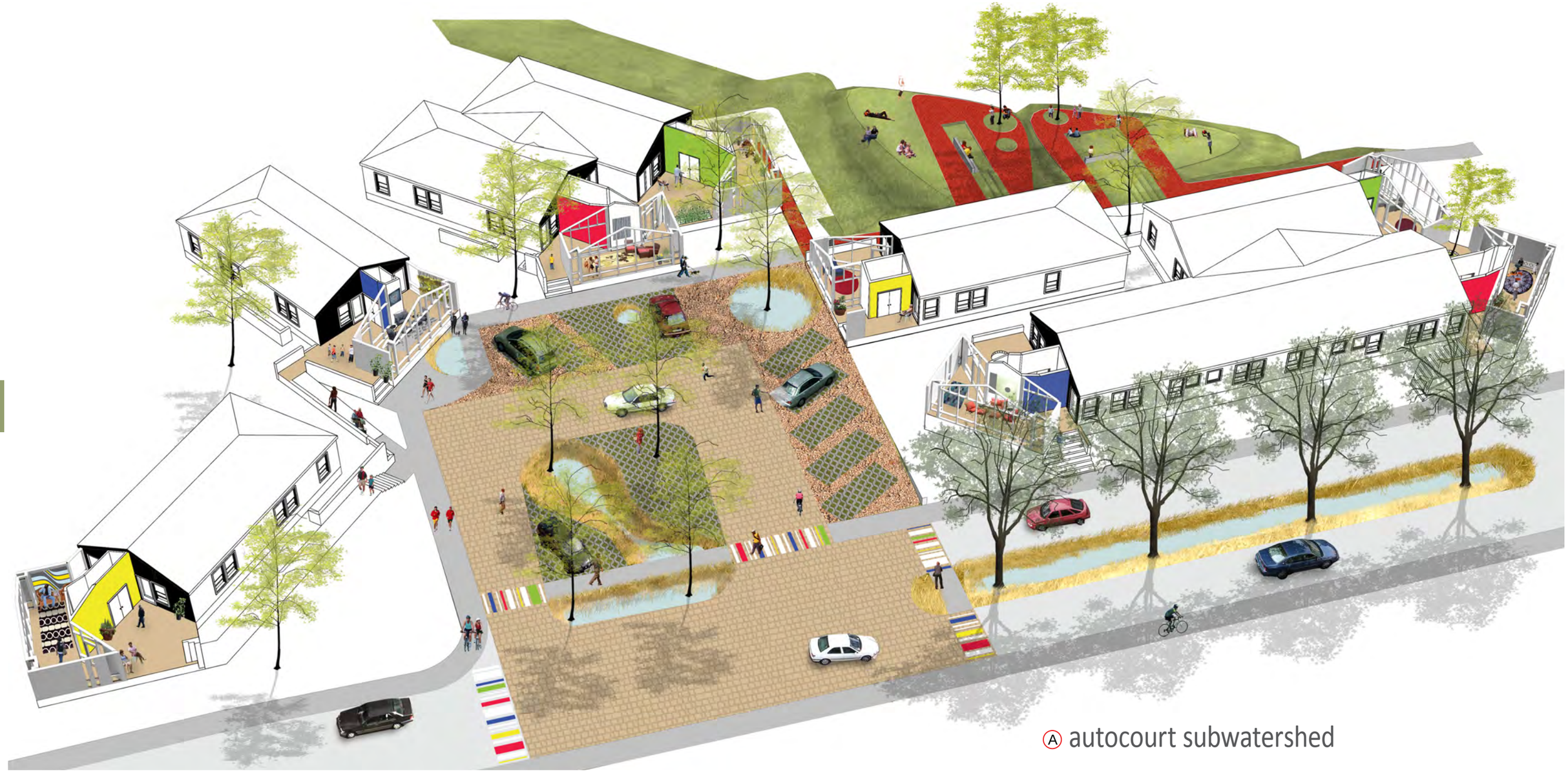
1 infiltration zone
2 constructed stream
3 bioswale
4 conserved wet meadow

Porchscape's
low impact development solution



5 agricultural pond
6 reclaimed detention pond
7 existing conveyance swale and easement
8 curb-gutter-pipe

conventional pipe-and-pond solution



lawn to shared street

Ⓐ autocourt subwatershed

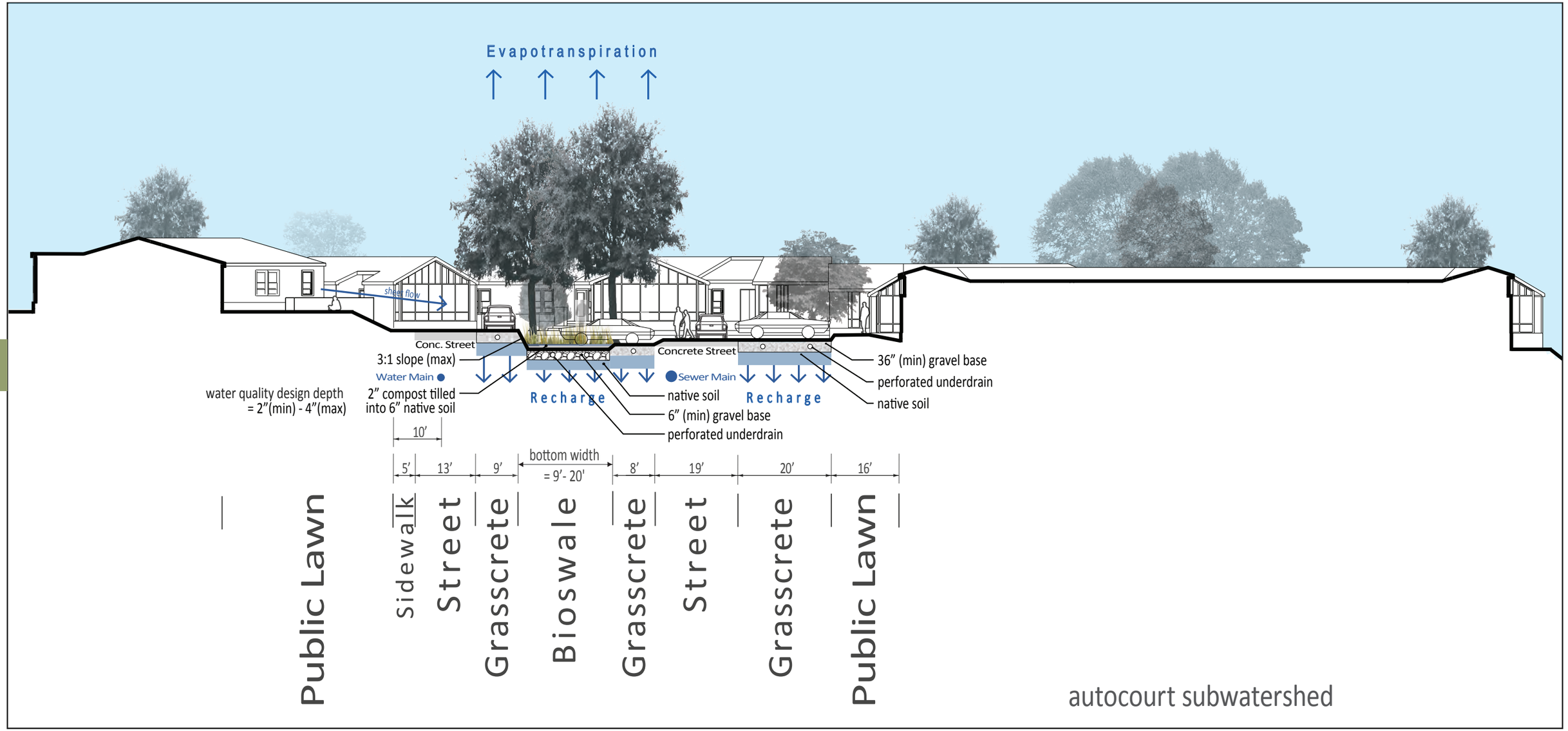
Traffic is more a social problem than an engineering problem. "If you want motorist to behave as if they are in a village, then build a village."

-Hans Monderman, Dutch traffic engineer

2' 14'

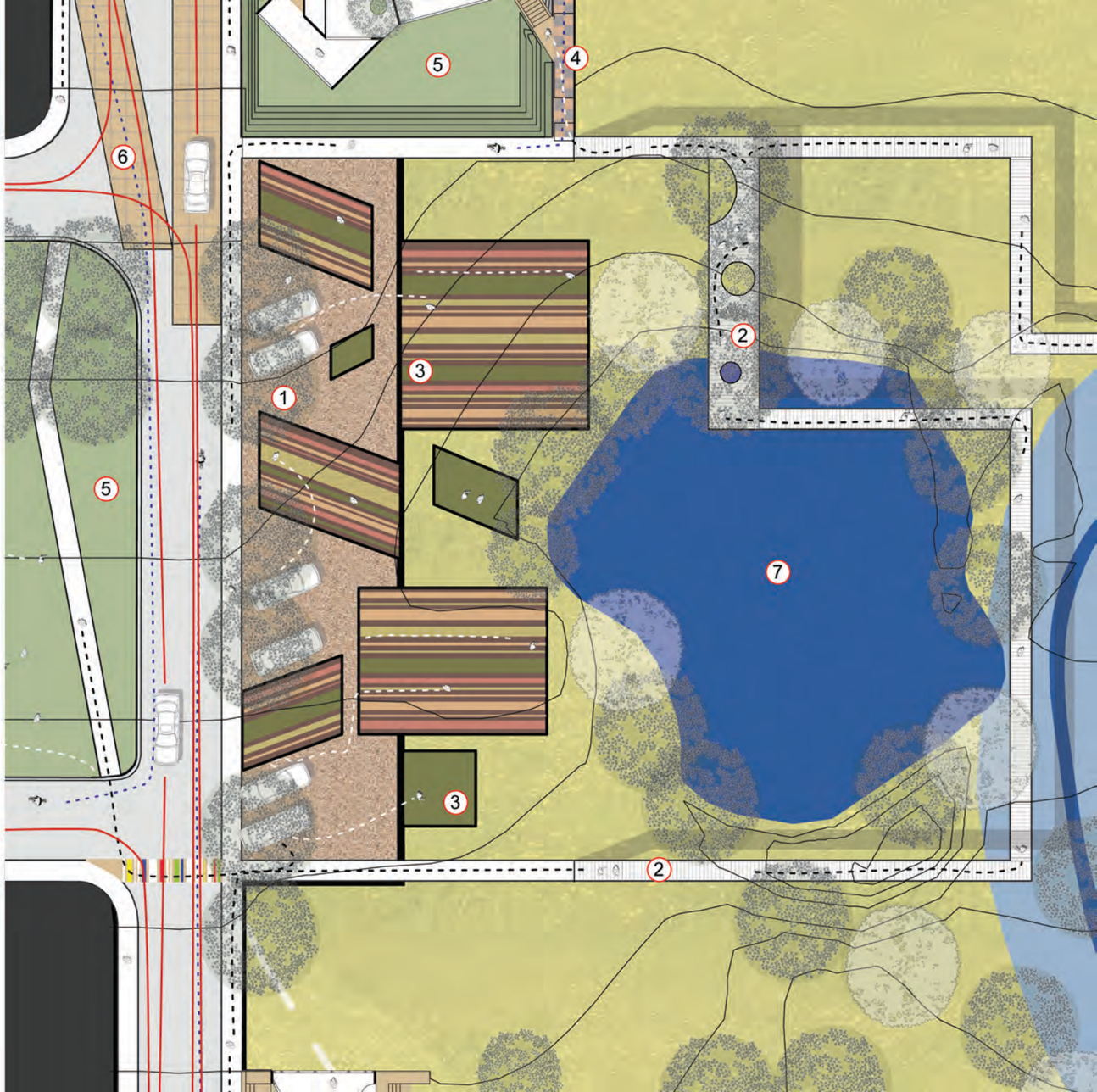
crushed stone 1
bioswale 2
grasscrete 3
rubber sidewalk 4
lawn/ play area 5
stained concrete 6

autocourt subwatershed

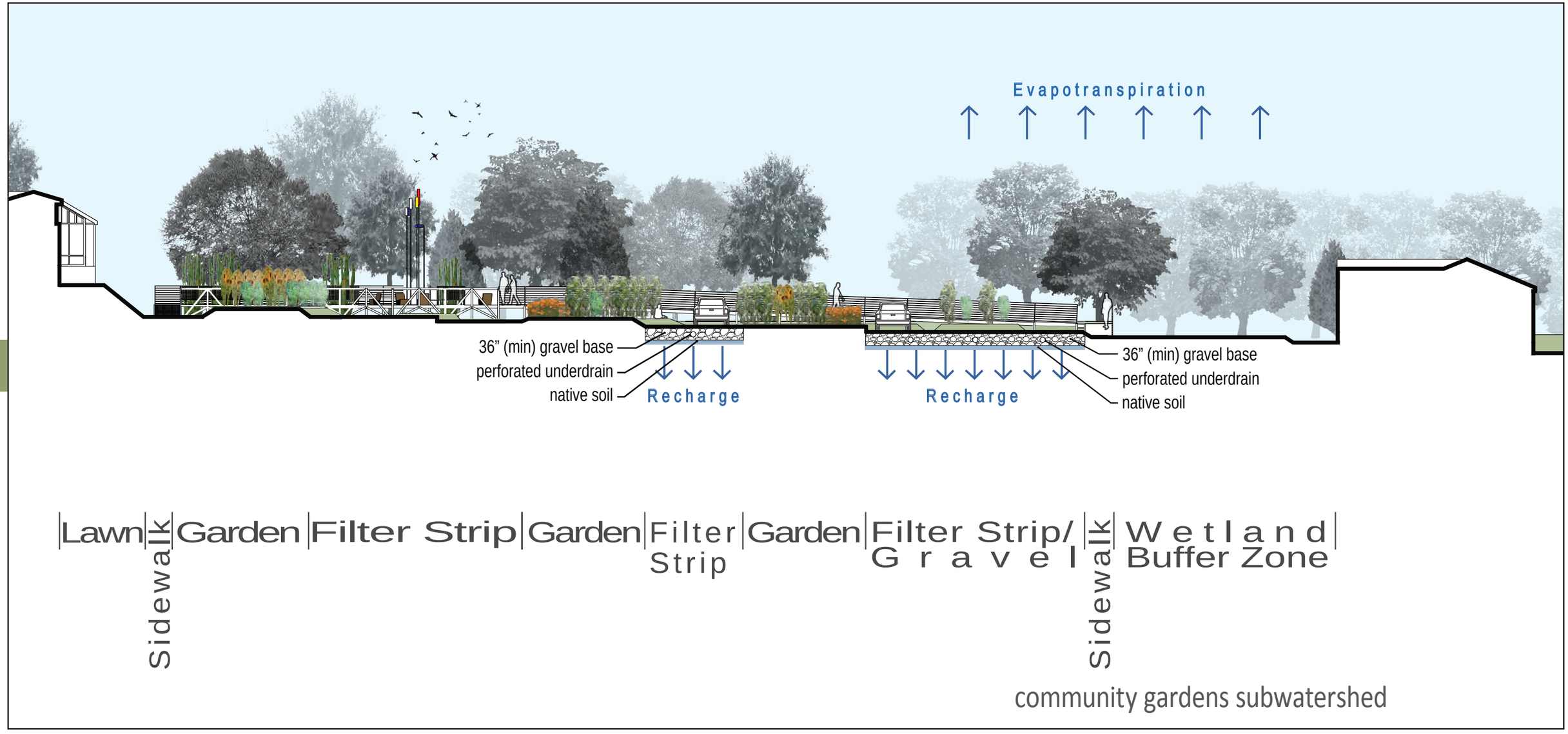

Evapotranspiration
sheet flow
Conc. Street
3:1 slope (max)
Water Main
water quality design depth
= 2"(min) - 4"(max)
2" compost tilled
into 6" native soil
Recharge
native soil
6" (min) gravel base
perforated underdrain
Concrete Street
Sewer Main
Recharge
native soil
perforated underdrain
36" (min) gravel base
10'
bottom width
= 9'- 20'
5'
13'
9'
8'
19'
20'
16'
Public Lawn
Sidewalk
Street
Grasscrete
Bioswale
Grasscrete
Street
Grasscrete
Public Lawn
autocourt subwatershed


lawn to shared street
Ⓑ community gardens subwatershed

In transitioning from a traffic world to a social world, public right-of-ways may sponsor the emergence of new and viable neighborhood economies.



community gardens subwatershed



lawn to shared street

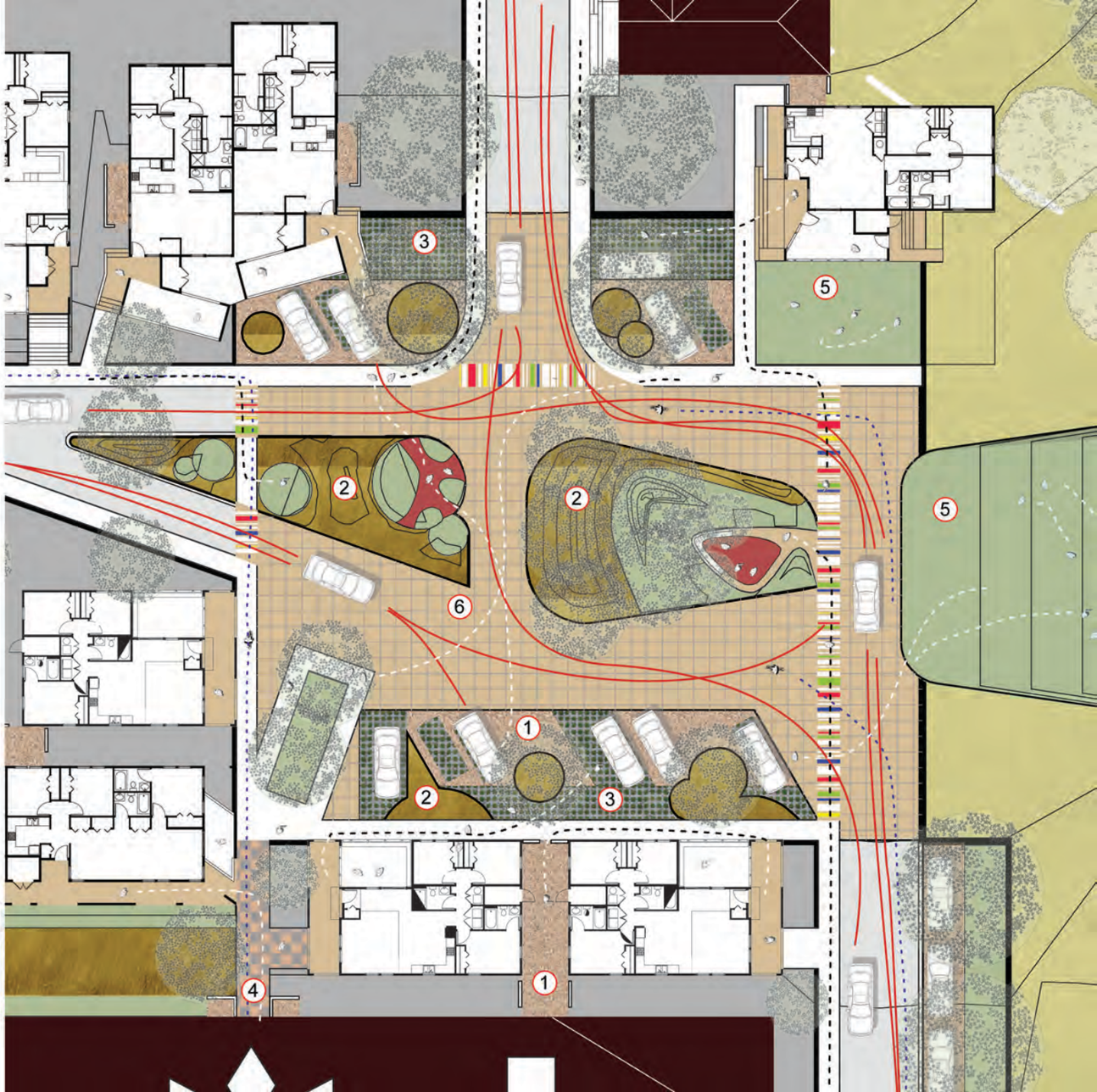
community gardens subwatershed

lawn to shared street

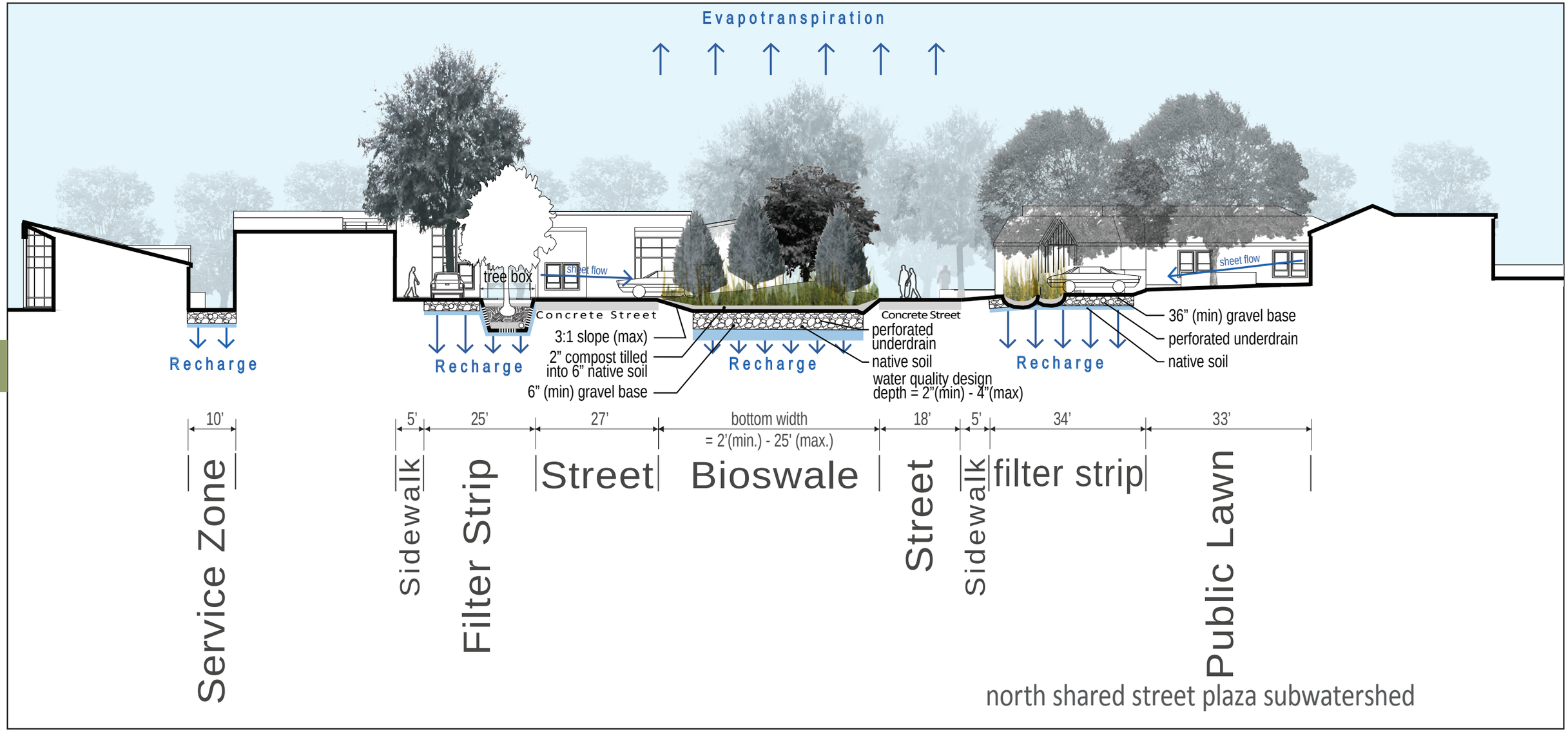
© north shared street plaza subwatershed

Three factors in the street environment cause motorists to slow down: intrigue, uncertainty, and humor. "The more neighborhoods that build the social life of their street, the greater the uncertainty that is created in the motorists mind even when there is no social activity in the streets."

-David Engwicht, *Mental Speed Bumps: The Smarter Way to Tame Traffic*



north shared street plaza subwatershed

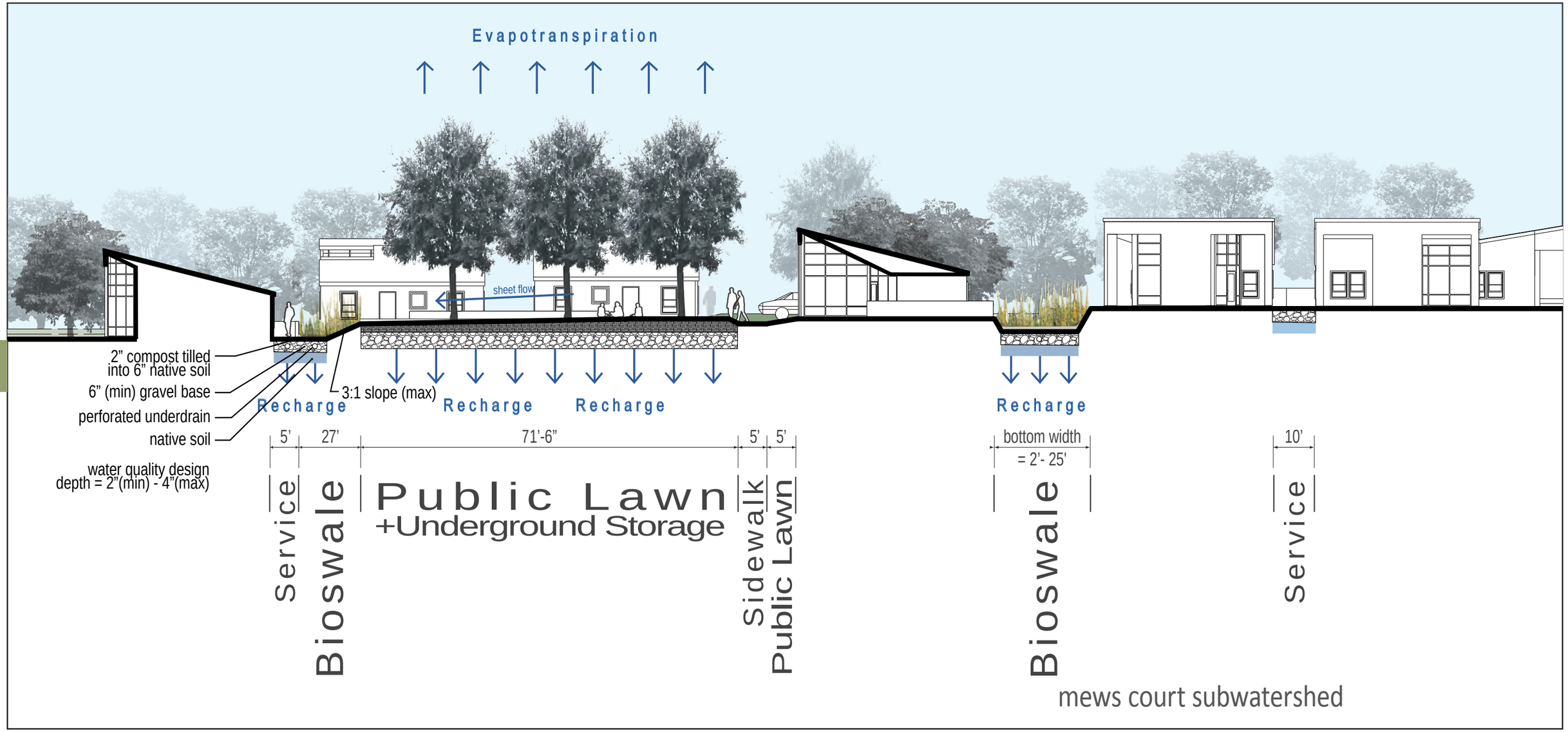

Evapotranspiration
tree box
sheet flow
Concrete Street
3:1 slope (max)
2” compost tilled into 6” native soil
6” (min) gravel base
Recharge
Concrete Street
perforated underdrain
native soil
water quality design depth = 2”(min) - 4”(max)
sheet flow
36” (min) gravel base
perforated underdrain
native soil
10’
5’
25’
27’
bottom width = 2’(min.) - 25’ (max.)
18’
5’
34’
33’
Service Zone
Sidewalk
Filter Strip
Street
Bioswale
Street
Sidewalk
filter strip
Public Lawn
north shared street plaza subwatershed

Ⓓ mews court subwatershed

"The same principles that make a great room make a great street."

-David Engwicht, *Mental Speed Bumps: The Smarter Way to Tame Traffic*

mews court subwatershed

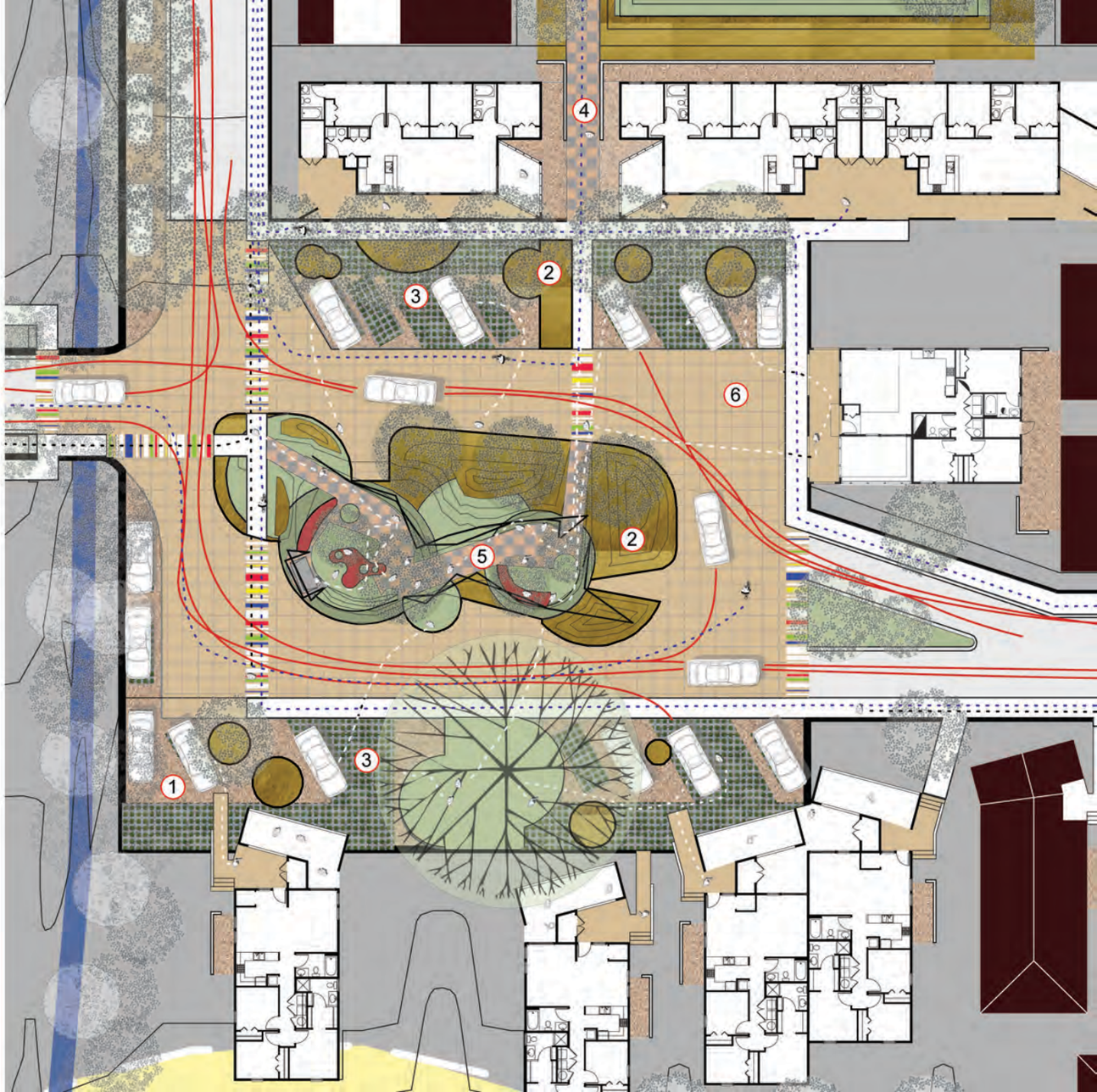


lawn to shared street

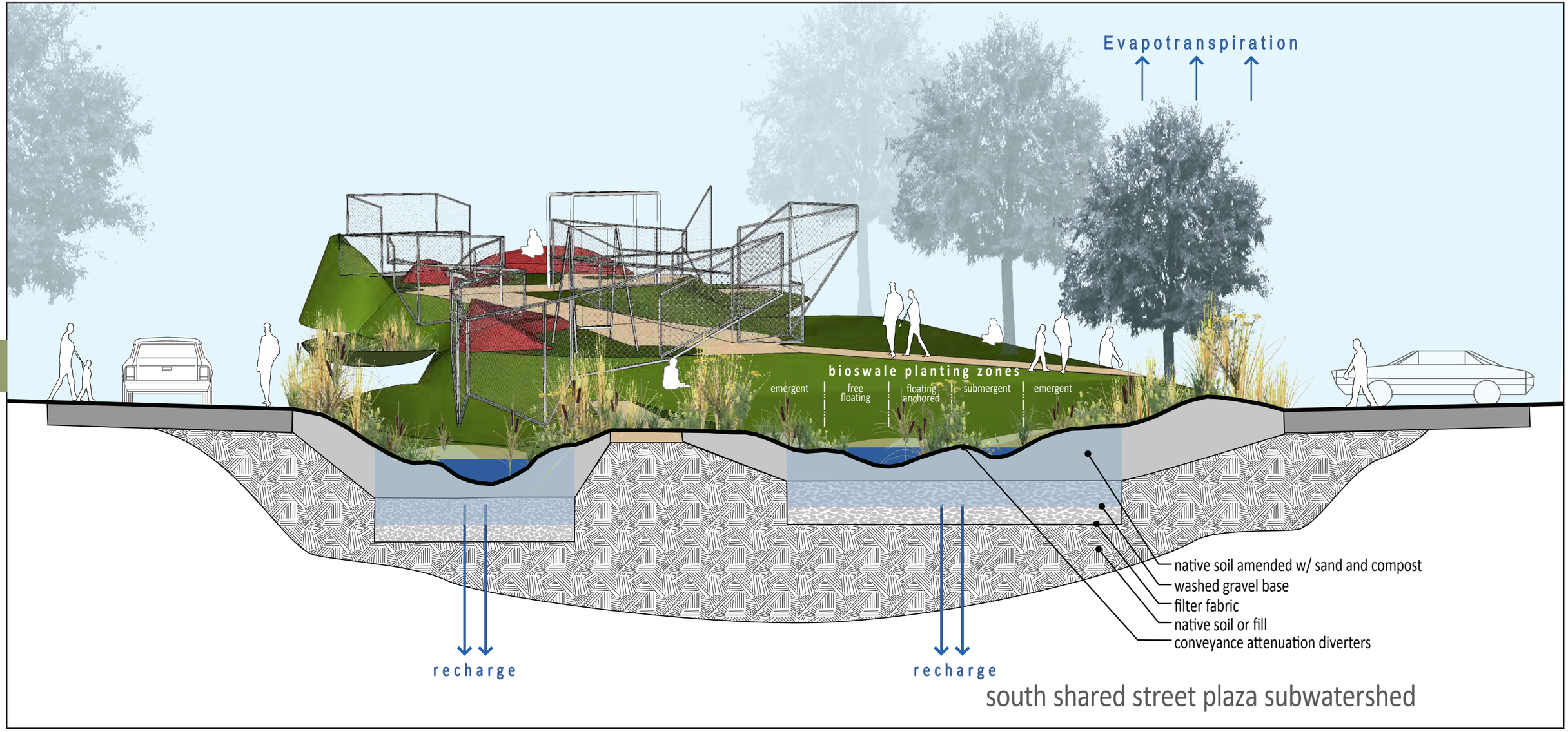
Ⓔ south shared street plaza subwatershed

"Traffic in residential streets is governed, to a large extent, by the degree to which residents have psychologically retreated from their street."

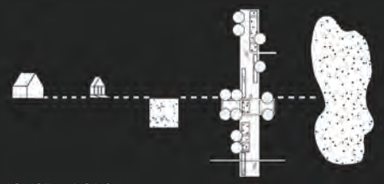
-David Engwicht, *Mental Speed Bumps: The Smarter Way to Tame Traffic*



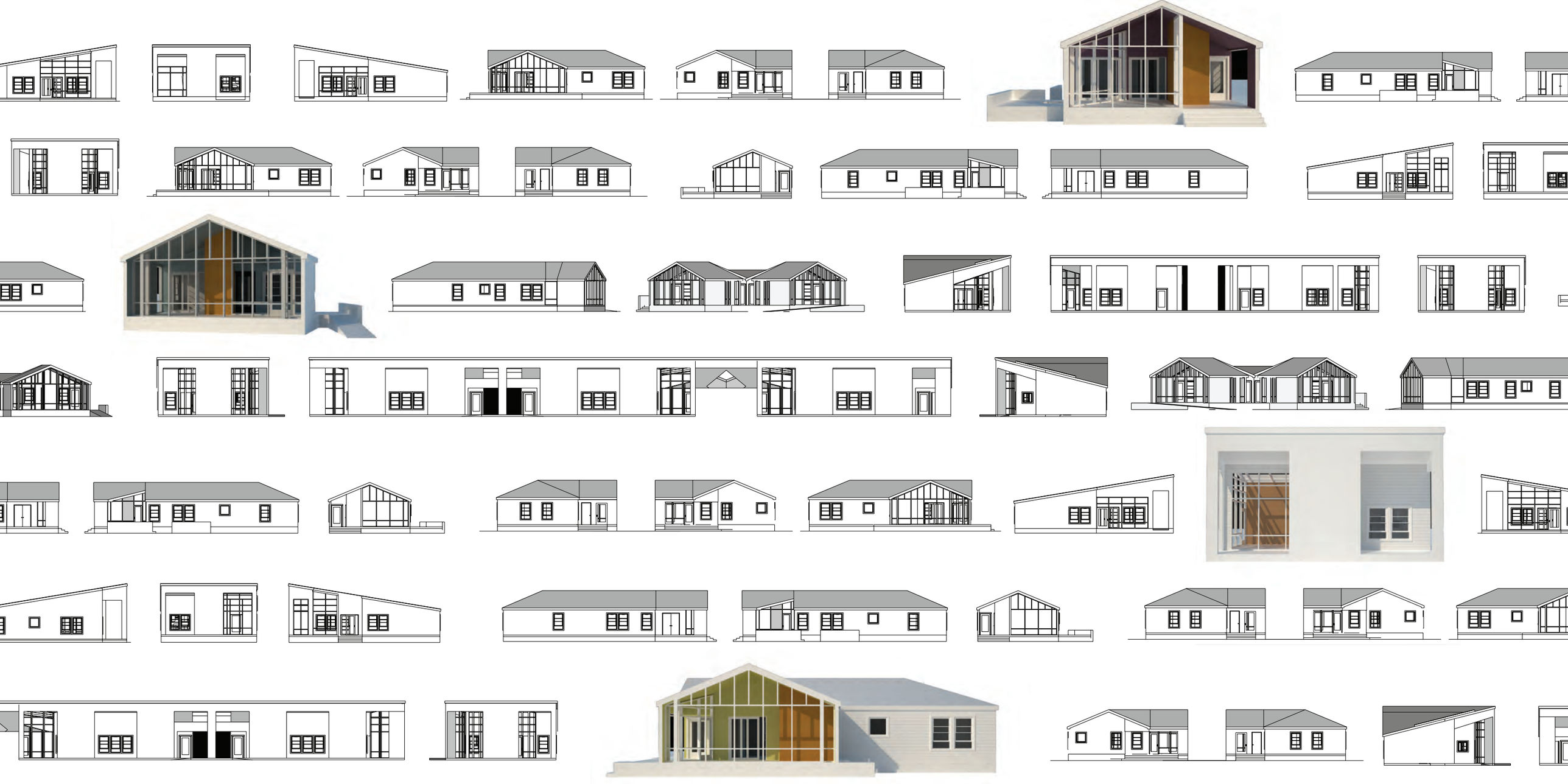
south shared street plaza subwatershed

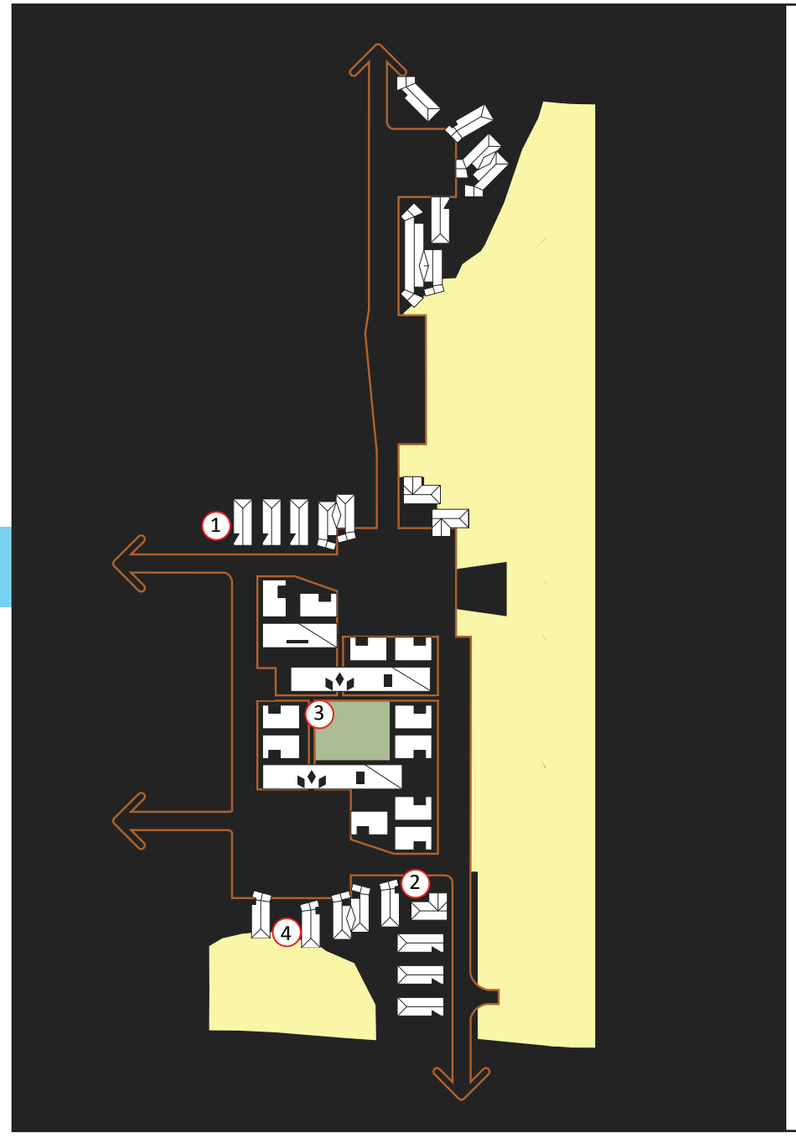


lawn to shared street

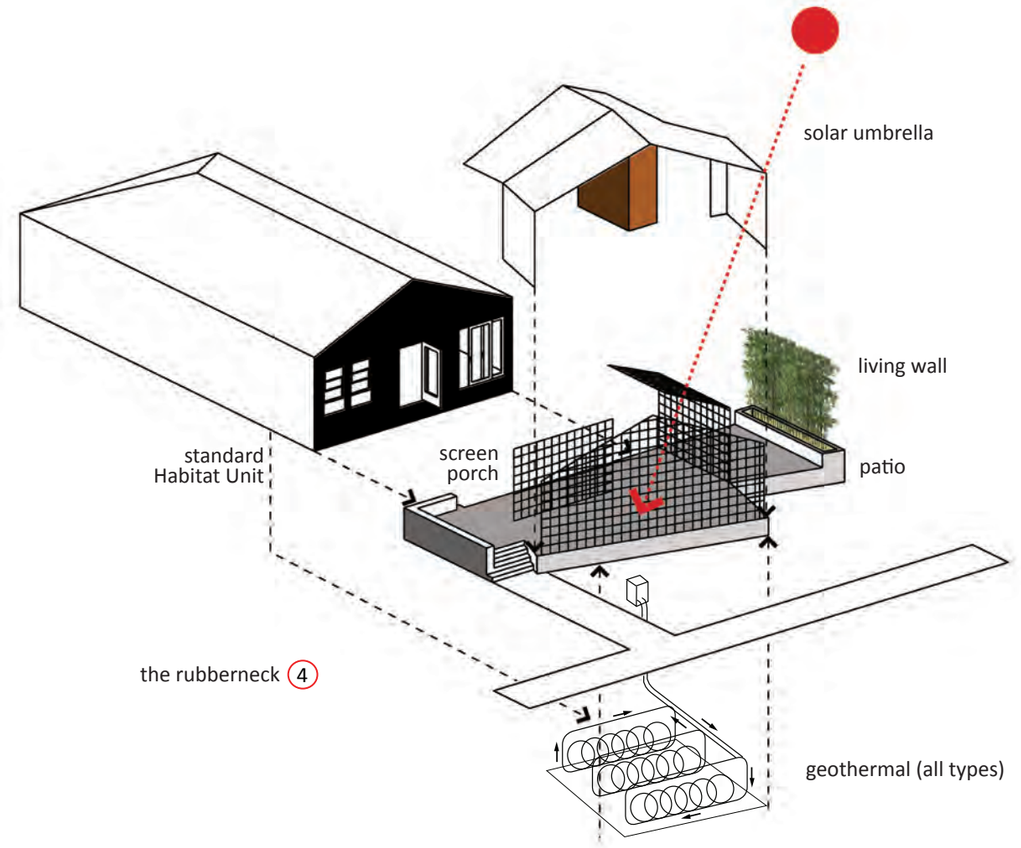


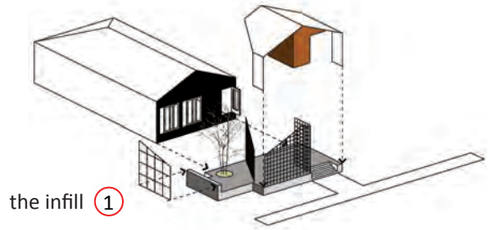
HOUSE PORCH

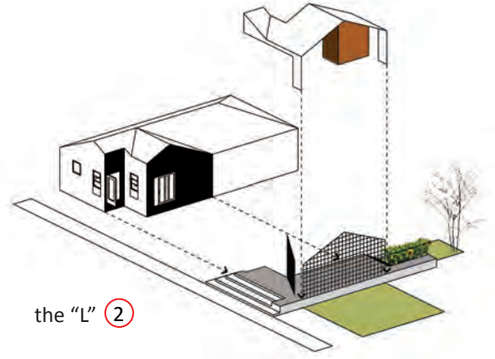


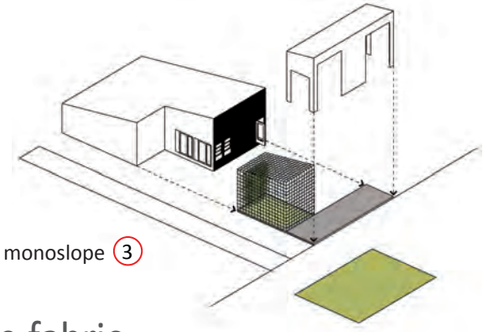


house to porch

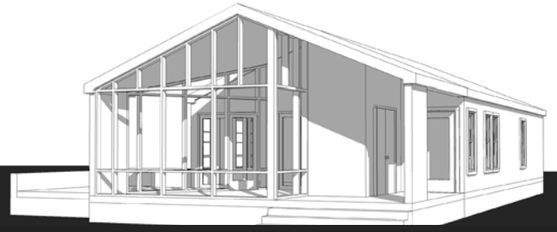


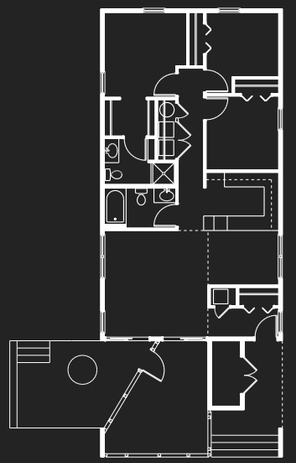






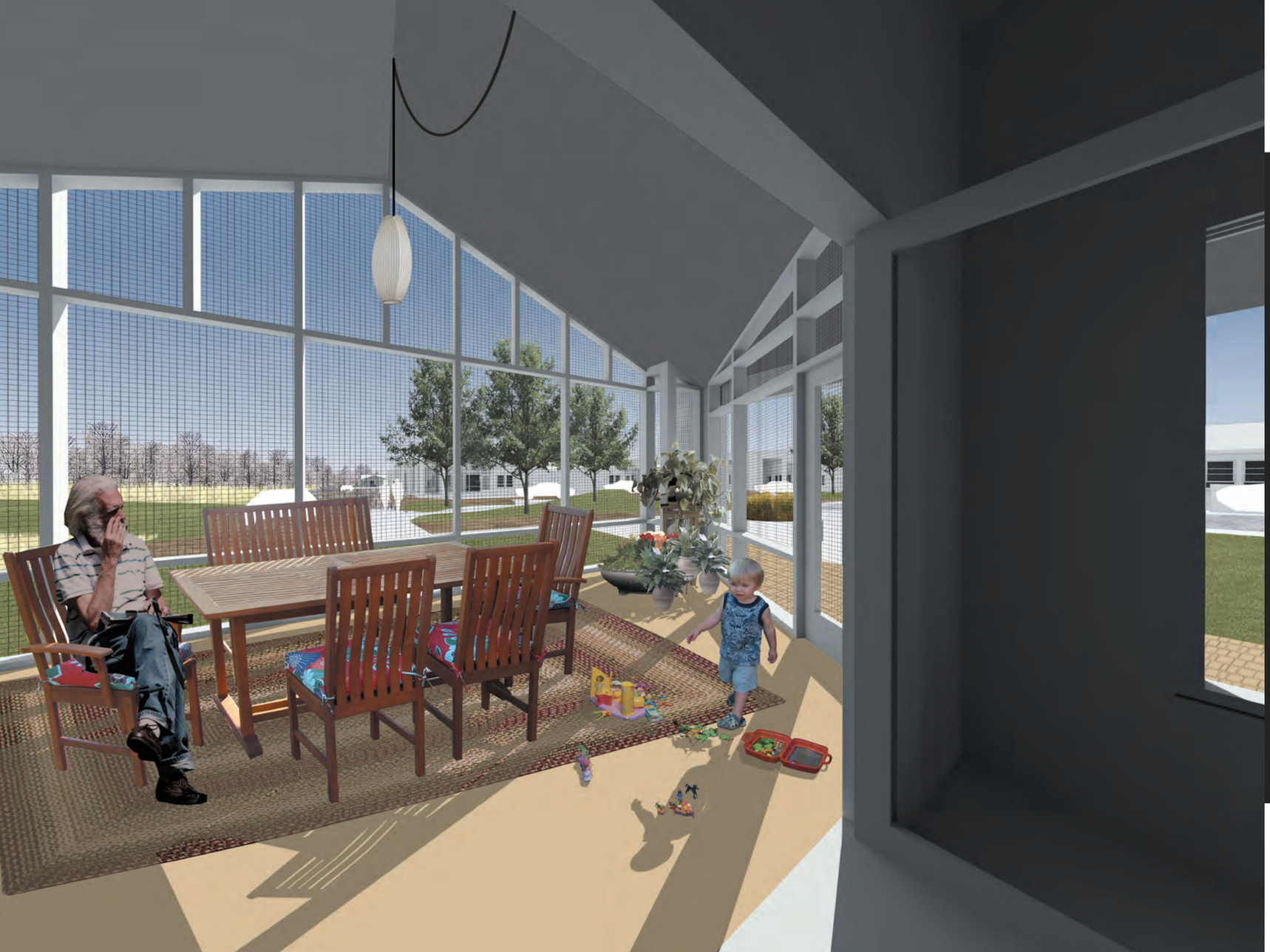
frontage fabric

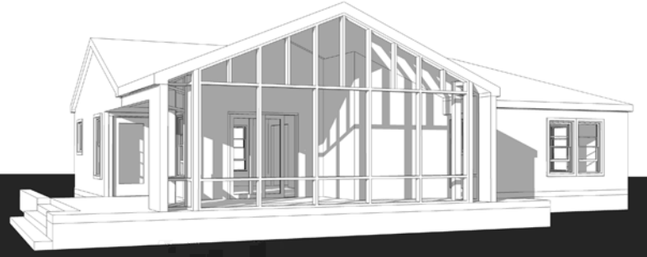


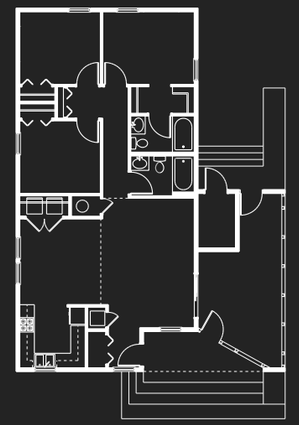


the infill

1150 Square Feet

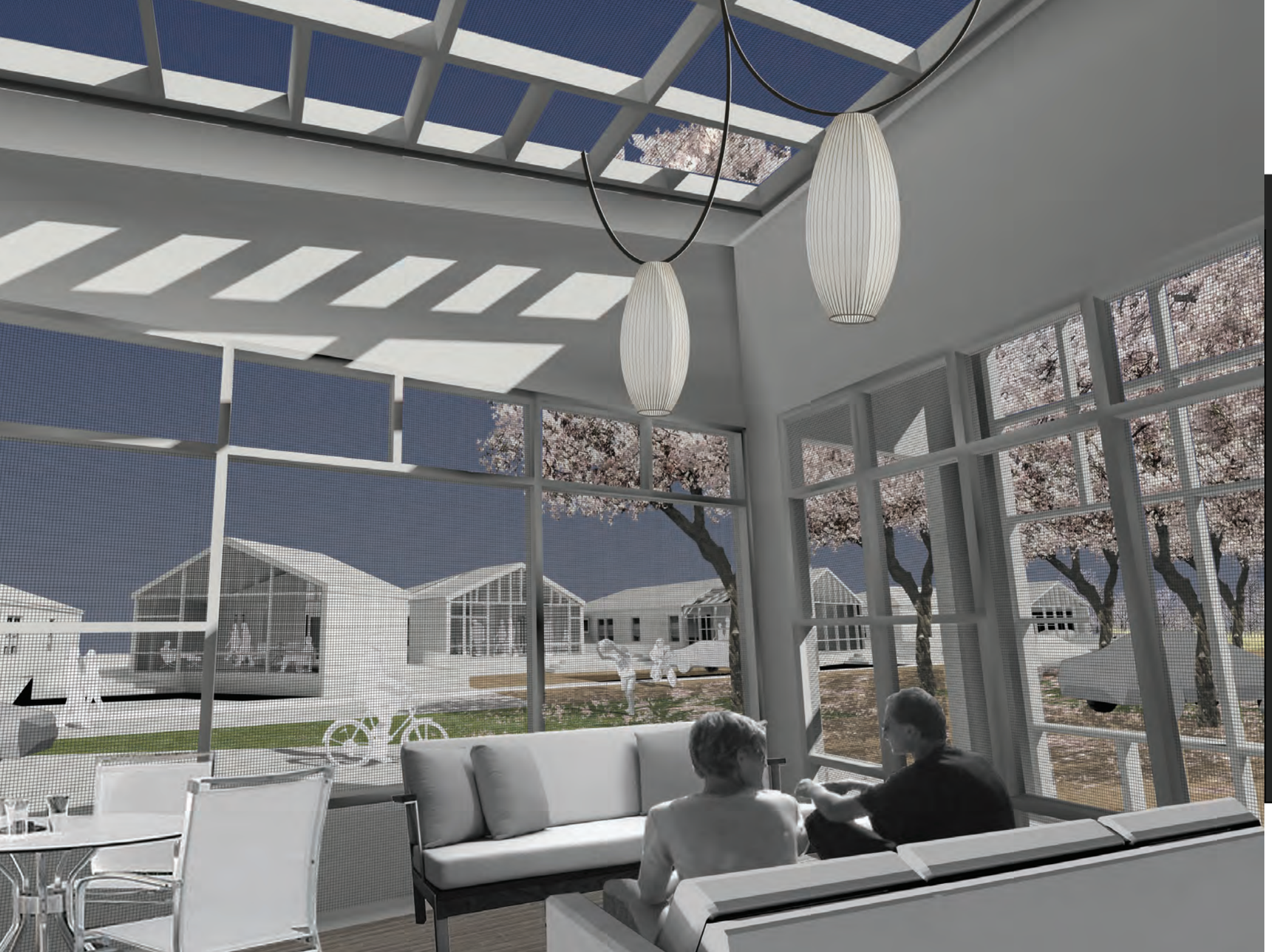


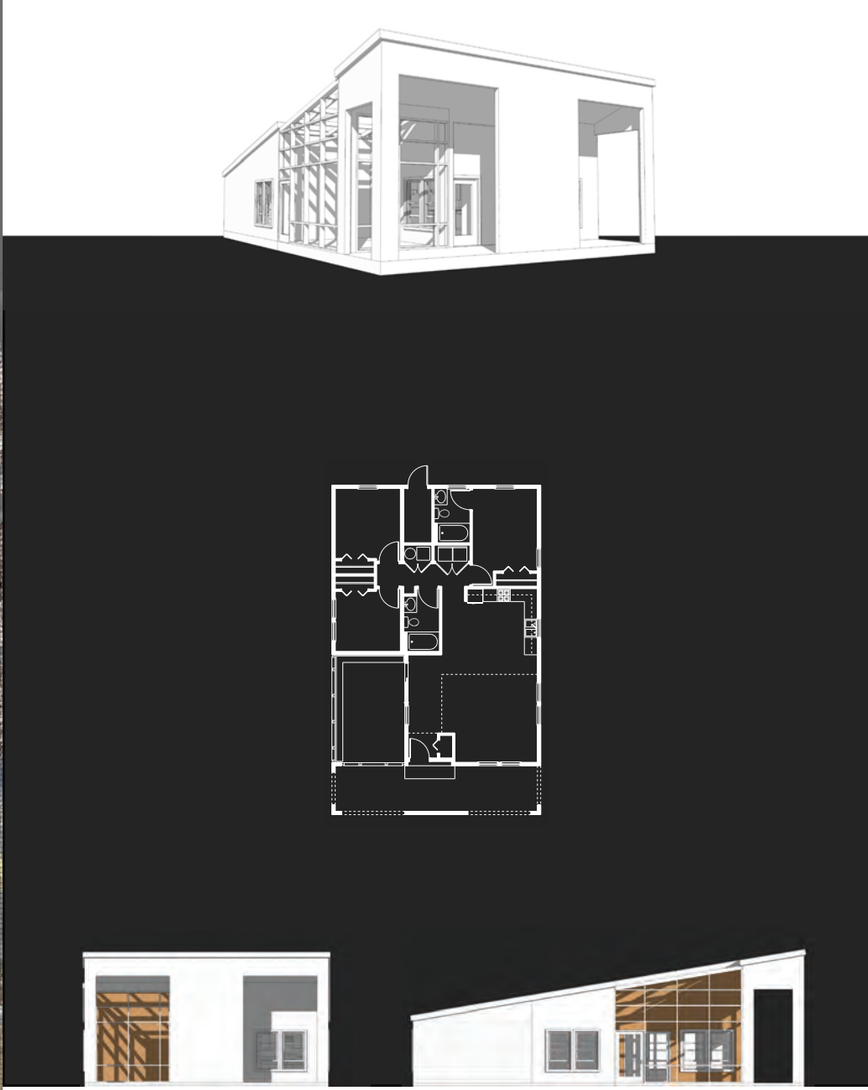




the “L”

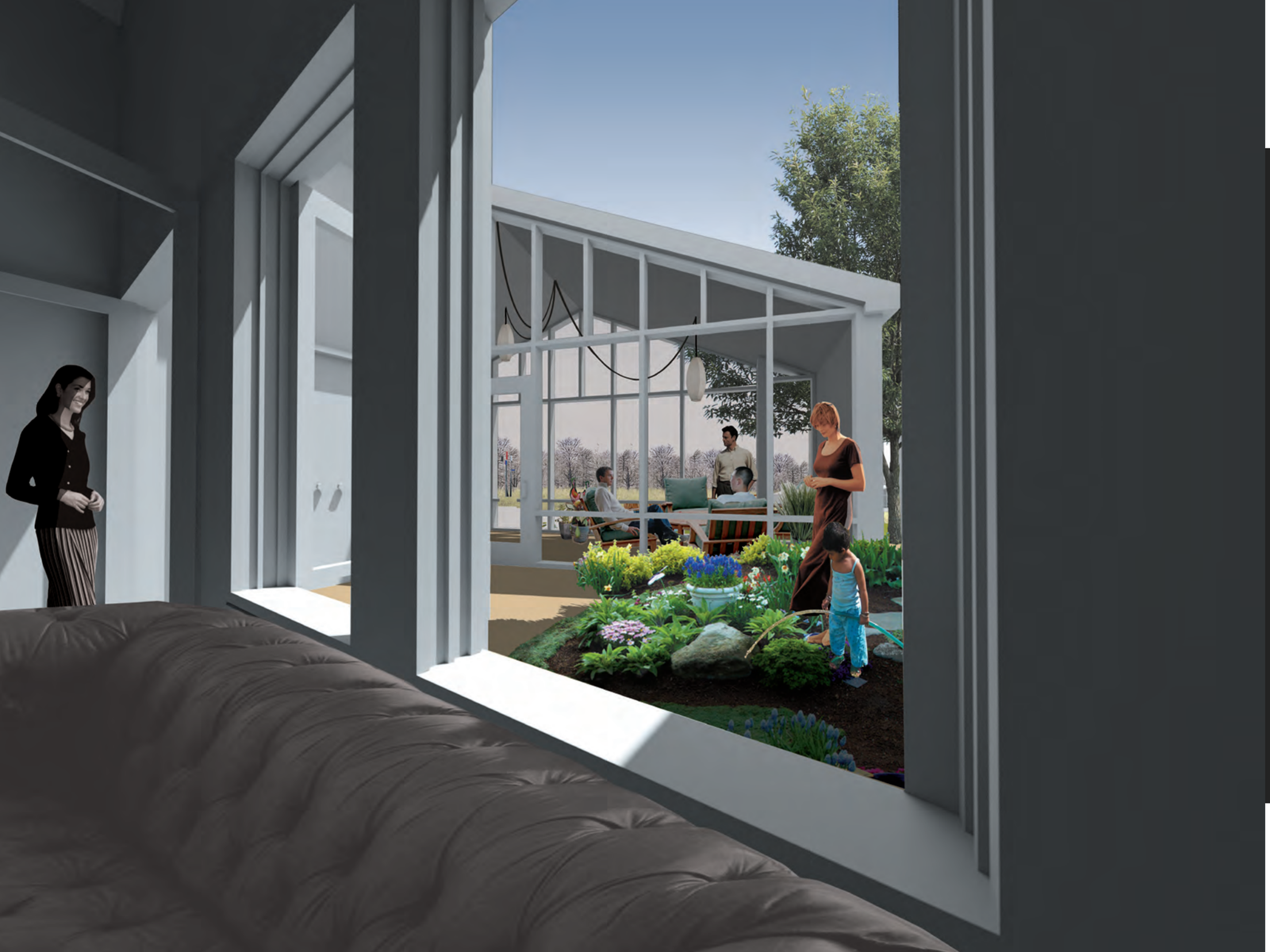
1150 Square Feet

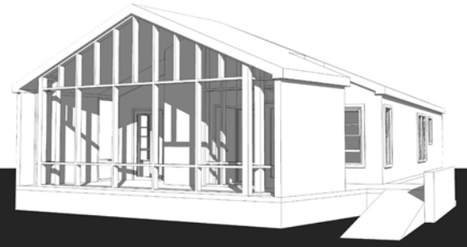


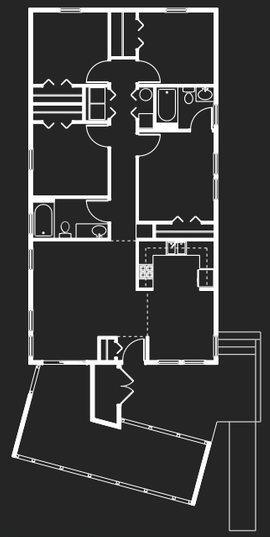


the monoslope

1150 Square Feet







the rubberneck

1250 Square Feet

UACDC UNIVERSITY OF ARKANSAS COMMUNITY DESIGN CENTER

MISSION

The mission of the University of Arkansas Community Design Center is to advance creative development in Arkansas through education, research, and design solutions that enhance the physical environment.

VISION

As an outreach center of the School of Architecture, UACDC is developing a repertoire of new design methodologies applicable to community development issues in Arkansas, with currency at the national level.

UACDC design solutions introduce a multiple bottom line, integrating social and environmental measures into economic development. Our recombinant design solutions add long-term value and offer collateral benefits related to sustained economic capacity, enhanced ecologies, and improved public health—the foundations of creative development.

APPROACH

Expanding the Consideration of Civic Space

The contemporary public domain has shifted to an expanded urban field that includes suburban and other non-urban environments—a geography of sprawl. Compounded by the decline of traditional downtowns, this shift poses new planning challenges for which no adequate civic development models exist.

Our planning approaches are tailored for historic downtowns, rural sites, watersheds, highway/rail infrastructure, the college campus, retail environments, and the office/residential/retail subdivision.

Developing New Models of Design

Through meta-disciplinary research and design principles, UACDC recombines ecological, architectural, landscape architectural, and urban design solutions to address emerging planning challenges. Our research maps the unique economic, political, and cultural processes that have shaped the Arkansas landscape.

Our work addresses new challenges in affordable housing, urban sprawl, environmental planning, and management of regional growth or decline.

Constructing Discourse

Design professionals, educators, and students seeking civic design experience staff the UACDC. We collaborate with other agencies such as the Biological and Agricultural Engineering Department, the Center for Business and Economic Research, the Arkansas Natural Resources Commission, and the Arkansas Forestry Commission. Through work with our clients and collaborators, we initiate learning networks that facilitate creative development.

IMPACT

UACDC was founded in 1995 and has provided design and planning services to over 30 communities across Arkansas. Our planning has helped Arkansas communities to secure nearly $64 million in grant funding to enact suggested improvements.

PORCHSCAPES

UACDC UNIVERSITY OF ARKANSAS COMMUNITY DESIGN CENTER

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Arkansas Natural Resource Commission
Tony Ramick, Supervisor,
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University of Arkansas Women's Giving Circle

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