



• August 15-18, 2010 • Dallas, Texas •
• Dallas Convention Center •



Water Efficiency & Sustainable Site Design in New Construction

Paul Bassett – Water Savers, LLC



Water Footprint

Human use lots of water for drinking, cooking and washing, but even more for producing things such as food, paper, cotton clothes, etc. The water footprint is an indicator of water use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business.



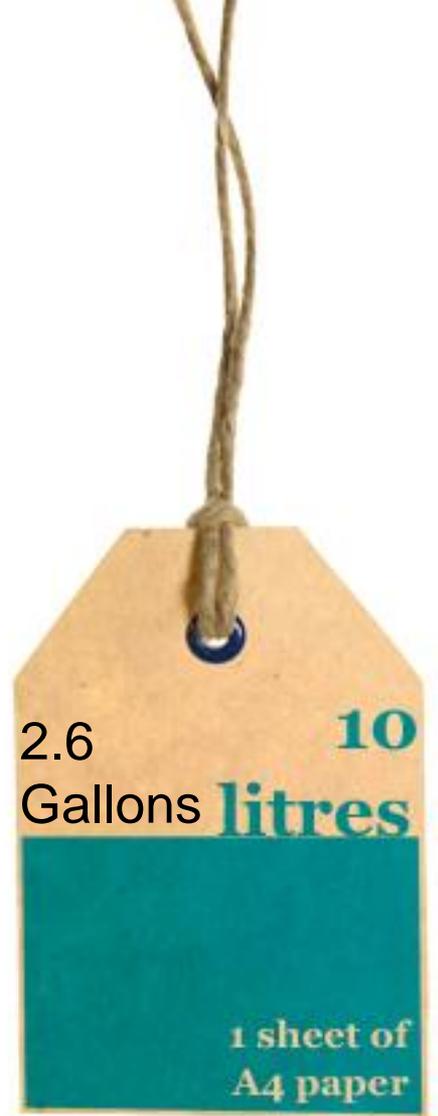
702 **2,700**
Gallons **litres**

1 t-shirt
made of cotton



624 **2,400**
Gallons **litres**

1 hamburger



Roots of Sustainability



The word “sustainability” may be relatively new, but its underlying ethic has deep roots on the North American continent. Native Americans have historically held to the **“seven generations”** rule, meaning that all decisions should take into account the impact on seven generations into the future. Well aware that people have the power to manipulate the world around them, Native Americans use their ceremonies and traditions to help them to maintain respect for life and to remind them that, as one Native American proverb puts it, **“We do not inherit the earth from our ancestors, we borrow it from our children.”**





Leadership in Energy and Environmental Design

A leading-edge system
for certifying the
greenest performing
buildings in the world

LEED® Facts
Building size 12,500 square ft
Type of building
LEED for Core & Shell Development
Certification awarded July 27, 2006

Platinum

Sustainable Sites
Water Efficiency
Energy & Atmosphere
Materials & Resources
Indoor Environmental Quality
Innovation & Design

*Out of a possible 62 points

LEED® Facts
Building size 12,500 square ft
Type of building
LEED for Core & Shell Development
Certification awarded July 27, 2006

Platinum 49*

Sustainable Sites ✓
Water Efficiency ✓
Energy & Atmosphere ✓
Materials & Resources ✓
Indoor Environmental Quality ✓
Innovation & Design ✓

*Out of a possible 62 points

LEED® Facts
Building size 12,500 square ft
Type of building
LEED for Core & Shell Development
Certification awarded July 27, 2006

49*

13/15
5/5
12/15
6/9
10/13

LEED® Facts
Building size 12,500 square ft
Type of building
LEED for Core & Shell Development
Certification awarded July 27, 2006

Platinum 49*

Sustainable Sites 13/15
Water Efficiency 5/5
Energy & Atmosphere 12/15
Materials & Resources 6/9
Indoor Environmental Quality 10/13
Innovation & Design 3/5

*Out of a possible 62 points



LANDSCAPES GIVE BACK

BENEFITS OF SUSTAINABLE SITES

THE SUSTAINABLE SITES INITIATIVE™

ASHRAE 189.1



SAFE & SUSTAINABLE BY THE BOOK



THE AMERICAN
INSTITUTE
OF ARCHITECTS







LIVING BUILDING CHALLENGE™ 2.0

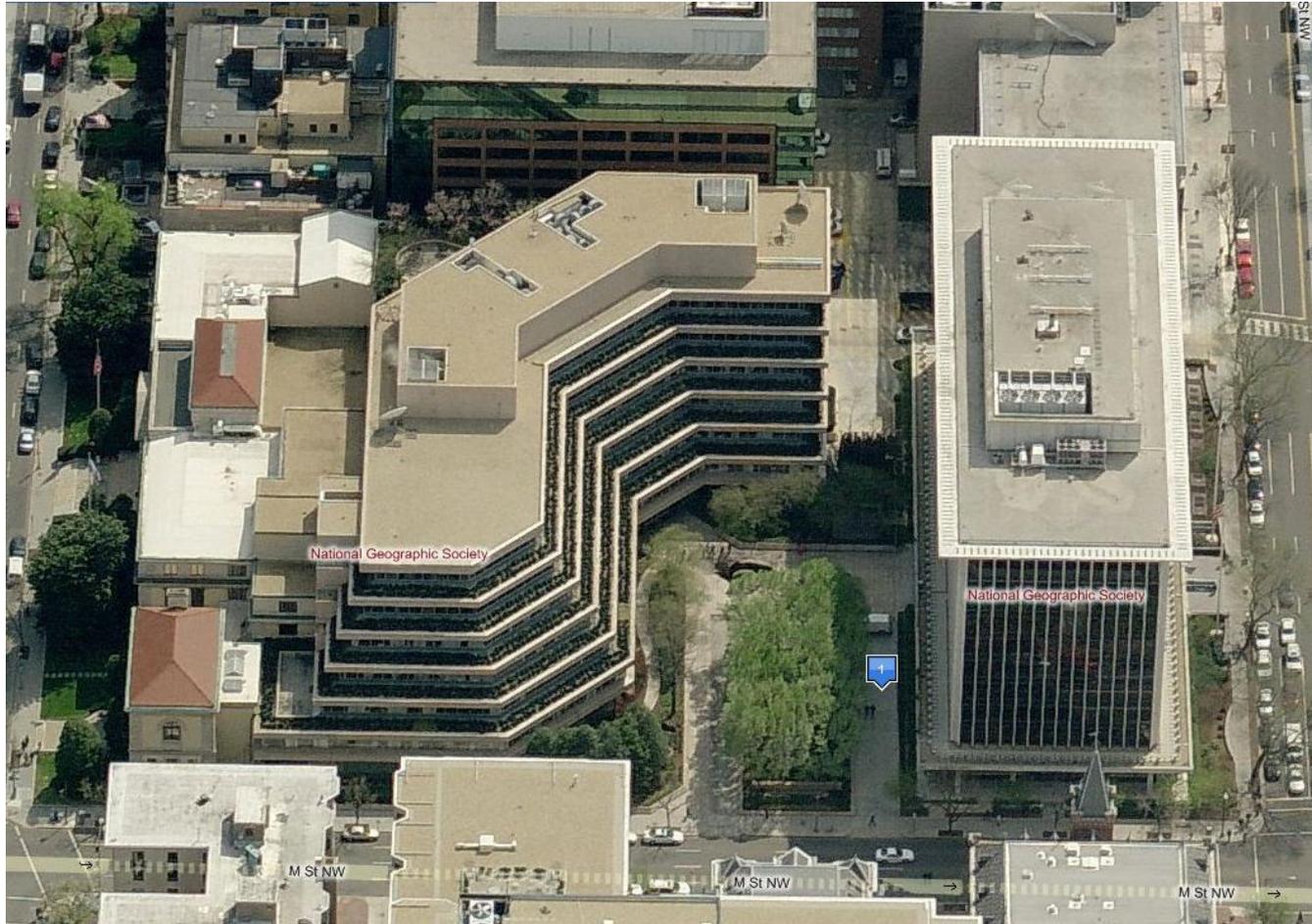
A VISIONARY PATH TO A RESTORATIVE FUTURE

www.ilbi.org



INTERNATIONAL
LIVING BUILDING
INSTITUTE™

1st LEED EB-Pilot



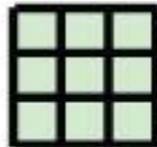
Sustainable Sites (SS)

Yes ? No

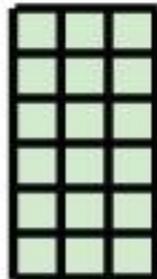
0 0 0

Sustainable Sites

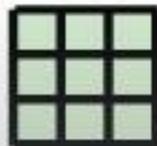
12 Points



Credit 1	LEED Certified Design and Construction	1
Credit 2	Building Exterior and Hardscape Management Plan	1
Credit 3	Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
Credit 4	Alternative Commuting Transportation	4



	10%	1
	25%	1
	50%	1
	75% or greater	1
Credit 5	Reduced Site Disturbance - Protect or Restore Open Space	1
Credit 6	Stormwater Management	1
Credit 7	Heat Island Reduction	2



	Non-Roof	1
	Roof	1
Credit 8	Light Pollution Reduction	1

Yes ? No

0 0 0

Water Efficiency

10 Points



Prereq 1 **Minimum Indoor Plumbing Fixture and Fitting Efficiency** Required



Credit 1	Water Performance Measurement	2
	Whole building metering	1
	Submetering	1
Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	3



	10%	1
--	-----	---

Water Efficiency (WE)

Yes ? No

0 0 0

Water Efficiency

10 Points

Y

Prereq 1 **Minimum Indoor Plumbing Fixture and Fitting Efficiency** Required

Credit 1 **Water Performance Measurement** 2

Whole building metering 1

Submetering 1

Credit 2 **Additional Indoor Plumbing Fixture and Fitting Efficiency** 3

10% 1

20% 1

30% 1

Credit 3 **Water Efficient Landscaping** 3

Reduce Potable Water Use by 50% 1

Reduce Potable Water Use by 75% 1

Reduce Potable Water Use by 100% 1

Credit 4 **Cooling Tower Water Management** 2

Chemical Management 1

Non-Potable Water Source Use 1

Yes ? No

0 0 0

Energy & Atmosphere

30 Points

Y

Prereq 1 **Energy Efficiency Best Management Practices - Planning, Documentation, and Opportunity Assessment** Required

Y

Prereq 2 **Minimum Energy Efficiency Performance** Required

Y

Prereq 3 **Refrigerant Management - Ozone-Protection** Required

--	--	--

Credit 1 **Optimize Energy Efficiency Performance** 15

Blue is the New Green Storm Water Management

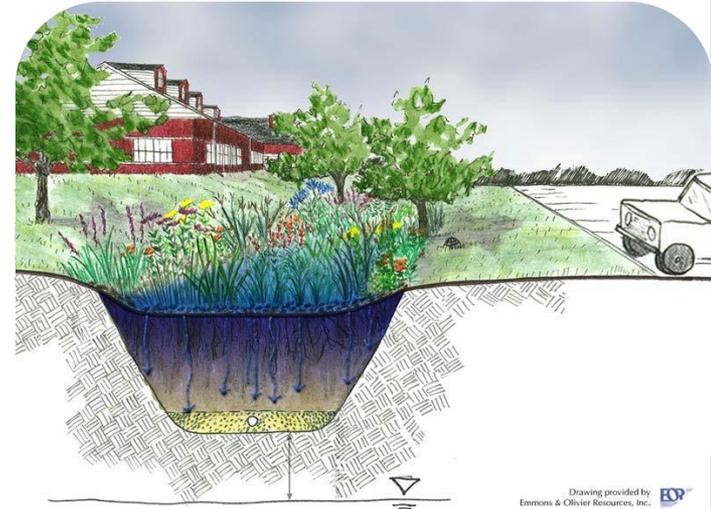


Green Roofs

A green roof is a roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane. Benefits of a green roof include: reducing heating and cooling loads on a building, increases the roof life span, reduce stormwater runoff, and filter pollutants. A concentration of green roofs in an urban area can reduce the city's average temperature during the summer months.

Rain Gardens

A rain garden is a garden which takes advantage of rainfall and stormwater runoff in its design and plant selection. Usually, it is a small garden which is designed to withstand the extremes of moisture and concentrations of nutrients, particularly Nitrogen and Phosphorus that are found in stormwater runoff. Rain gardens are sited ideally close to the source of the runoff and serve to slow the stormwater as it travels downhill, giving the stormwater more time to infiltrate and less opportunity to gain momentum and erosive power.



Drawing provided by
Emmons & Olivier Resources, Inc. 

Permeable Paving Systems

Permeable paving is a range of materials and techniques for paving roads, parking lots and walkways that allow the movement of water and air around the paving material. Whether porous asphalt, concrete, paving stones or bricks, all these pervious materials allow precipitation to percolate through areas that would traditionally be impervious and instead infiltrates the stormwater through to the soil below.

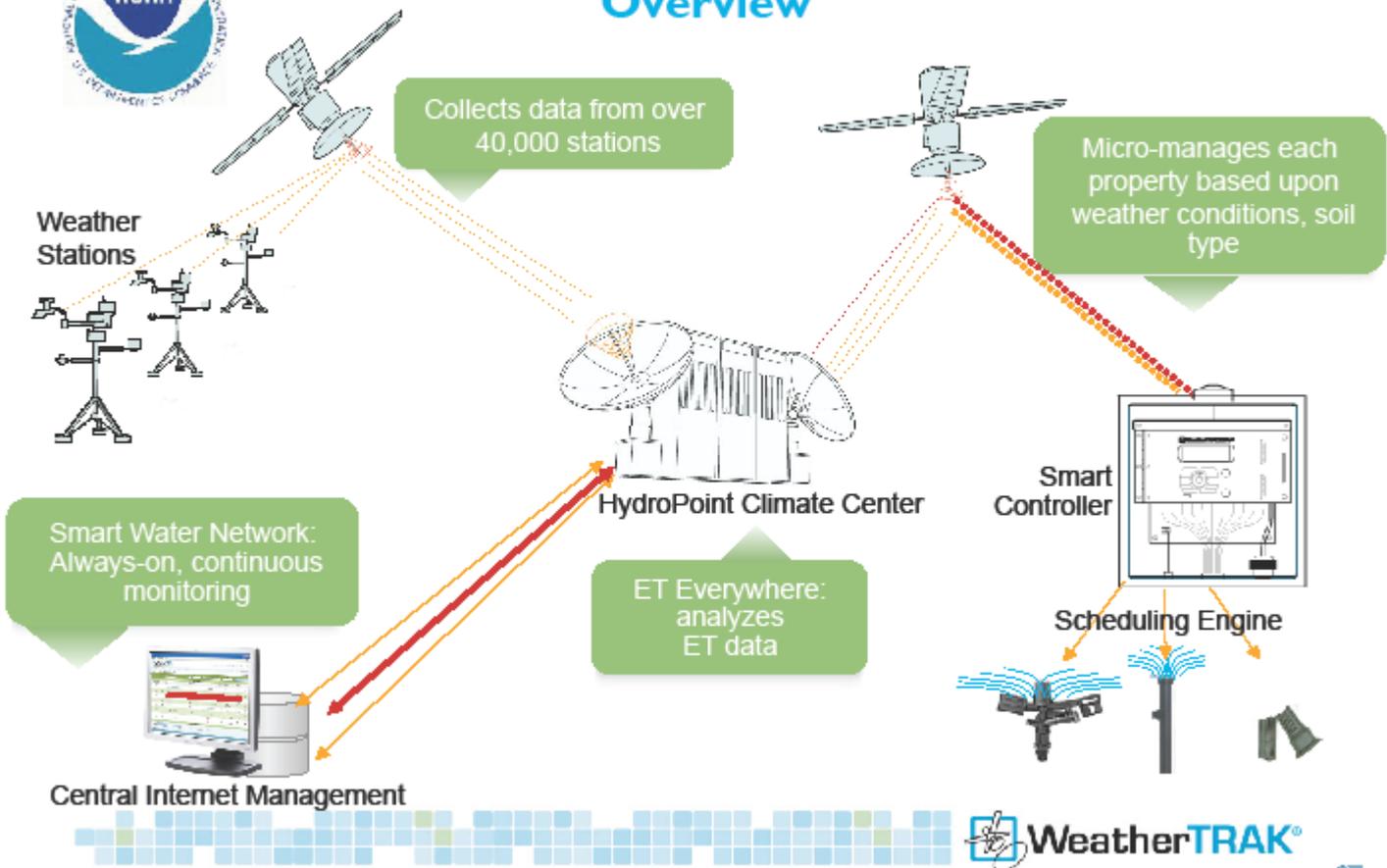


Smart Irrigation Controllers





Overview



Central Internet Management

WeatherTRAK®



Low Application Sprinklers



Subsurface Drip Tubing



THE SUSTAINABLE SITES INITIATIVE™



An Overview

Summer 2010



THE SUSTAINABLE SITES INITIATIVE™

An interdisciplinary effort to create voluntary national guidelines and a rating system for sustainable land design, construction and maintenance practices for landscapes of all types, with or without buildings



AMERICAN SOCIETY OF
LANDSCAPE ARCHITECTS

*ASLA Library & Education
Advocacy Fund*

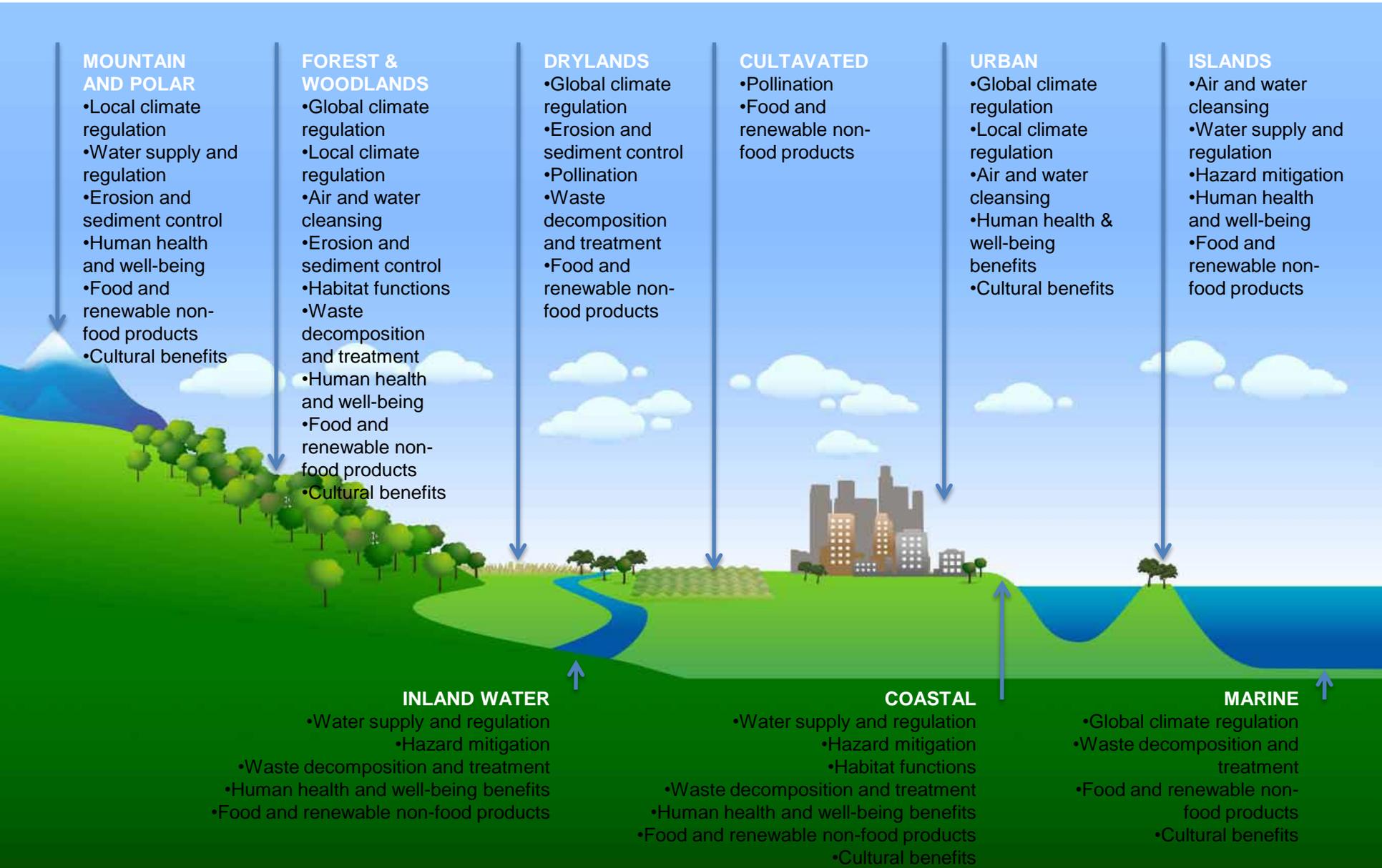


Lady Bird Johnson
Wildflower center
THE UNIVERSITY OF TEXAS AT AUSTIN



UNITED STATES
BOTANIC GARDEN

The Bounty of Ecosystems



Guiding Principles of a Sustainable Site

Do no harm

Make no changes to the site that will degrade the surrounding environment. Promote projects on sites where previous disturbance or development presents an opportunity to regenerate ecosystem services through sustainable design.

Precautionary principle

Be cautious in making decisions that could create risk to human and environmental health. Some actions can cause irreversible damage. Examine a full range of alternatives—including no action—and be open to contributions from all affected parties.

Design with nature and culture

Create and implement designs that are responsive to economic, environmental, and cultural conditions with respect to the local, regional, and global context.

Provide regenerative systems as intergenerational equity

Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.

Support a living process

Continuously re-evaluate assumptions and values and adapt to demographic and environmental Change.

Use a systems thinking approach

Understand and value the relationships in an ecosystem and use an approach that reflects and sustains ecosystem services; re-establish the integral and essential relationship between natural processes and human activity.

Use a collaborative and ethical approach

Encourage direct and open communication among colleagues, clients, manufacturers, and users to link long-term sustainability with ethical responsibility.

Maintain integrity in leadership and research

Implement transparent and participatory leadership, develop research with technical rigor, and communicate new findings in a clear, consistent, and timely manner.

Foster environmental stewardship

In all aspects of land development and management, foster an ethic of environmental stewardship—an understanding that responsible management of healthy ecosystems improves the quality of life for present and future generations.

Sustainable Development

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Brundtland Report,
Our Common Future (1987)



Framework

- Regulate global and local climate

- Detoxify and cleanse air, soil and water

- Regulate water supply

- Control erosion and retain sediment

- Provide refuge and nursery habitat/ pollination services

- Decompose, treat, and re-use waste

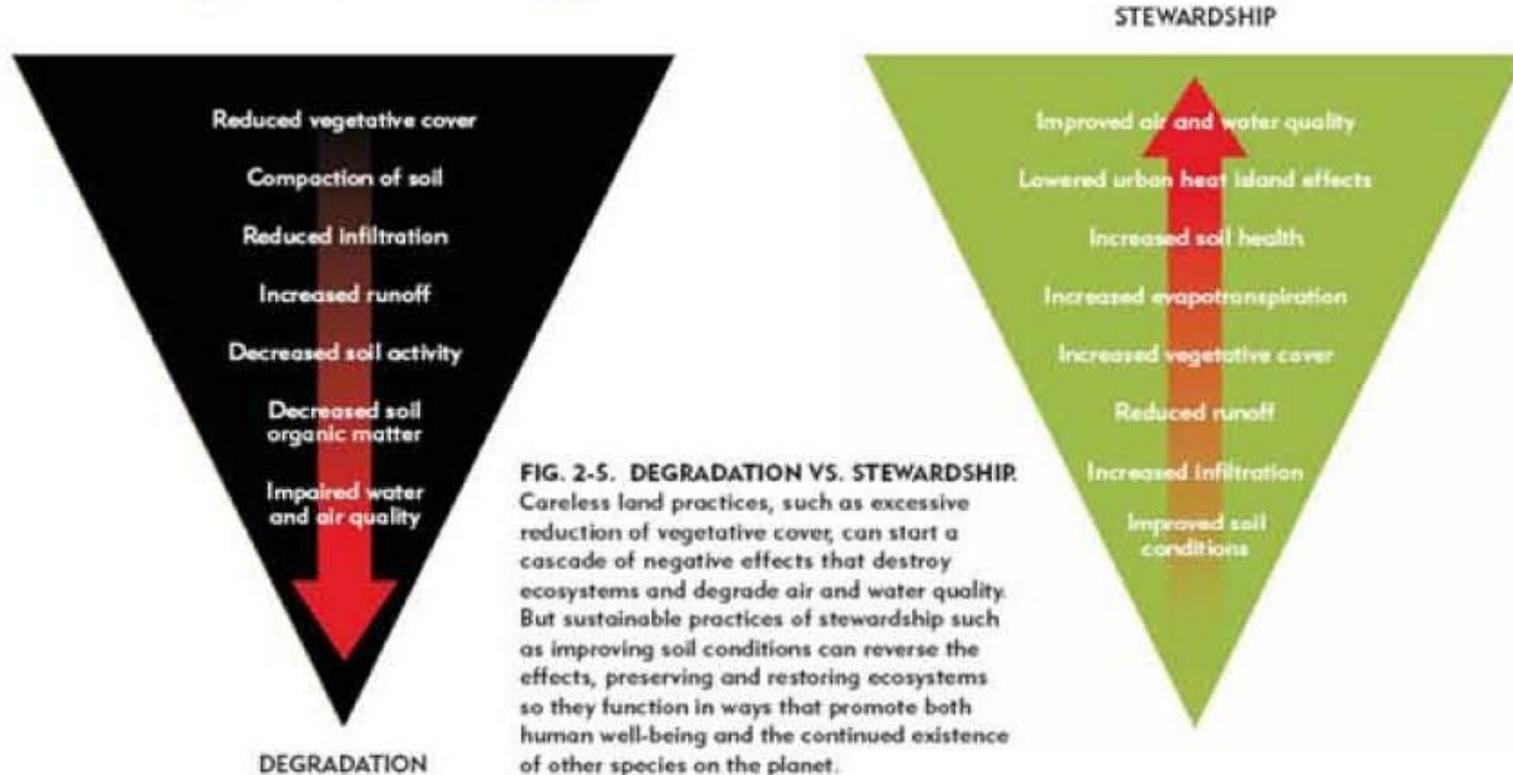
- Provide human health and well-being benefits

- Provide food and non-food products

- Provide cultural, educational and aesthetic values

- Mitigate potential hazards

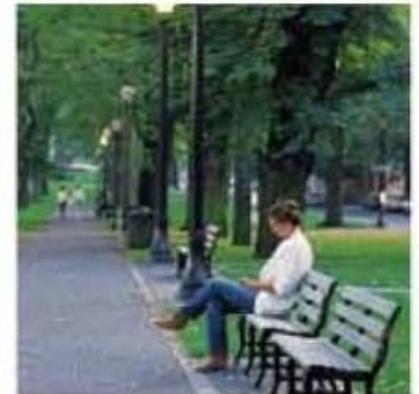
Paradigm Change



Conservation to Regeneration through Performative Landscapes

Project Applications

- parks, trails, campgrounds
- industrial and office parks
- govt. & medical complexes
- conservation easements
- botanical gardens
- university campuses
- residential sites
- streetscapes & plazas



Credit Categories

THE SUSTAINABLE SITES INITIATIVE

GUIDELINES AND PERFORMANCE BENCHMARKS 2009

American Society of Landscape Architects
Lady Bird Johnson Wildflower Center
at The University of Texas at Austin
United States Botanic Garden

Site Selection 21 poss. points
Preserve existing resources and repair damaged systems

Pre-Design Assessment and Planning 4 poss. points
Plan for sustainability from the onset of the project

Site Design – Water 44 poss. points
Protect and restore site's processes and systems

Site Design – Soil and Vegetation 51 poss. points
Protect and restore site's processes and systems

Site Design – Materials Selection 36 poss. points
Reuse/recycle and support sustainable production practices

Site Design – Human Health and Well-Being 32 poss. points
Build communities and a sense of stewardship

Construction 21 poss. points
Minimize effects of construction-related activities

Operations and Maintenance 23 poss. points
Maintain the site for long-term sustainability

Monitoring and Innovation 18 poss. points
Reward exceptional performance

The Sustainable Sites Initiative and LEED

How has USGBC participated in SITES?

USGBC staff and volunteer involvement have helped shape the Initiative

- USGBC staff on the Steering Committee
- USGBC licensing agreement underway
- LEED Technical Advisory Group reviewing SITES Guidelines
- USGBC staff support on pilot program creation

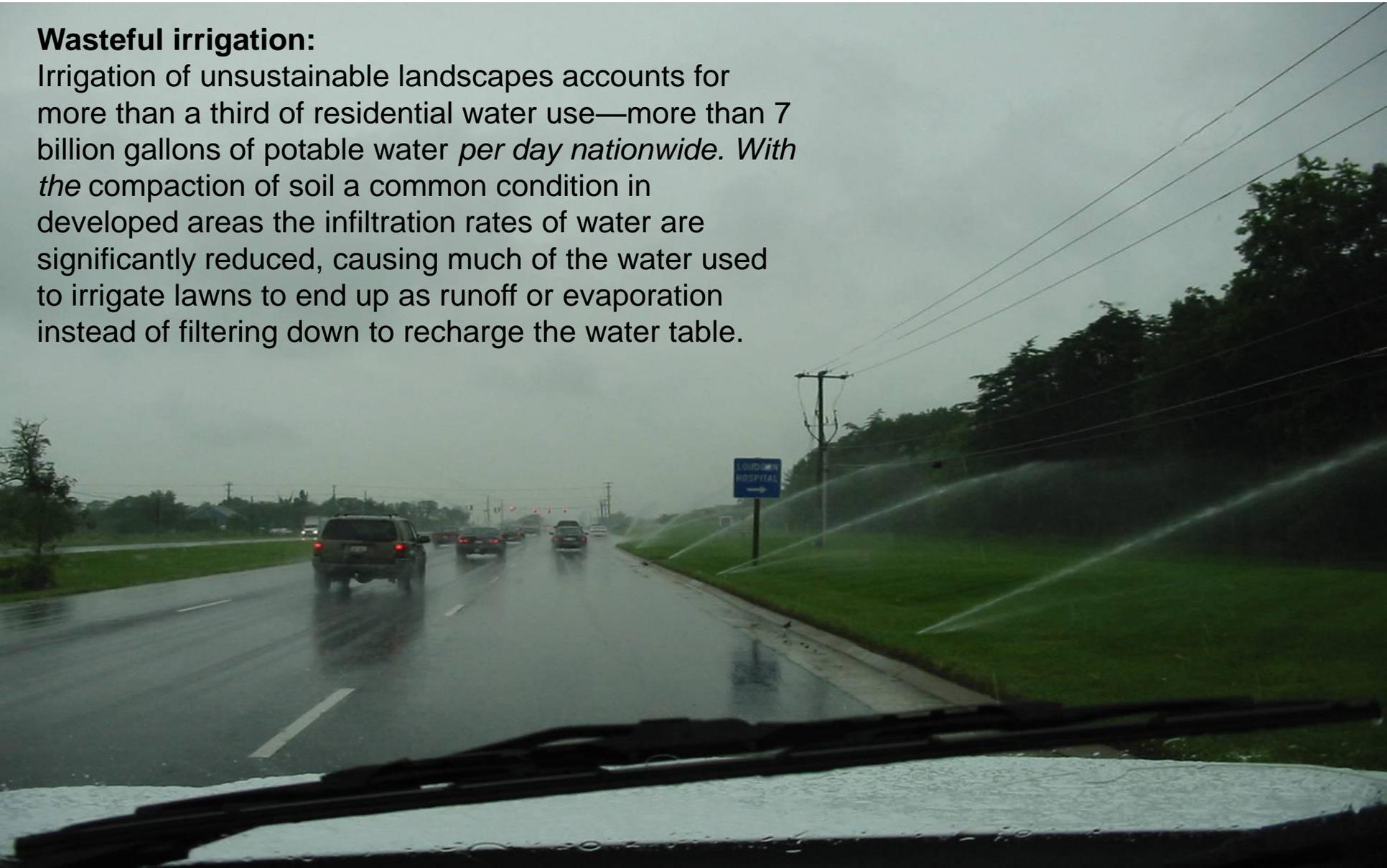


www.usgbc.org

Treating Water as a Resource

Wasteful irrigation:

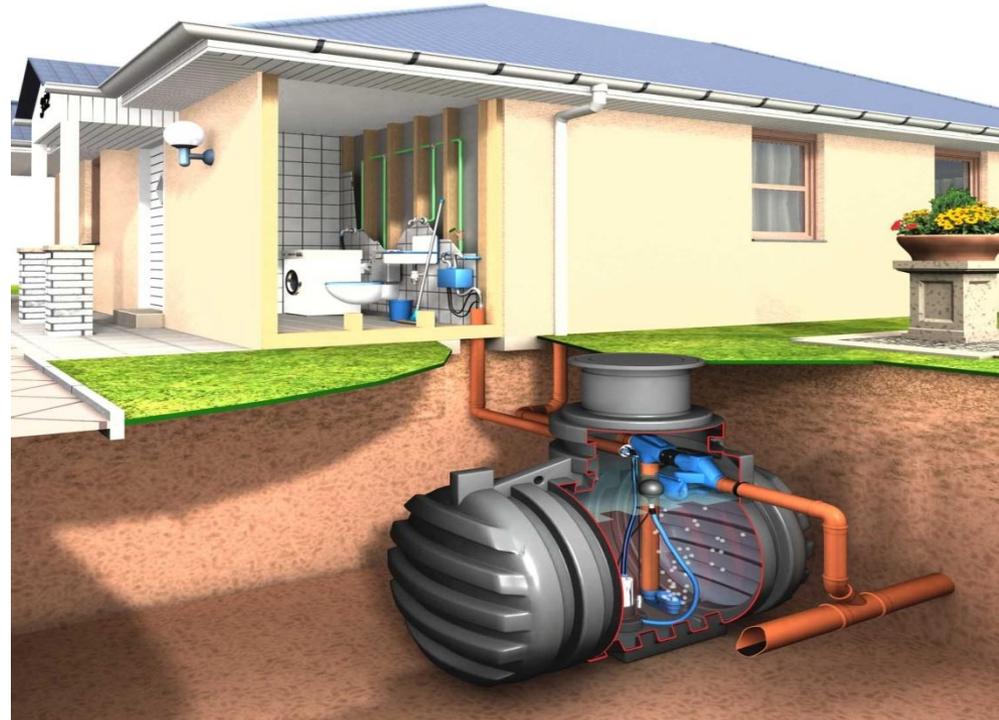
Irrigation of unsustainable landscapes accounts for more than a third of residential water use—more than 7 billion gallons of potable water *per day nationwide*. *With the* compaction of soil a common condition in developed areas the infiltration rates of water are significantly reduced, causing much of the water used to irrigate lawns to end up as runoff or evaporation instead of filtering down to recharge the water table.



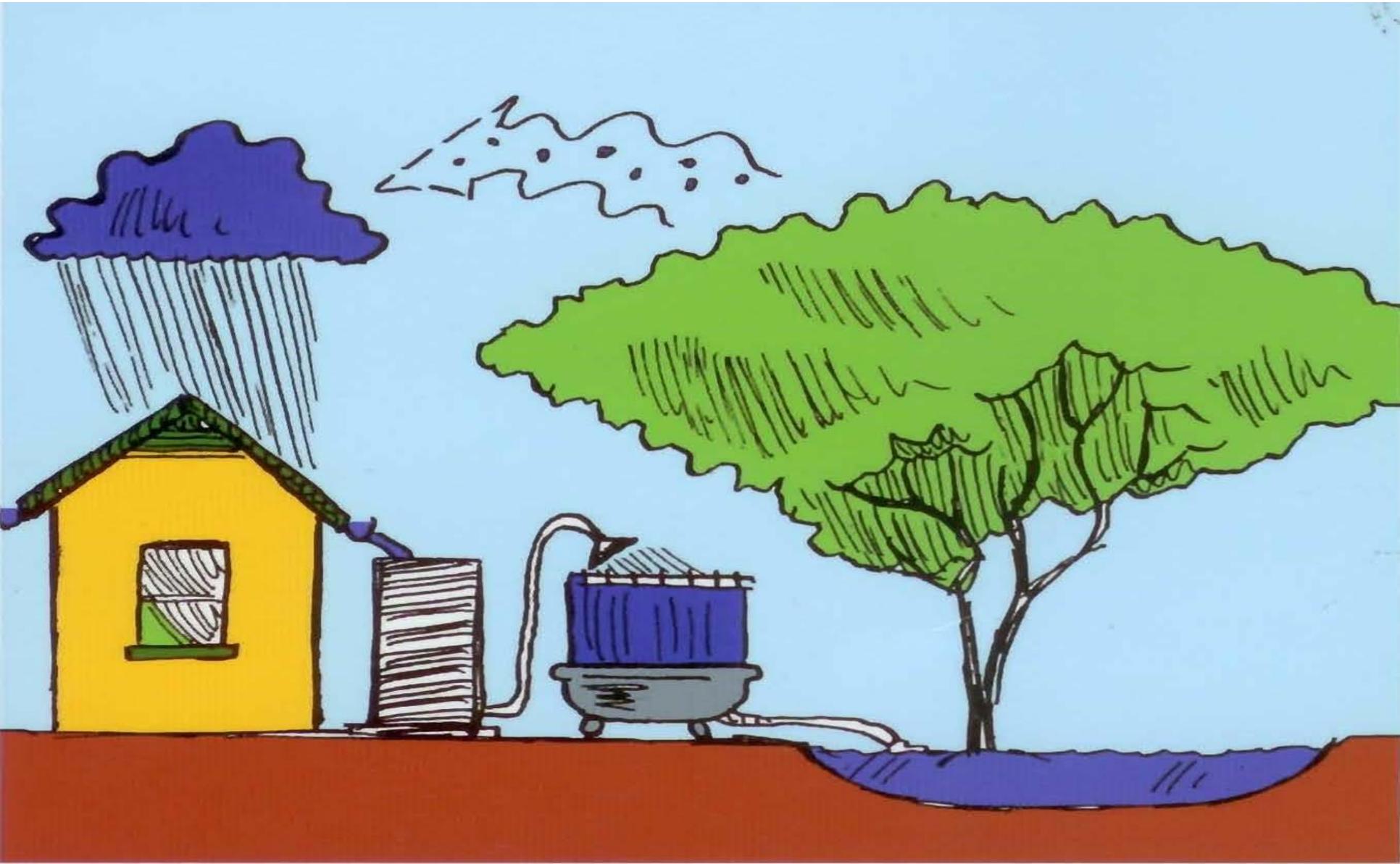
Undervaluing Rain

In most cities and towns around the country, rainfall is treated as waste, to be funneled directly from roof gutters to sewers. In older cities this stormwater flows into combined sewer/stormwater systems that flow to water treatment plants, thus raising the cost of purifying drinking water. In heavy storms, these combined sewer systems can overflow, pumping raw sewage into fresh water.

Rather than getting rid of stormwater runoff as quickly as possible, a sustainable approach to stormwater management would find ways to capture it on site and use it for irrigation, ornamental water features, drinking water, and groundwater recharge.



Hydrologic Cycle of Water



Unsustainable Landscape



ASHRAE 189.1

American Society of Heating, Refrigerating and Air-Conditioning Engineers

Standard 189.1 provides a “total building sustainability package” for those who strive to design, build and operate green buildings. From site location to energy use to recycling, this standard sets the foundation for green buildings by addressing site sustainability, water use efficiency, energy efficiency, indoor environmental quality, and the building’s impact on the atmosphere, materials and resources. Standard 189.1 serves as a jurisdictional compliance option to the Public Version 1.0 of the International Green Construction Code (IgCC) published by the International Code Council. The IgCC regulates construction of new and remodeled commercial buildings.



**TABLE 303.1
PROJECT ELECTIVES CHECKLIST**

Section	Description	Check the corresponding box to indicate each project elective selected.
CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES		
304.1	Whole Building Life Cycle Assessment	<input type="checkbox"/>
CH 4. SITE DEVELOPMENT AND LAND USE		
407.2.1	Flood hazard avoidance	<input type="checkbox"/>
407.2.2	Agricultural land	<input type="checkbox"/>
407.2.3	Infill site	<input type="checkbox"/>
407.2.4	Brownfield site	<input type="checkbox"/>
407.2.5	Greenfield development	<input type="checkbox"/>
407.2.6	Greenfield proximity to development	<input type="checkbox"/>
407.2.7	Greenfield proximity to diverse uses	<input type="checkbox"/>
407.3.1	Changing and shower facilities	<input type="checkbox"/>
407.3.2	Long term bicycle parking and storage	<input type="checkbox"/>
407.3.3	Preferred parking	<input type="checkbox"/>
407.4.1	Site hardscape 1	<input type="checkbox"/>
407.4.2	Site hardscape 2	<input type="checkbox"/>
407.4.3	Site hardscape 3	<input type="checkbox"/>
407.4.4	Roof covering	<input type="checkbox"/>
407.5	Light pollution	<input type="checkbox"/>
CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY		
507.2	Waste management (502.1 + 20%)	<input type="checkbox"/>
507.3(1)	Reused, recycled content, recyclable, bio-based and indigenous materials (50%)	<input type="checkbox"/>
507.3(2)	Reused, recycled content, recyclable, bio-based and indigenous materials (80%)	<input type="checkbox"/> (2 Electives)
507.4(1)	Multi-story building – footprint reduced by at least 45%	<input type="checkbox"/>
507.4(2)	Multi-story buildings – footprint reduced by at least 70%	<input type="checkbox"/> (2 Electives)
507.5	Reduced building volume	<input type="checkbox"/>
507.6.1	Service life – 100 year design service life category	<input type="checkbox"/>
507.6.1	Service life – 200 year design service life category	<input type="checkbox"/> (2 Electives)
507.6.2	Interior adaptability	<input type="checkbox"/>
507.7	Moisture control	<input type="checkbox"/>

CH 6. ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY		
613.3.1	Project <i>TANEU</i> is at least 7 points lower than required by Table 302.1.	<input type="checkbox"/>
613.3.2	Project <i>TANEU</i> is at least 14 points lower than required by Table 302.1	<input type="checkbox"/> (2 Electives)
613.3.3	Project <i>TANEU</i> is at least 21 points lower than required by Table 302.1	<input type="checkbox"/> (3 Electives)
613.3.4	Project <i>TANEU</i> is at least 28 points lower than required by Table 302.1	<input type="checkbox"/> (4 Electives)
613.3.5	Project <i>TANEU</i> is at least 35 points lower than required by Table 302.1	<input type="checkbox"/> (5 Electives)
613.3.6	Project <i>TANEU</i> is at least 42 points lower than required by Table 302.1	<input type="checkbox"/> (6 Electives)
613.3.7	Project <i>TANEU</i> is at least 49 points lower than required by Table 302.1	<input type="checkbox"/> (7 Electives)
613.3.8	Project <i>TANEU</i> is at least 56 points lower than required by Table 302.1	<input type="checkbox"/> (8 Electives)
613.3.9	Project <i>TANEU</i> is at least 63 points lower than required by Table 302.1	<input type="checkbox"/> (9 Electives)
613.3.10	Project <i>TANEU</i> is at least 70 points lower than required by Table 302.1	<input type="checkbox"/> (10 Electives)
613.4	Building thermal envelope systems	<input type="checkbox"/>
613.5	Mechanical systems	<input type="checkbox"/>
613.6	Passive design	<input type="checkbox"/>
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY		
710.2.1	Fixture flow rates are one tier above that required by Table 302.1	<input type="checkbox"/>
710.2.1	Fixture flow rates are two tiers above that required by Table 302.1.	<input type="checkbox"/> (2 Electives)
710.3	On-site wastewater treatment	<input type="checkbox"/>
710.4	Non-potable outdoor water supply	<input type="checkbox"/>
710.5	Non-potable water for plumbing fixture flushing	<input type="checkbox"/>
710.6	Automatic fire sprinkler system	<input type="checkbox"/>
710.7	Non-potable water supply to fire pumps	<input type="checkbox"/>
710.8	Non-potable water for industrial process makeup water	<input type="checkbox"/>
710.9	Efficient hot water distribution system	<input type="checkbox"/>
710.10	Non-potable water for cooling tower makeup water	<input type="checkbox"/>
710.11	Graywater collection	<input type="checkbox"/>
CH 8 INDOOR ENVIRONMENTAL QUALITY AND COMFORT		
809.2.1	VOC emissions - flooring	<input type="checkbox"/>
809.2.2	VOC emissions – ceiling systems	
809.2.3	VOC emissions- wall systems	<input type="checkbox"/>
809.2.4	Total VOC limit	<input type="checkbox"/>
809.3	Views to building exterior	<input type="checkbox"/>

Section 702.1 requires conformance with both the *prescriptive*- and the *performance-based* methods, with exceptions.

Section 702.1.2 allows the jurisdiction to require additional fitting and fixture flow rate reductions to either 30 percent (Tier 1) or 40 percent (Tier 2), based on the performance based method described above, by indicating so in Table 302.1.

Section 702 also contains specific requirements for:

- Combination tub/shower valves
- Food establishment pre-rinse spray heads
- Drinking fountain controls
- Non-water urinal connections
- Appliances (clothes washers, ice makers, food steamers and dishwashers)
- Municipal-reclaimed water
- Efficient hot water distribution systems
- Makeup water supply
- Water powered pumps
- Food service handwashing faucets
- Dipper Wells
- Automated and self-service vehicle wash facilities
- Spa covers
- Swimming pool covers and splash troughs

Section 703 regulates water in:

- Hydronic closed systems
- Humidification systems
- Condensate coolers (tempering)
- Condensate drains (recovery)
- Heat exchangers
- Humidifier discharge

Section 704 regulates water softeners and reverse osmosis water treatment systems.

Section 705 contains specific requirements for indoor ornamental fountains, water features and water metering.

Section 706 contains signage and water quality requirements for non-potable water systems.

Sections 707, 708 and 709 contain detailed requirements for the construction of:

- Rainwater collection and distribution systems,
- Graywater systems and
- Reclaimed water systems, respectively.

Section 710 contains *project electives* related to water resource conservation and efficiency. See the portion of Table 303.1 under Chapter 7 for *project electives* related to water resource conservation and efficiency.

IGCC CHAPTER 8 OVERVIEW: INDOOR ENVIRONMENTAL QUALITY AND COMFORT

The provisions of Chapter 8 are intended to reduce the quantity of building indoor air contaminants and other pollutants,

- Perform as well or better than their less efficient counterparts.
- Are 20 percent more water efficient than average products in that category.
- Realize water savings on a national level.
- Provide measurable water savings results.
- Achieve water efficiency through several technology options.
- Are effectively differentiated by the WaterSense label.
- Obtain independent, third-party certification.





LIVING BUILDING CHALLENGE™ 2.0

A VISIONARY PATH TO A RESTORATIVE FUTURE

www.ilbi.org



INTERNATIONAL
LIVING BUILDING
INSTITUTE™

THE METAPHOR OF THE FLOWER

ROOTED IN PLACE AND YET:

Harvests all energy + water

Is adapted to climate and site

Operates pollution free

Is comprised of integrated systems

Is beautiful



2.0

WHY A CHALLENGE?

Infusing inspiration and poetry

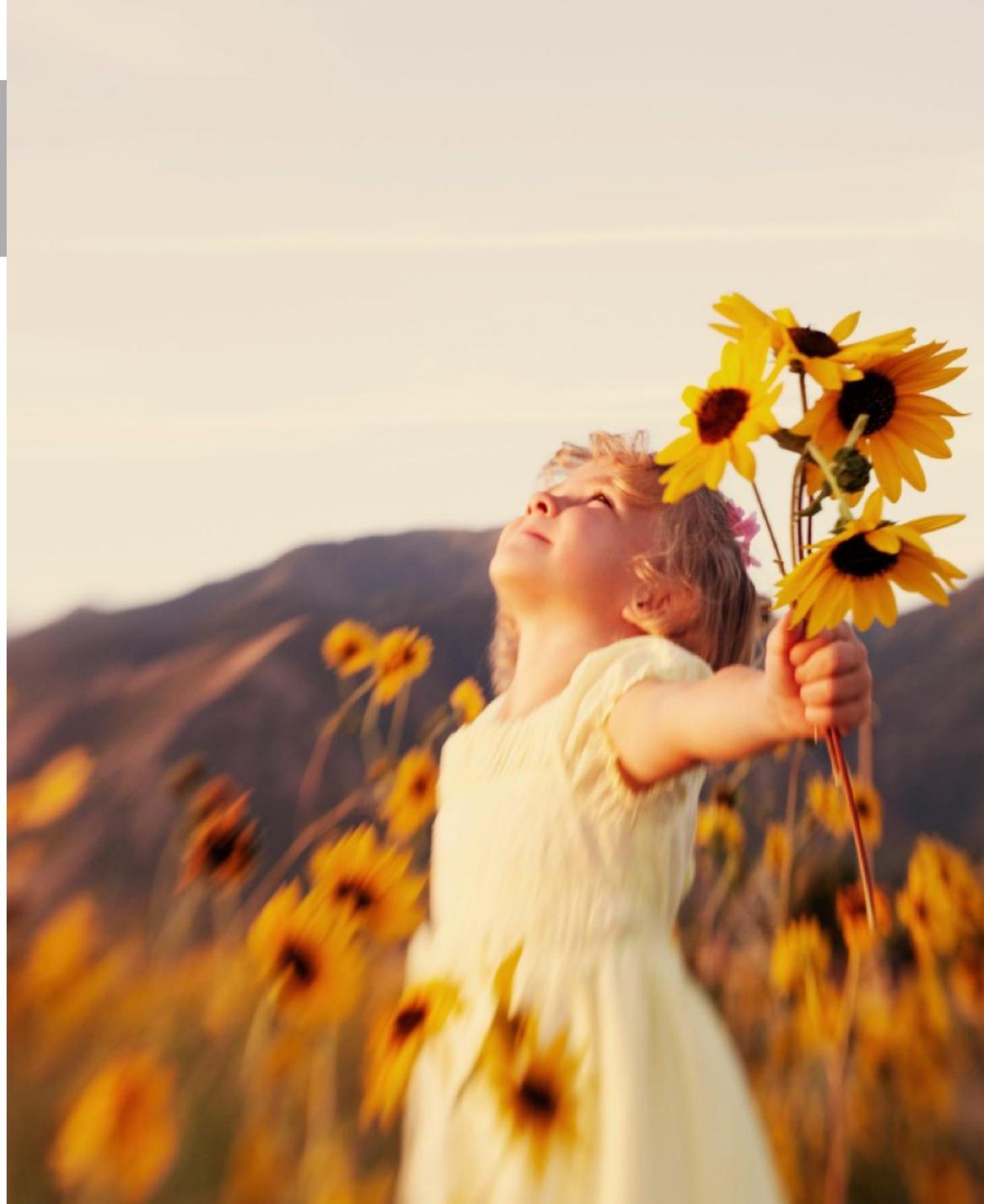
Embracing the psychology of the 'end game'

Rewarding early adopters

Creating models for the future

Stirring the pot

Pulling the market forward



TWO RULES

1. All Imperatives assigned to a Typology are mandatory.
2. Living Building Challenge certification is based on actual, rather than modeled or anticipated, performance.





Renovation



Landscape + Infrastructure



Building



Neighborhood

FOUR TYPOLOGIES



L1. Natural Habitat Preserve



L2. Rural Agriculture Zone



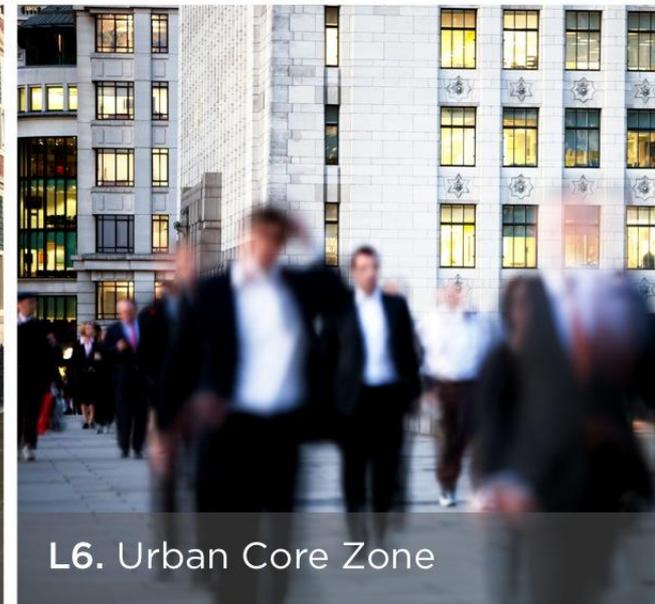
L3. Village or Campus Zone



L4. General Urban Zone



L5. Urban Center Zone



L6. Urban Core Zone

SIX "LIVING TRANSECT" CATEGORIES



SCALE JUMPING

LIMITS TO
GROWTH
URBAN
AGRICULTURE
HABITAT
EXCHANGE
CAR FREE
LIVING



SITE

Restoring a healthy coexistence with nature

NET ZERO
WATER

ECOLOGICAL
WATER FLOW



WATER

Creating water independent sites, buildings + communities

NET ZERO
ENERGY

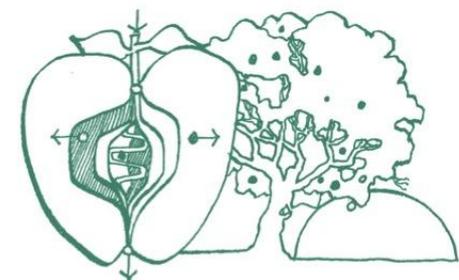


© 2009 ILBI

ENERGY

Relying only on current solar income

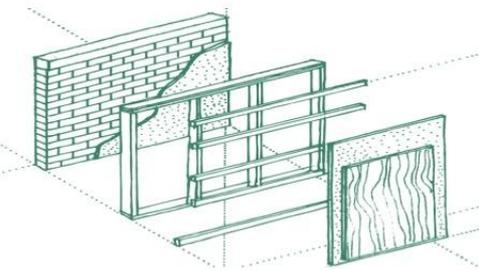
CIVILIZED
ENVIRONMENT
HEALTHY AIR
BIOPHILIA



HEALTH

Maximizing physical and psychological health + well being

RED LIST
EMBODIED
CARBON
FOOTPRINT
RESPONSIBLE
INDUSTRY
APPROPRIATE
SOURCING
CONSERVATION
+ REUSE



MATERIALS

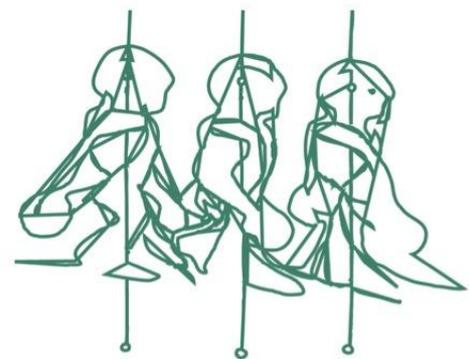
Endorsing products + processes that are safe for all species through time



HUMAN SCALE
+ HUMANE
PLACES

DEMOCRACY
+ SOCIAL
JUSTICE

RIGHTS TO
NATURE



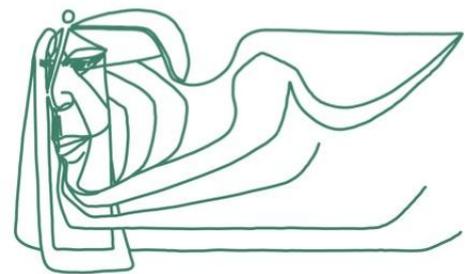
© 2009 ILBI

EQUITY

Supporting a just, equitable world

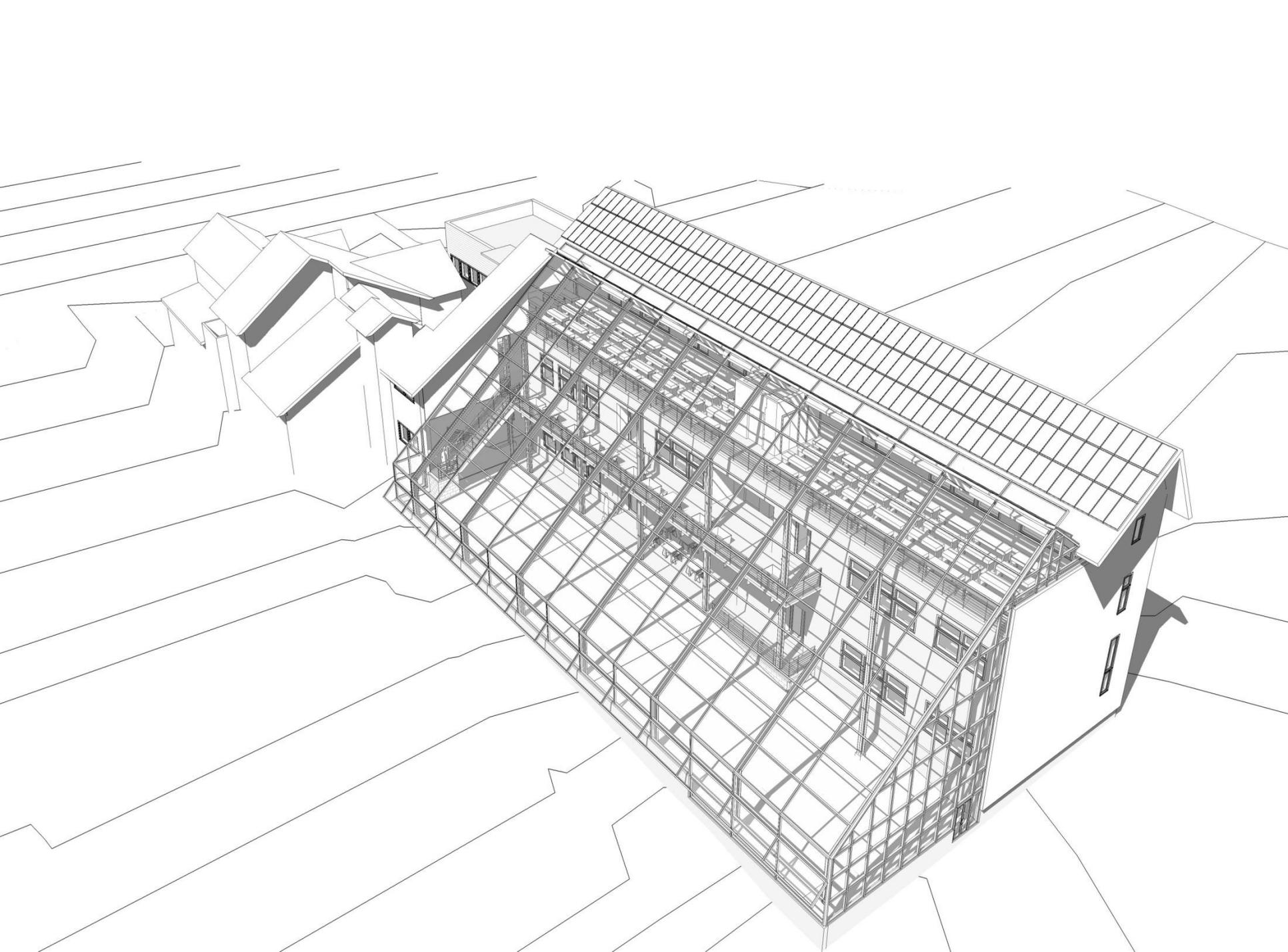
BEAUTY +
SPIRIT

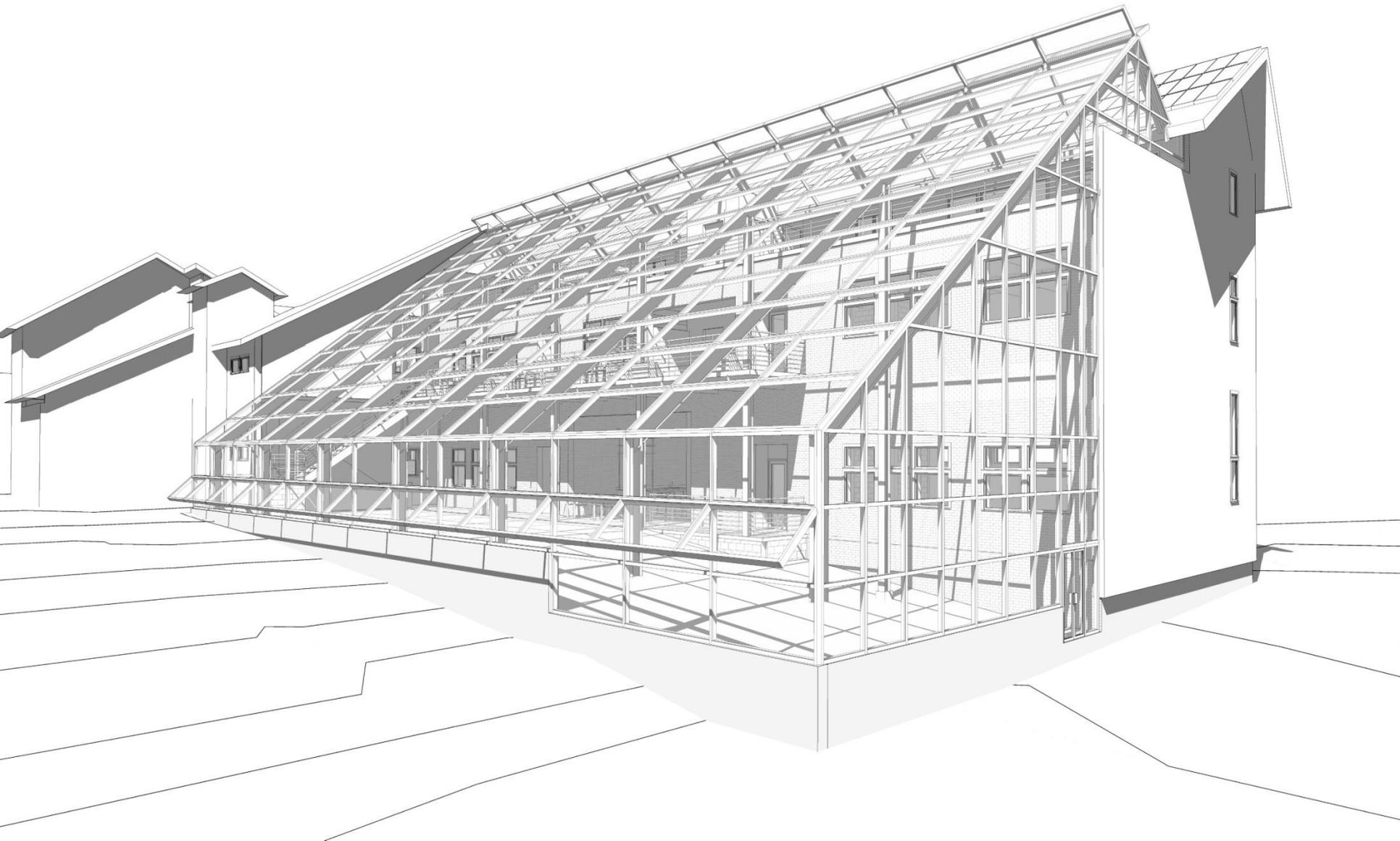
INSPIRATION +
EDUCATION

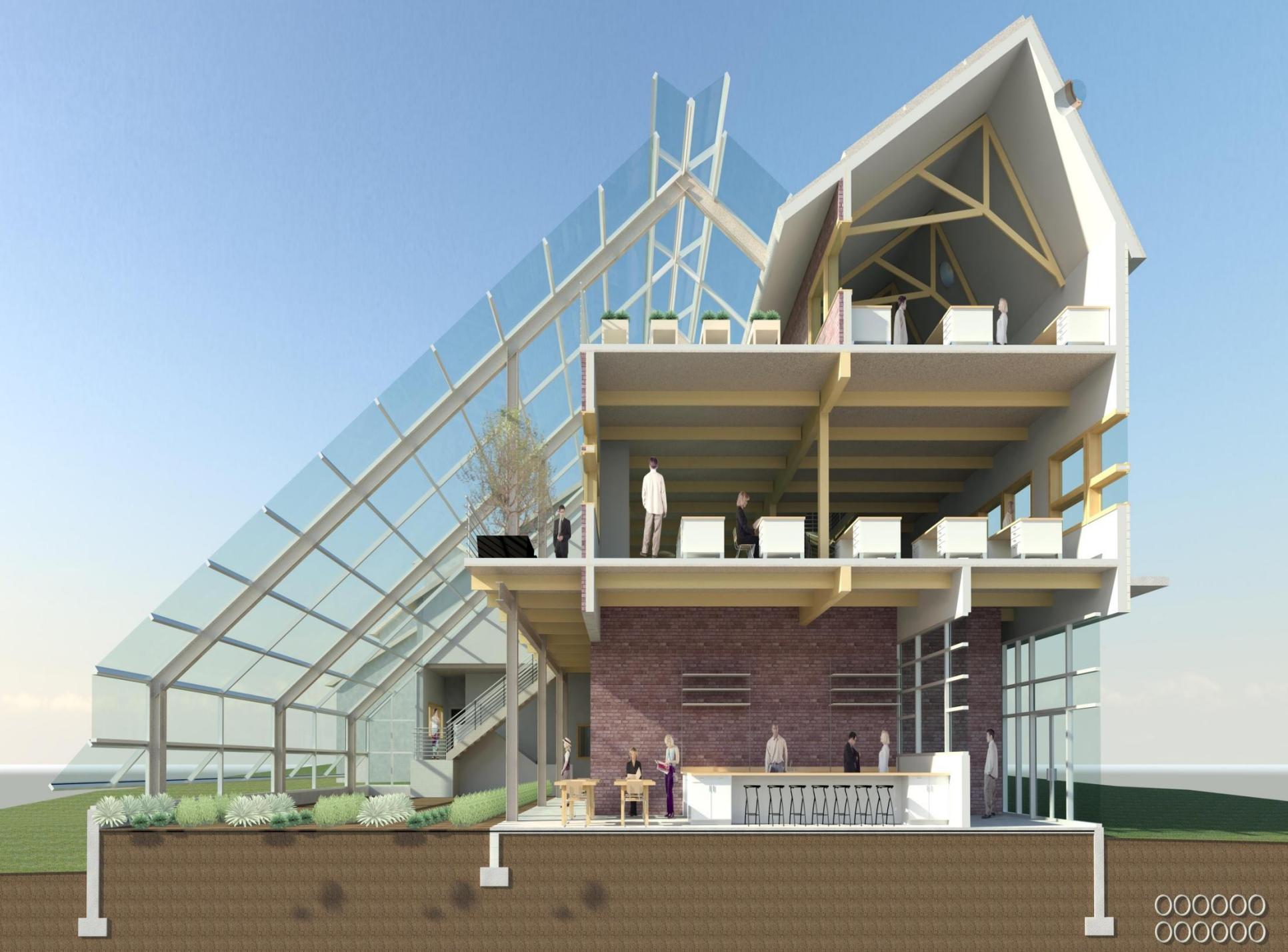


BEAUTY

Celebrating design that creates transformative change







Questions or Comments Please 😊

Paul Bassett

Water Savers, LLC

pbassett@watersaversllc.com

www.watersaversllc.com