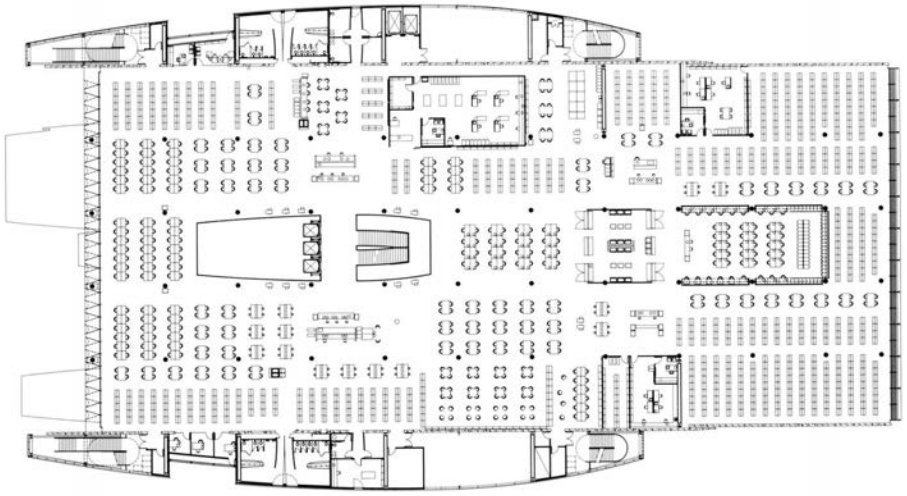
Sustainable Architecture and the Campus Masterplan

UNCC Faculty Council • October 27, 2022

Brook Muller
Dean, College of Arts + Architecture
University of North Carolina at Charlotte



Will Bruder

Burton Barr Central Library, Phoenix, AZ

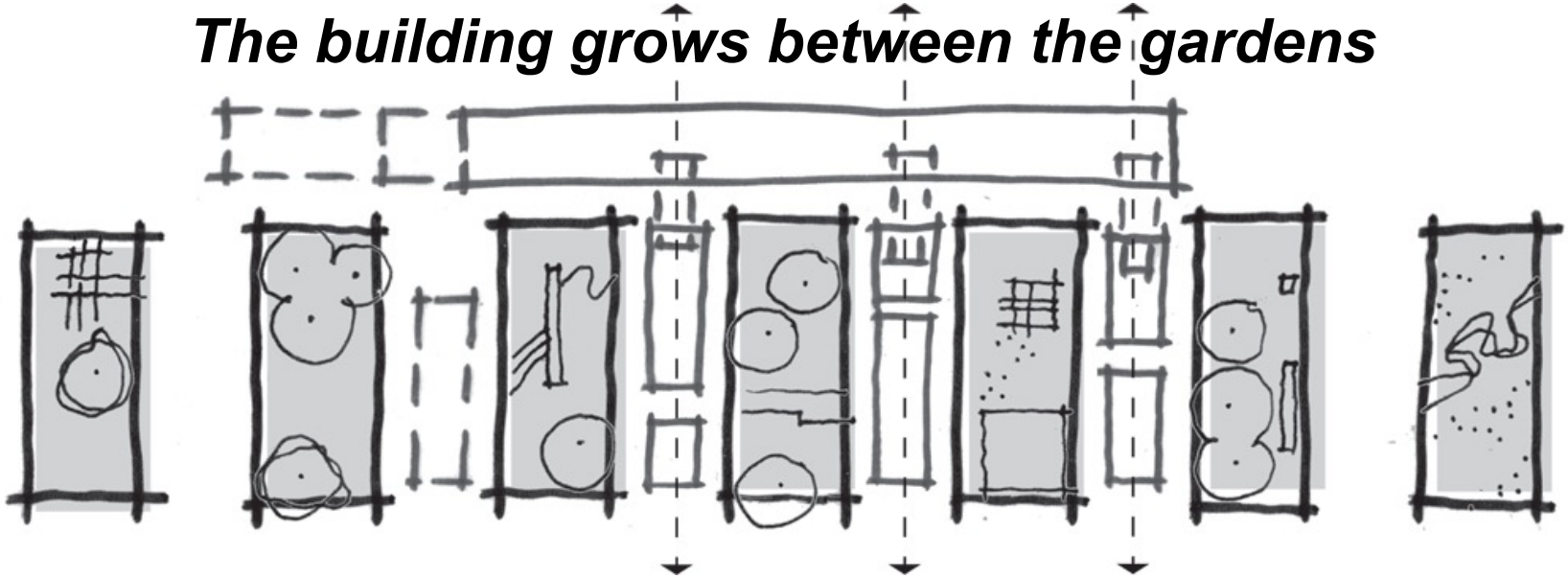
Behnisch & Partner Architects and Michael Singer Art Studio

Dutch Institute for Forestry and Nature Research

European Pilot Project for Environmentally Friendly Building, Wageningen, The Netherlands

Rainwater harvested from roofs
Water stored in cisterns
and used to water plants in atria
Evaporation of plants cools space
There is no AC

The building grows between the gardens



Dutch Institute for Forestry and Nature Research

THE NEW YORK TIMES, THURSDAY, FEBRUARY 17, 2000

CURRENTS

Barbara Flanagan

ARCHITECTURE

Offices So Green, They're Practically Outdoors

Edwin Walvisch

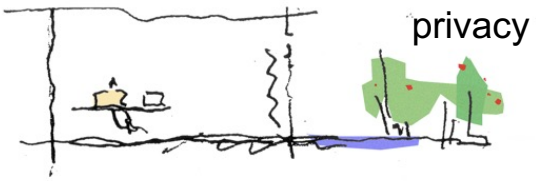
You know the grass has to be greener when a firm of ecologically smart German architects does a sustainable project for professional environmentalists in the Netherlands. Much greener. Behnisch, Behnisch & Partner used off-the-shelf greenhouse parts to build two glass-roofed gardens enclosed by offices for Alterra, Green World Research, in Wageningen.

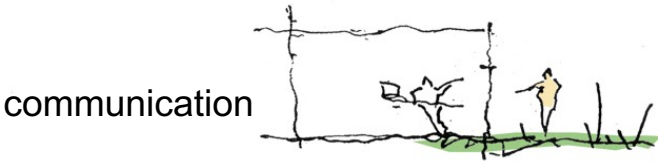
Inside, the sun has been harnessed to heat and light the spaces and to grow verdant plants. But the structure is hardly passive. The building doesn't work unless the workers are as busy as bees, tweaking their microclimates. Because there is no mechanical ventilation (except in the labs), researchers must adjust the temperatures of their separate offices by opening doors and windows onto the hall and gardens. The temperature in the building itself is calibrated by adjusting roof sunscreens and garden doors.

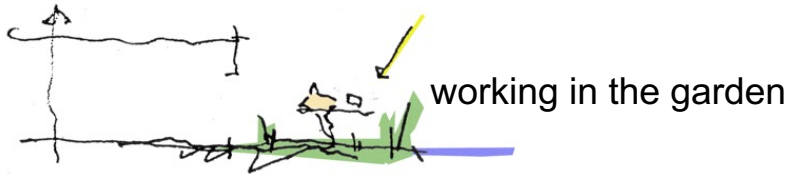
Workers also submit to the radical (and ancient) notion that, whatever they do, the temperature and humidity inside their offices is going to fluctuate. Thus, most workers keep a wardrobe handy, especially sweaters to be grabbed on chilly mornings. Later, when the building has been warmed up by humming computers and sunlight has heated it, it is possible to enjoy semi-alfresco meetings and lunches in the enclosed garden in shirt sleeves year-round.

The project is green on more than the inside. The lumber — short pieces of larch — was grown locally. Roofs are covered with moss for insulation. And rainwater is recycled, some into garden pools, some into the plumbing system as "gray water" for the toilets.

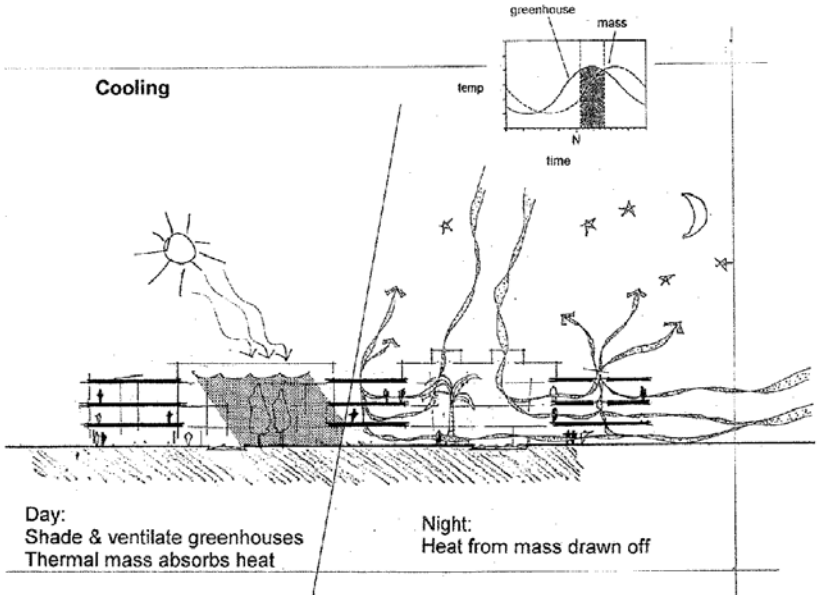
Eco-evangelical as this project may be, the fact that the building plan is shaped like a big "E" is just plain serendipitous.



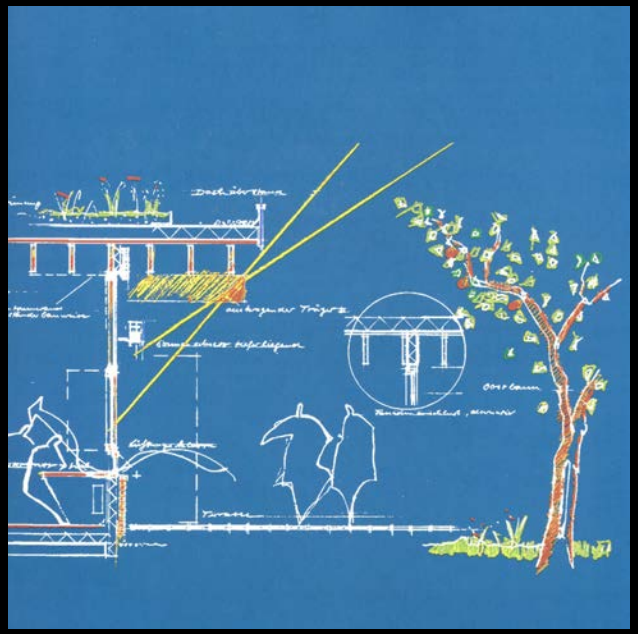




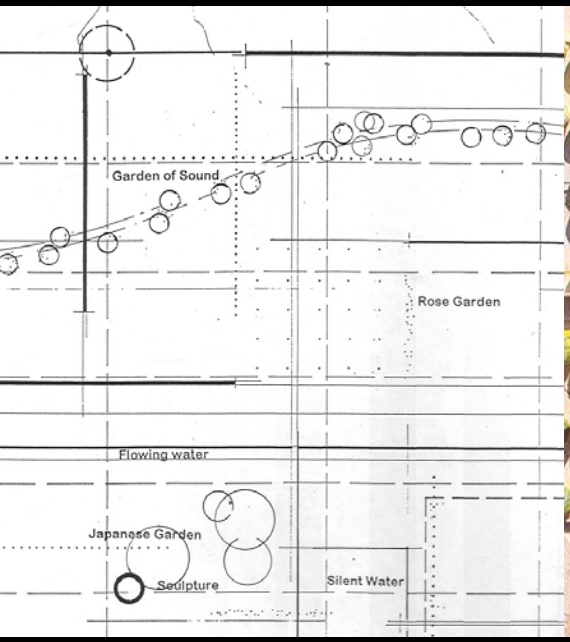
An energy diagram coincides with a sociability diagram

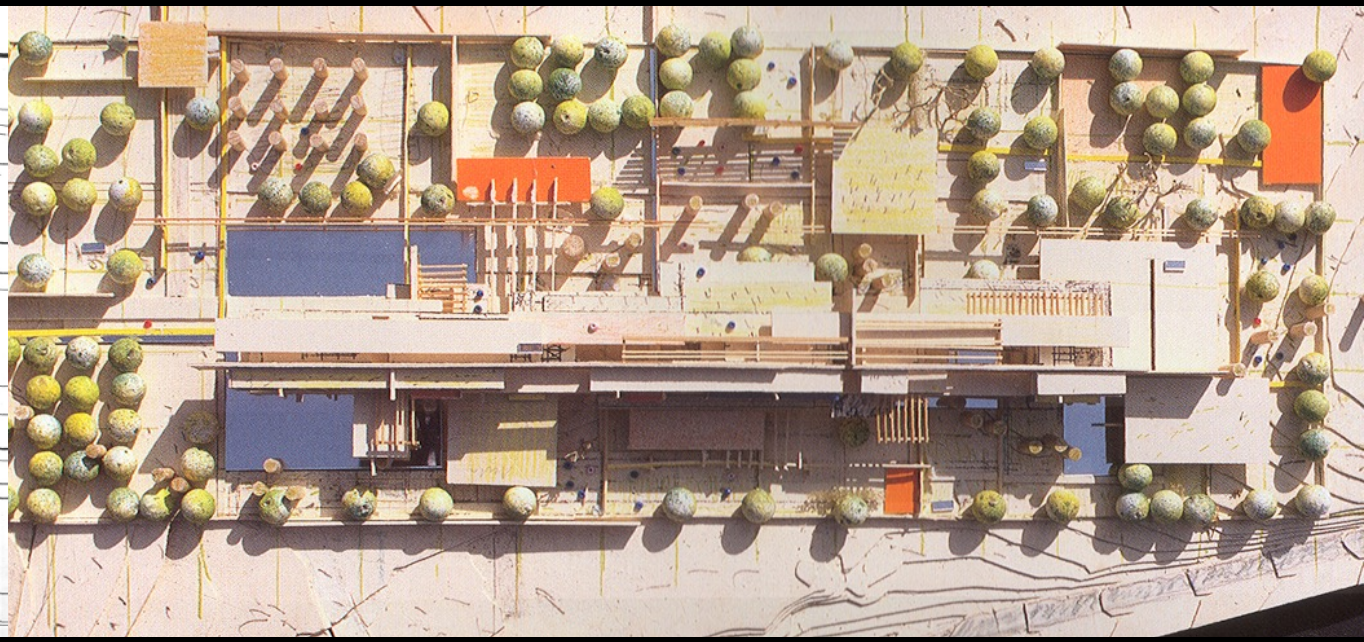


Dutch Institute for Forestry and Nature Research



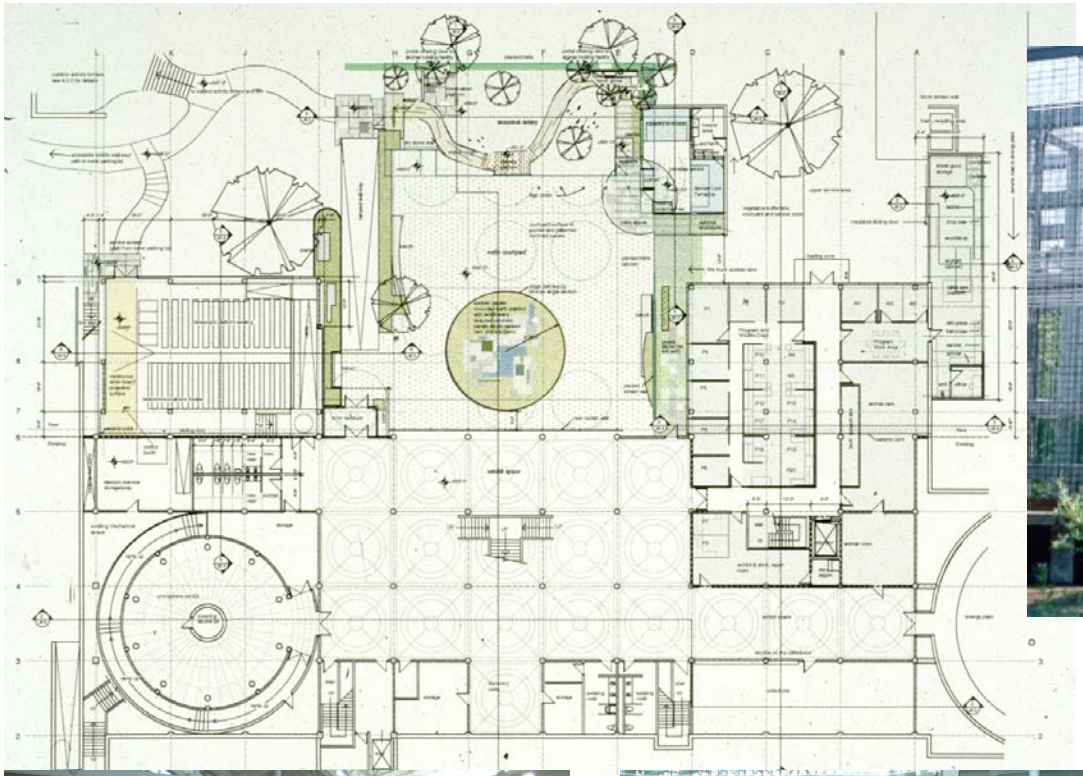
"The Formal Elaboration of the Landscape Should Stand in the Foreground"





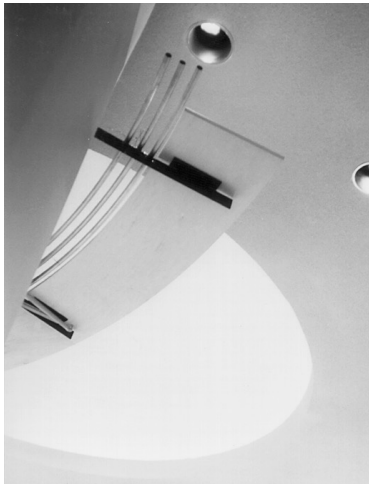
ICP Portugal, 1996

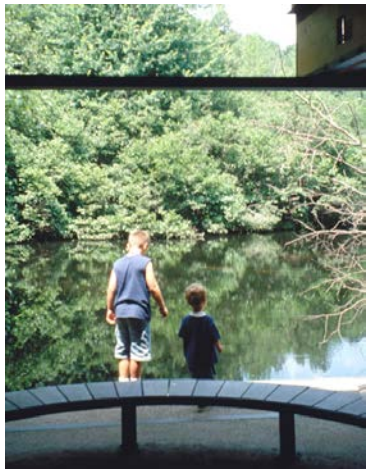
Blackbird Architects and Michael Singer Art Studio
Ecotarium/New England Science Center, Worcester, MA
Master plan and expansion of environmental sciences museum



Ecotarium/New England Science Center

Midcentury modernist architect Edward Durrell Stone's simple building nested within a rock ledge
And yet largely windowless
Design as a process of removal
New 60'x40' façade brings woodland indoors





Hyphae Design Lab ***Keeling Apartments UCSD***

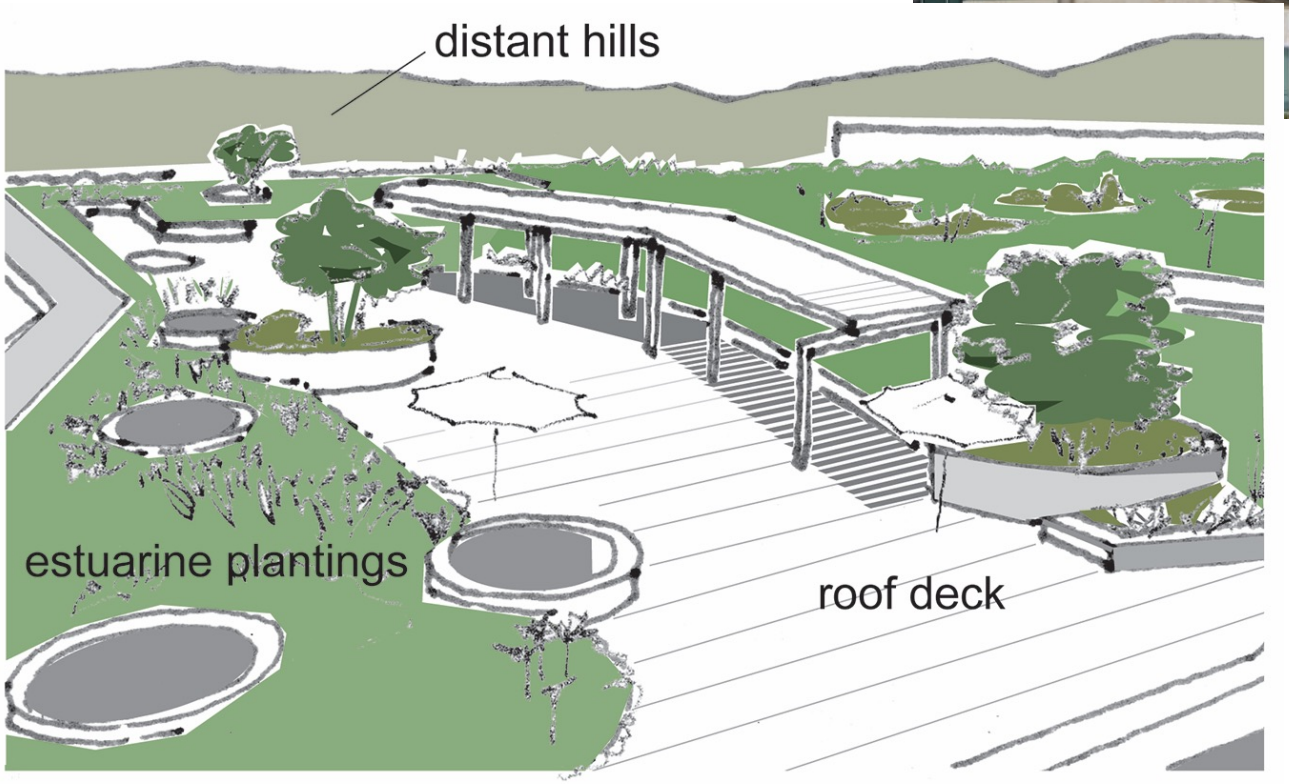
hyphæ design laboratory

DETAIL OF WIER AND WATER CONVEYANCE CHANNEL

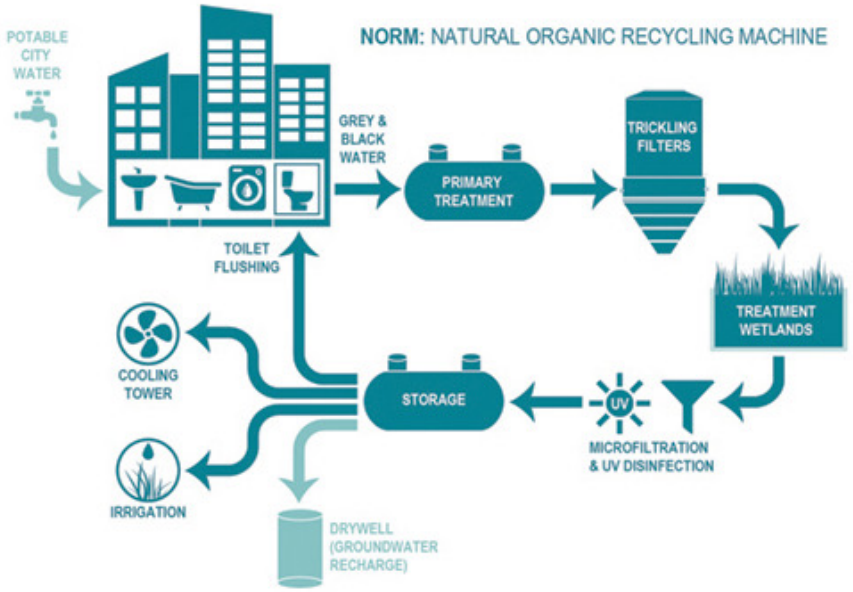
moving dollars from utilities to the landscape

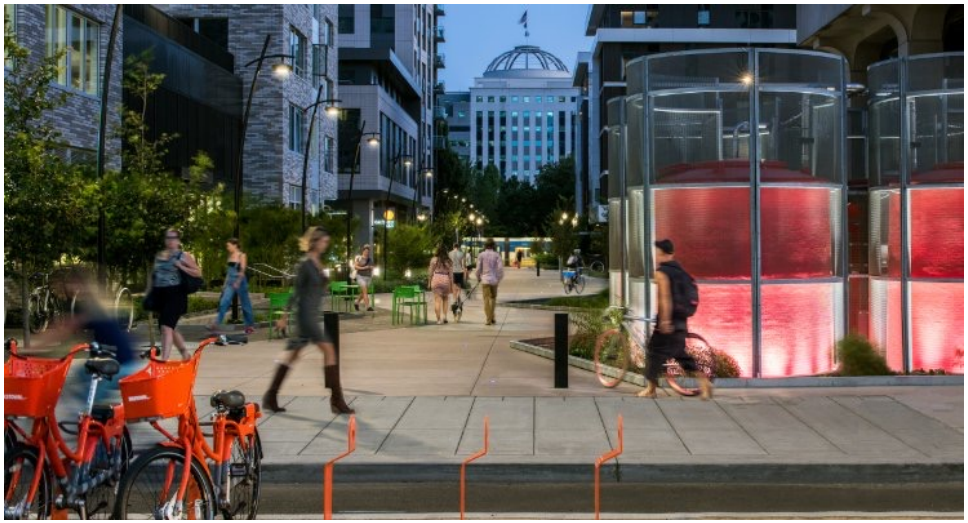
hyphæ design laboratory

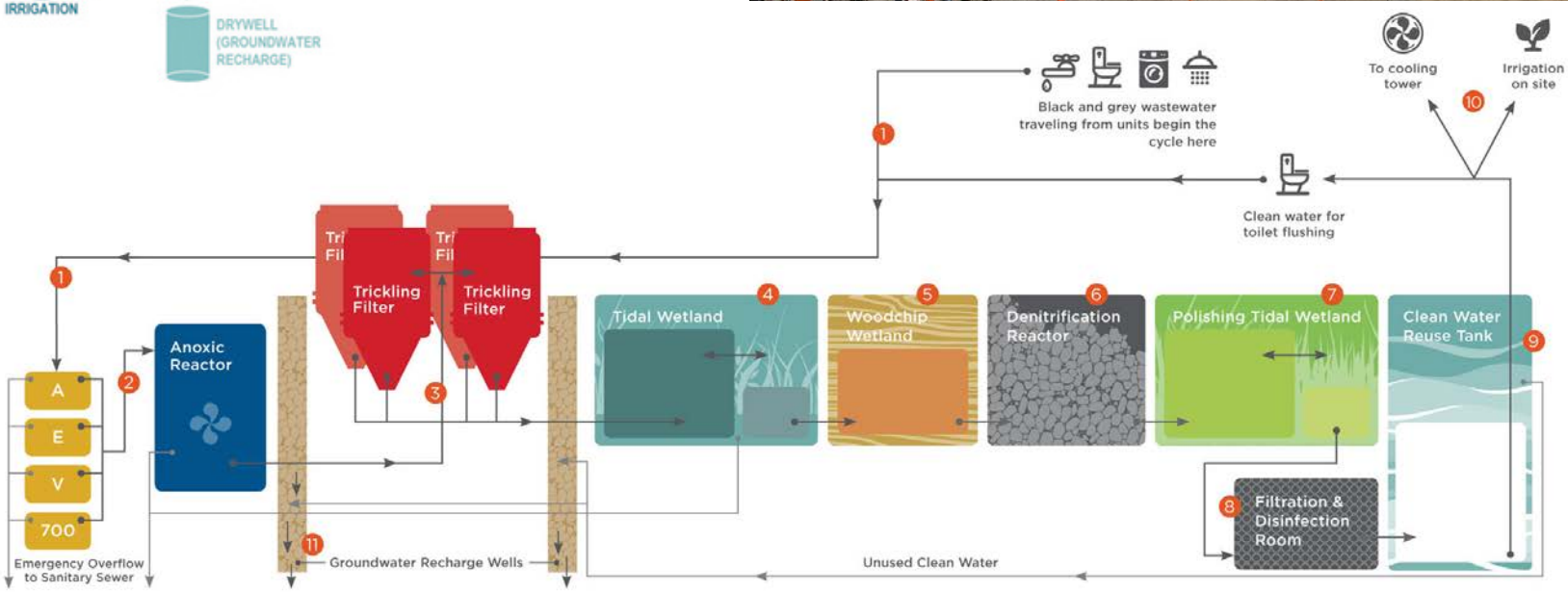
"form follows chemistry"



Palomar Medical Center in Escondido, CA



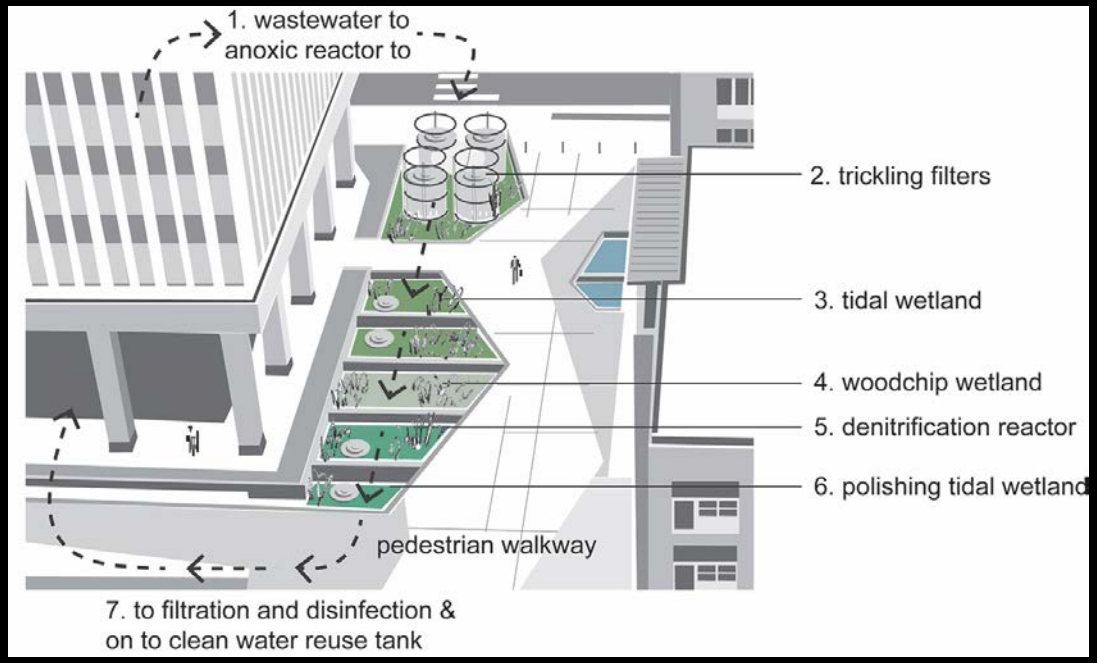




Natural Organic Recycling Machine • Hassalo on Eighth

GBD Architects • Place Landscape Architects

Biohabitats • Puttman Infrastructure


1. wastewater to anoxic reactor to
2. trickling filters
3. tidal wetland
4. woodchip wetland
5. denitrification reactor
6. polishing tidal wetland
pedestrian walkway
7. to filtration and disinfection & on to clean water reuse tank

GO LLOYD

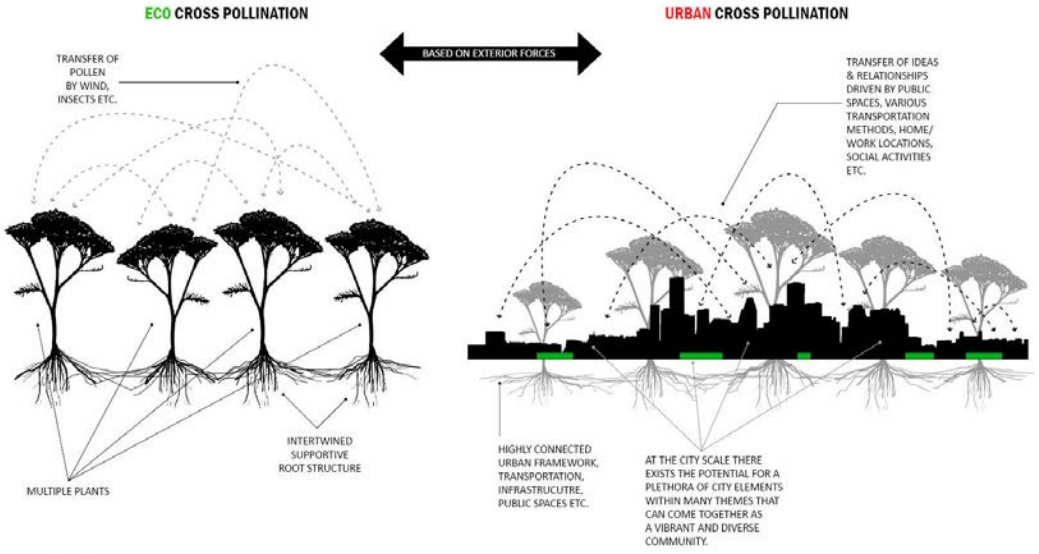
HOME ABOUT EVENTS NEWS STORE

April 4, 2016

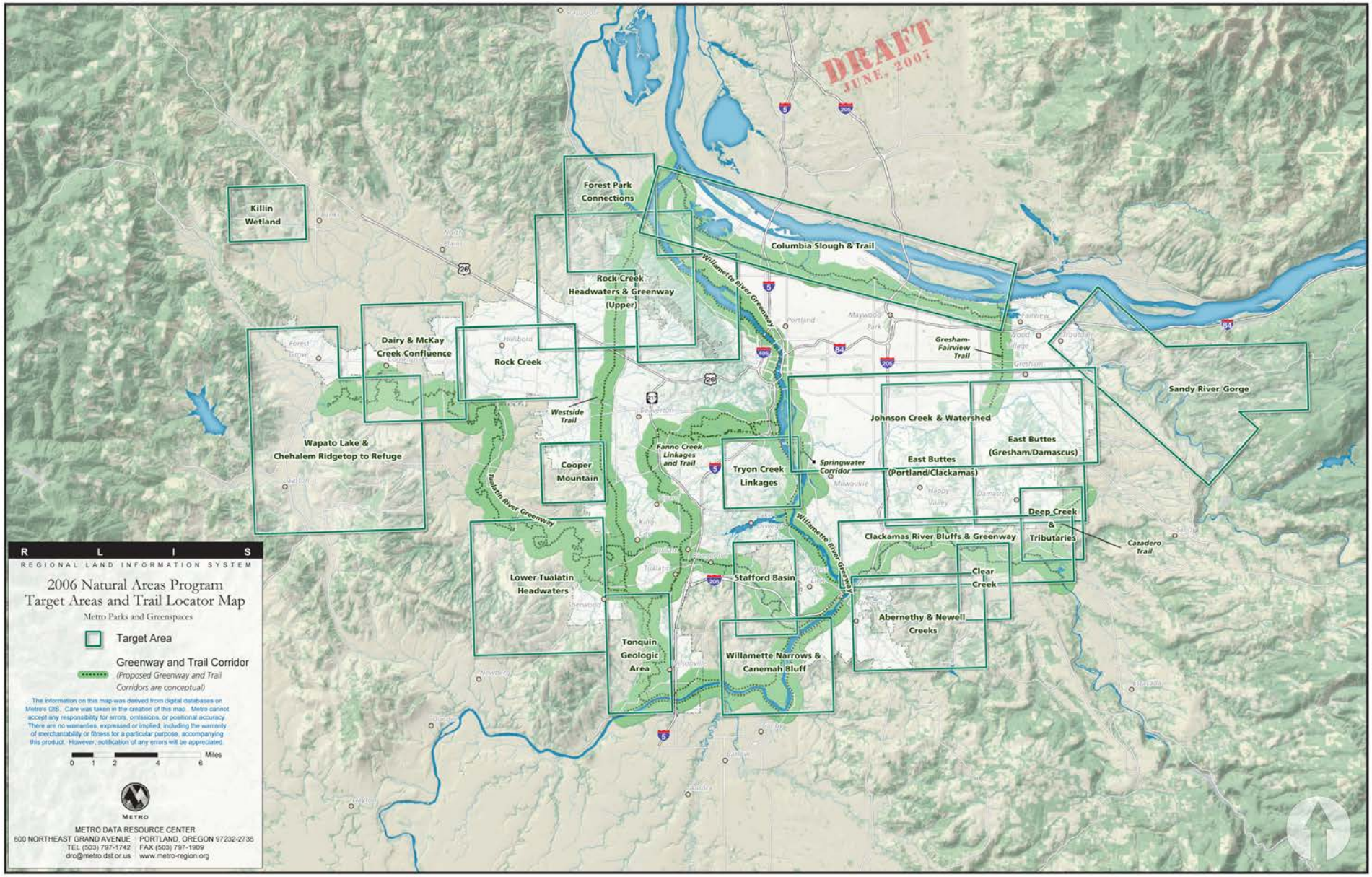
Pollinator Corridor

Green Zebra and American Assets Trust have teamed up with City Repair and the Lloyd EcoDistrict to "adopt" and create a "pollinator corridor" on NE Multnomah St between NE 7th and 9th Ave.

MACRO URBAN POLLINATION



Dusty Gedge
"the green roof guy of London"



Please recycle with mixed paper

"Annual global spending on ecosystem protection (including acquisition) is just over $3 billion (the price of two B-2 bombers)."

- Stephen M. Meyer, "The End of the Wild"

Urban Ecotones

Transitional Spaces for Commerce and Culture

PRESENT | 2025 | 2040

METRO 2010

City growth and development continue along the corridors and centers concept prescribed by the METRO 2040 plan, thus increasing city density and facilitating less energy consumptive transportation patterns. Human lifestyles continue to depend heavily upon cheap, unsustainable fossil fuels. Our green building center is strategically located at the edge of a city regional center for optimal accessibility and future viability.

KEY

Centers
Public Transit
Road Network
Green Building Center
Green Network
Green Project Sites

BIG BOX POWER CENTER 2010

Commercial big box corridors are located along highways and automobile transportation routes, which in turn are located along critical low-land and wetland habitats. Conventional big box parking lots and structures tend to progressively impinge, or destroy these natural corridors.

METRO 2025

The City of Portland Peak Oil Task Force has predicted that the world will most likely experience peak oil production between 2010 and 2020, thereby reducing the feasibility of current transportation systems and industrial methods of farming and manufacturing beyond that time. Resultant fossil fuel shortages will necessitate changes in human ecology toward localized economies based on renewable energy sources. Giant commercial parking lots and big box retail will become obsolete voids along commercial corridors. These voids become the regenerative spaces for new ways of living. Seas of asphalt are transformed into centers of community building, urban agriculture and adaptive reuse.

BIG BOX POWER CENTER 2025

The green building center model uses site specific design strategies, stormwater management and innovative programming to generate synergistic relationships with lowland habitat corridors. These relationships, defined as urban ecotones, effectively enhance rather than degrade natural systems.

METRO 2040

The green building center becomes a design model for successful lifestyle change that is copied throughout Portland. Former commercial strips of asphalt parking become city-scale green corridors, generating new habitats and connectivity for plants, animals and people.

BIG BOX POWER CENTER 2040

As large parking lots become increasingly obsolete due to less automobile usage, adjacent big box developments will begin to sell or convert peripheral land from asphalt surfacing to HCA habitat, sustainable urban agriculture, and mixed use community space.

KEY

Parking Areas
Buildings
Low HCA
Med HCA
High HCA
Wetlands

Connectivity for habitat and people through proposed highway underpass

Production and community garden plots

Habitat access to rooftop vegetation

Vegetated Roof for Habitat, Stormwater and Aesthetics

Rooftop Terrace and Cafe with Views of Wetland Ecosystems

Adaptive parking units respond to future demand

Center for Urban Agriculture offers education and resources on local food production and preparation

2-story Main Building with 5.1 kWh photovoltaic array on roof

Entry and stormwater promenade along building facade

Rooftop Agriculture

Composting Facility requires no inputs of water and energy

Restoration Production Greenhouse and Plots

Multi-use trail connection allows habitat connectivity

Protection and expansion of Core Habitat Areas

Bike Parking and Flex Truck/Van Fleet for Reduced Automobile Use

Stormwater Wetlands offer aesthetic entry feature while treating building and site runoff

Adaptive Parking at HCA / Commercial Ecotone periphery

Vegetated Swales Filter parking lot runoff and provide habitat value

Connectivity to Transit, Bike, and Trail Systems

STORMWATER MANAGEMENT

Simplified Method Summary

TOTAL IMPERVIOUS SITE AREA =	182,485 s.f.
IMPERVIOUS AREA REDUCTION:	
ecoroof/roof garden =	37,729 s.f. reduction
TOTAL TO BE MANAGED =	144,756 s.f
STORMWATER FACILITY MANAGEMENT:	
infiltration planter =	12,750 s.f. (745 s.f. @ 0.6)
flow-through planter =	13,750 s.f. (825 s.f. @ 0.6)
vegetated swale =	43,541 s.f. (5225 s.f. @ 0.12)
vegetated basin =	82,355 s.f. (7415 s.f. @ 0.12)
TOTAL IMPERVIOUS AREA MANAGED =	152,396 s.f.

Stormwater Treatment Trains

A Extensive Ecoroof
B Roof Garden
C Cistern
D Flow-through Planter
E Infiltration Planter
F Vegetated Swale
G Stormwater Ponds
H Permeable Paving
I Wetlands (maintain input flows)

GREEN HOME CENTER PROGRAM

The building design utilizes simplicity of structural form while evolving the big box typology to more sustainable ends. Ground floor spaces are open and adaptable and connected by a central circulation spine. The 2 story core is the only significant climate controlled space and extensive daylighting of interior spaces (proven to increase sales and worker productivity) additionally reduces energy use. A simple recycled steel frame construction maximizes the reuse of materials and adds significant economic savings. The south-facing façade is composed of sustainably harvested wood panels and vegetated green screens, thus reducing solar gain and providing elegant store branding that builds customer recognition for future stores.

SITE 2010 1:200

SITE 2040 1:200

95,000 sf Green Home Center / Greenhouse
4,000 sf Rooftop Cafe / Terrace
36,000 sf Center for Urban Agriculture
4,000 sf Composting Facility
2000 sf Production Greenhouse

350 Auto Spaces
7 Flex Truck/Van Fleet
40 Bicycle Spaces

25,000 sf Garden Center
15,000 sf Community Garden / Plant Production
16,000 sf Composting Operations
16,000 sf Ecoroof Roof Gardens
10,000 sf Site Landscaping

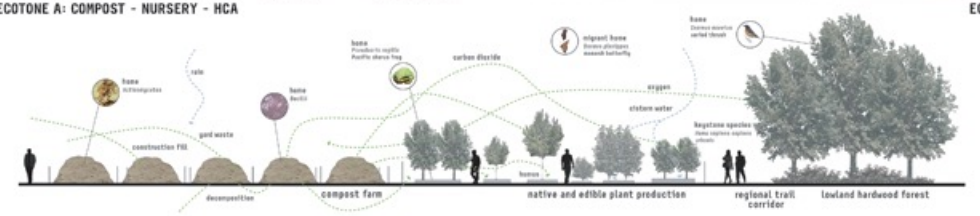
7500 sf Mitigation Area for Multi-use Path
40,000 sf Restoration/Native Plant Areas

BONUSES UTILIZED
15,000 sf density bonus
50 Ft. ht. limit increase
10% parking reduction for connectivity
1/2 bike parking benefit for density
Location of stormwater facilities in HCAs

Site Program 2010 Initial Build-out

2040 Evolution

ECOTONE A: COMPOST - NURSERY - HCA

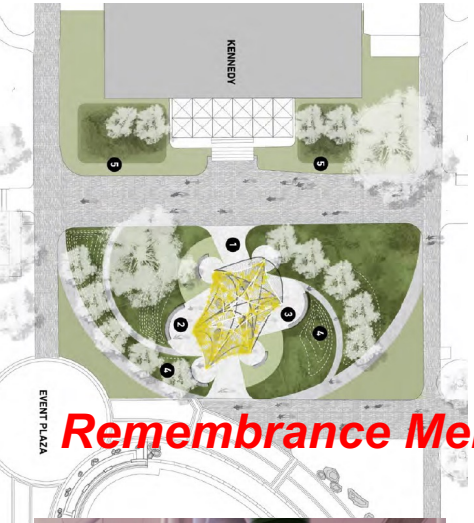


ECOTONE B: HCA - DEMONSTRATION GARDEN - GREENHOUSE

GreenWorks+


Dry Creek Greenway
I-85 Interchange
Barton Creek Greenway
N. Tryon Street
Lake
UNCC
University Research Park
J.C. Harris Boulevard
Dry Creek Greenway
University Executive Park
University Hospital

Placemaking in the Interstitial Spaces
Performative Landscapes

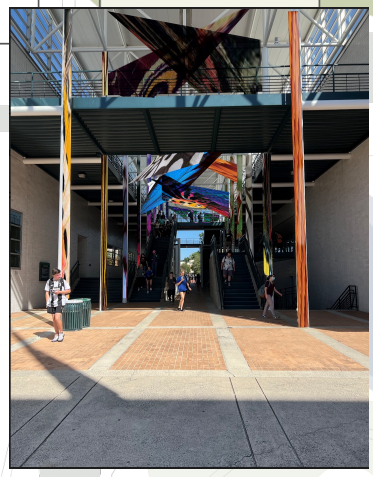


Remembrance Memorial: 10 X 10 and Hypersonic

Storrs West Expansion

Colvard Passage

Arts Quad



Meditation Space

Arts Quad

Hearth for CoAA