

A close-up photograph of autumn leaves, primarily oak leaves, showing vibrant shades of yellow, orange, and red. The leaves are slightly out of focus, creating a soft, natural background.

The National Academies – Pathways to Urban Sustainability

Houston's “Green” Build Capital

**Rives Taylor FAIA
Director of Sustainable Design, Gensler**



why sustainable facility design?

Buildings Today In the USA



Satellite Photo at Night Showing Electric Light Usage and Light Pollution



Clear Cutting, a Non-sustainable Forestry Practice



Water Use

There are more than 76 million residential buildings and nearly 5 million commercial buildings in the U.S. today. Collectively, these buildings consume:

- *40% of all energy and 76% of all electricity used in the USA*
- *Over \$ 220 billion in annual energy costs*

US Environmental Information Association (2008)
EIA Annual Energy Outlook



And....

- 50% of SO_x emissions
- 25% of NO_x ,
emissions and
- 39% of CO_2 emissions

US Department of Energy



And....

*25% of potable
water use*

US Department of Energy



And.....

- *40% of processed materials (stone, steel, etc.); and,*
- *55% of virgin wood consumption*

World Watch Institute



And.....

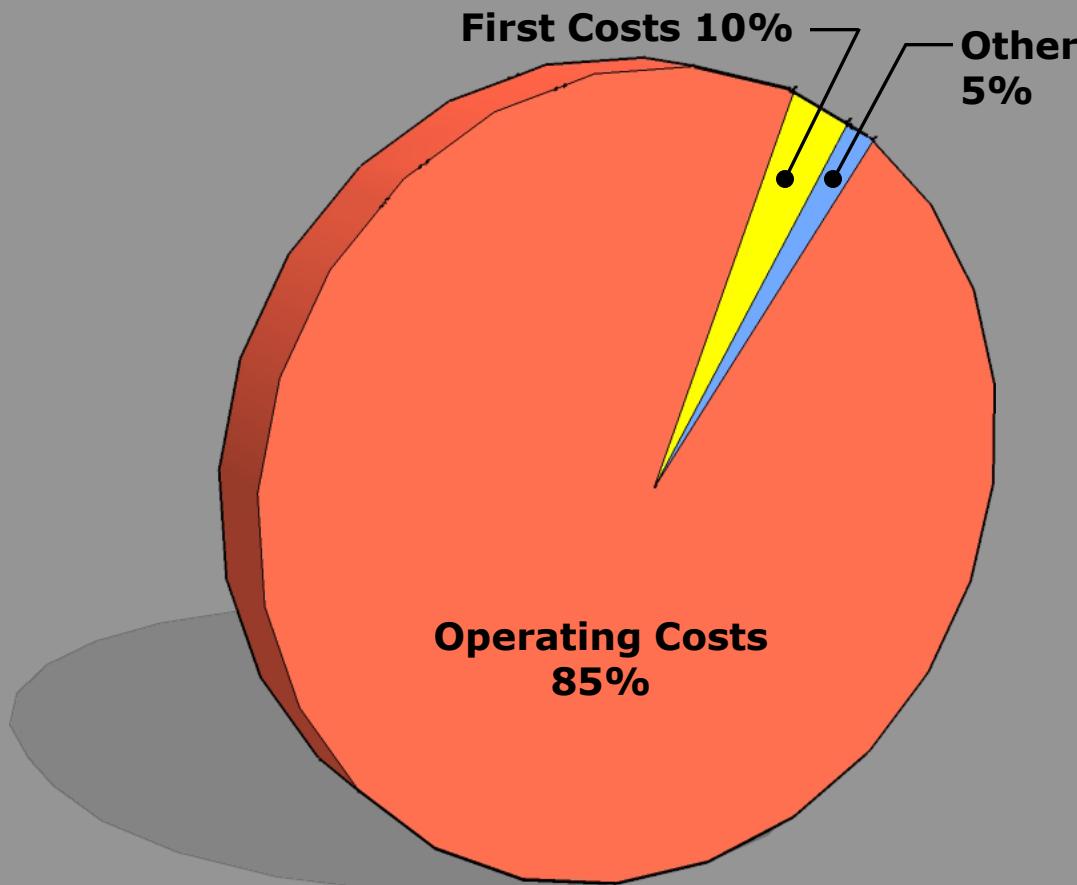
Construction and demolition debris accounts for 25% of landfill content.. roughly 2.5 pounds for every square foot we build

World Watch Institute



Why Green Building?

A BUILDING'S REAL COST



Operating expenses (things like lighting, cooling and maintenance) make up the largest cost of owning a building.

First costs typically account for less than 10 percent of the money that must be spent on a facility over its life.

As much as 85 percent of the building's real cost is related to operating the facility.

Other costs include land acquisition, conceptual planning, renewal or revitalization, and disposal.

Source: National Research Council, 1998

Green Building Ideas

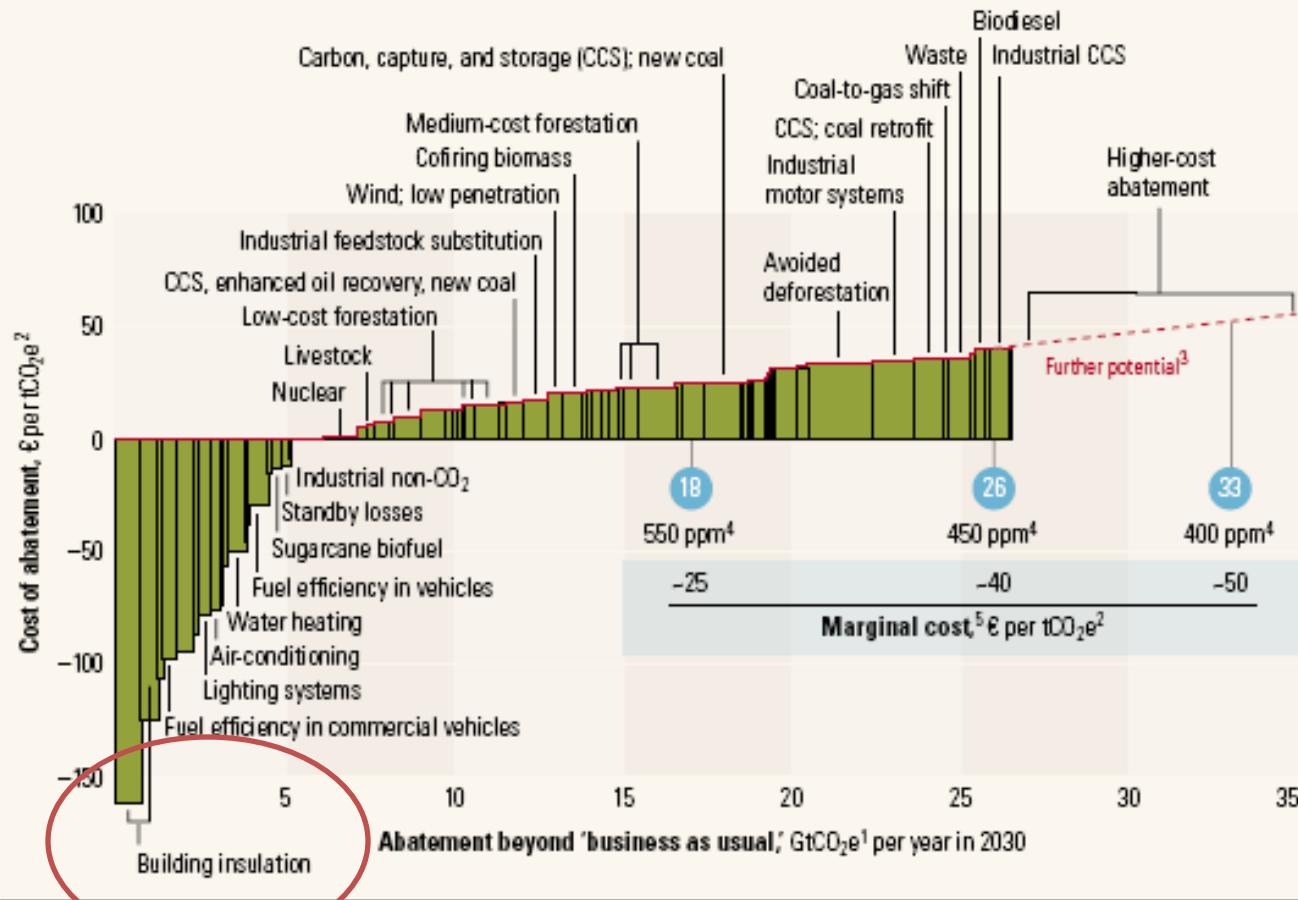
What might it cost?

Global cost curve for greenhouse-gas abatement measures beyond 'business as usual'; greenhouse gases measured in GtCO₂e¹

● Approximate abatement required beyond 'business as usual,' 2030

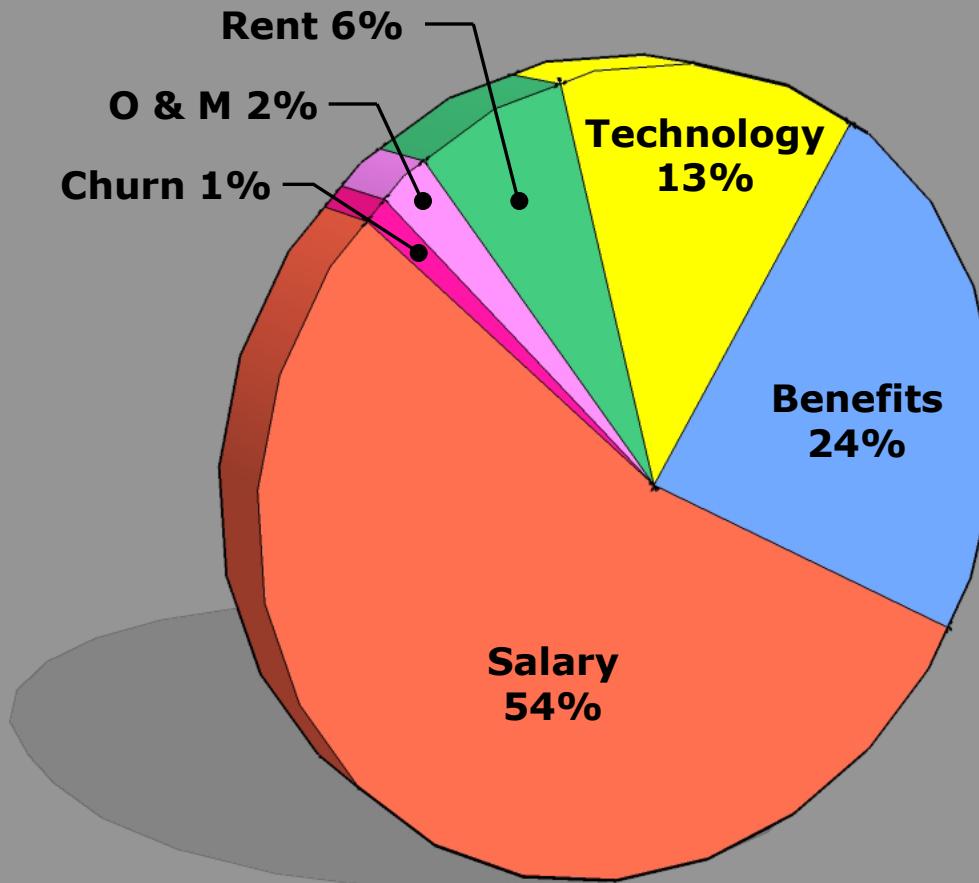
INSULATION

- Provides the first line of defense from heat gain or loss.
- Code minimums will not insure energy efficiency, the amount of insulation can only be determined based on project location, and current and future projected energy costs.



Why Green Building?

FULL OPERATING COSTS



Personnel costs (salary and benefits) make up 78 percent of total business expenses for tenants.

Costs associated with the building itself account for only 9 percent.

If a sustainable design can help improve worker health, productivity or retention, the payoff is far greater than any reduction in building life cycle costs.

Sources:

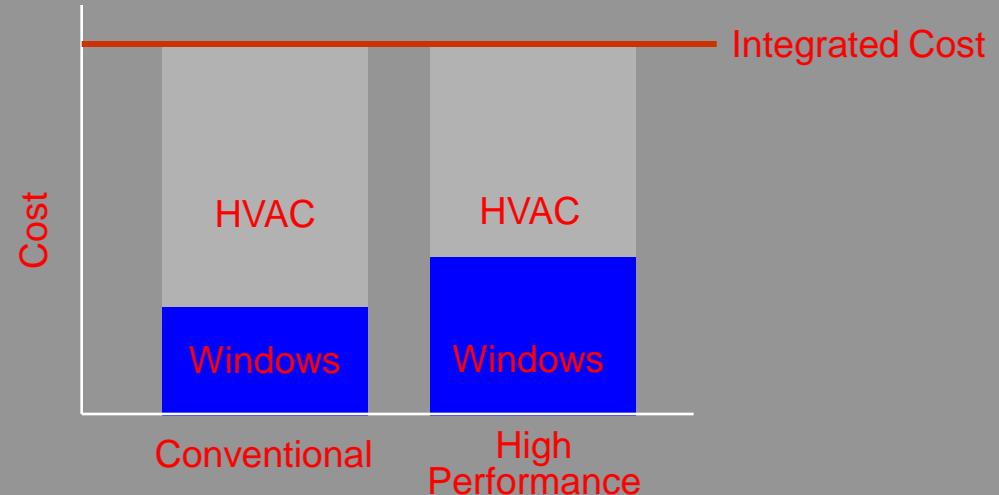
Carnegie-Mellon University
GSA

Why Green Building?

First and Long Term Costs

1) Competitive first costs

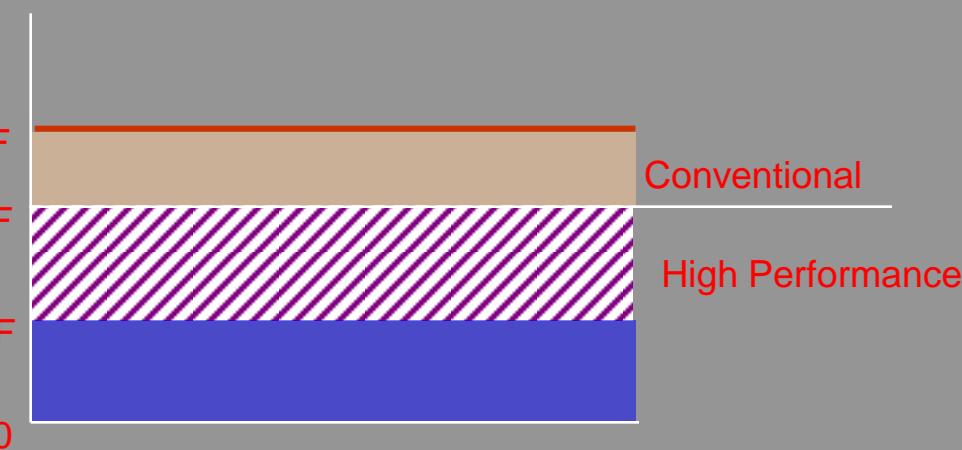
Integrated design offsets costs



2) Reduced operating costs

Lower utility costs (i.e., \$.60–\$1.20 per square foot versus \$1.50).*

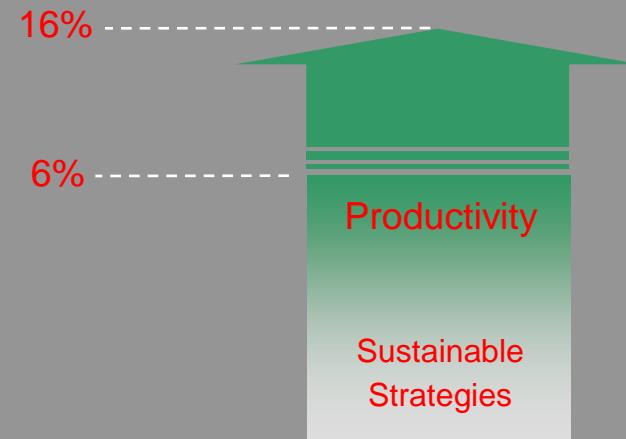
* Rough estimate based on LEED credits that reward up to 60% energy savings over ASHRAE 90.1-1999 and up to 30% water use reduction (after meeting the Energy Policy Act of 1992)



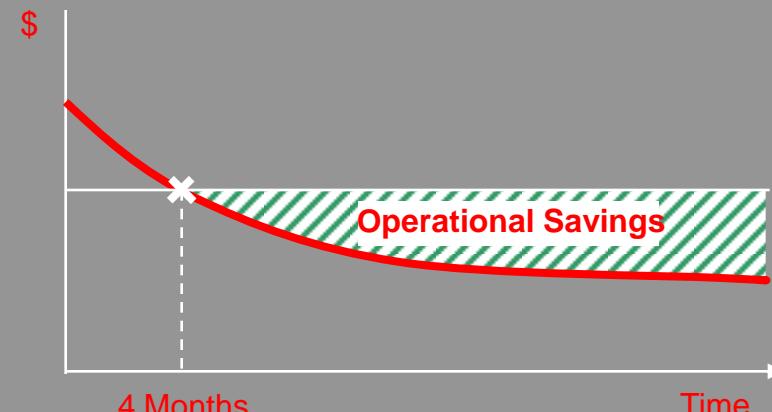
Why Green Building?

Increased Productivity

Productivity gains of between 6 and 16 percent can be attributable to sustainable measures such as daylighting



...with paybacks ranging from 4 months to 4 years



Rocky Mountain Institute

Why Green Building?

Increased Productivity - Payback





**what are the
Houston
responses?**

Blossom Street Residence



1997-2000
Robert Morris. Architect



GREATER HOUSTON BUILDERS ASSOCIATION

GREEN BUILDING INITIATIVE™
GUIDELINES AND SUPPLEMENT INFORMATION
VERSION 1.0



GREATER HOUSTON BUILDERS ASSOCIATION
9511 WEST SAM HOUSTON PARKWAY NORTH
HOUSTON, TX 77064
PHONE: (281) 970-8970
FAX: (281) 970-8971
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"Governing The American Dream"



November 2004 • NREL/TP-550-36960

Building America Best Practices Series: Volume 1

Builders and Buyers Handbook for Improving New Home Efficiency,
Comfort, and Durability in the Hot and Humid Climate



U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Building Technologies Program

University of Texas Health Science Center - Houston

School of Nursing



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Efficient Envelope and Water Harvesting

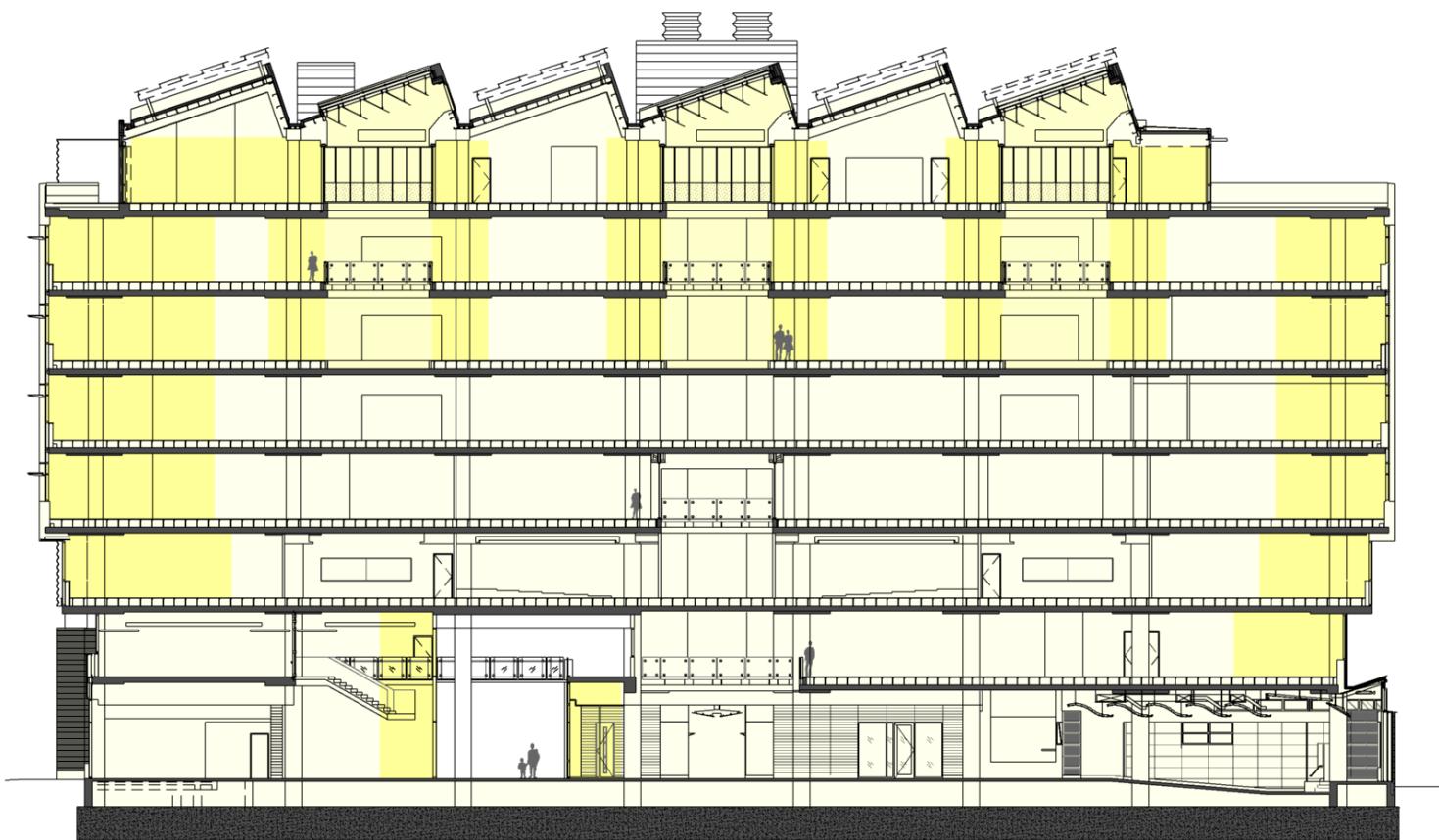


Personal Scale

Increasing human capital through
comfort, wellness and productivity



Passive Energy Systems





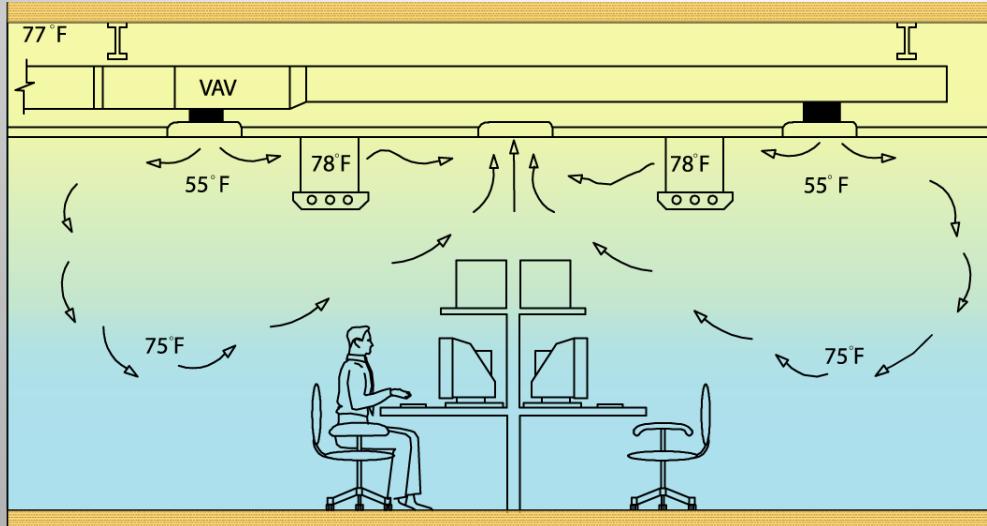
The High Performance Office



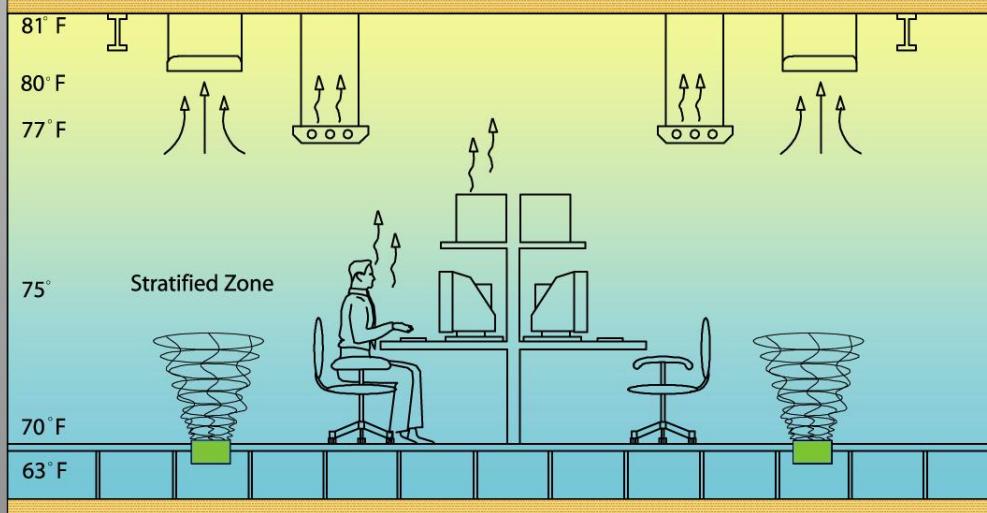
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Raised Access Flooring: Cooling

Traditional
Overhead
Air
Distribution
System



Raised Access
Flooring with
an Under
Floor Air
Distribution
System



With an under floor air distribution system offers a variety of energy saving advantages:

- Heated air temperature can be lower and provide comfort
- Cooled air temperature can be higher and provide comfort
- Less fan energy is required
- Less overall energy may be needed to provide the same level of comfort
- Only the occupied zone needs to be heated or cooled

Source of Indoor Air Quality Issues



DesignTex™ Fabric - Non Toxic



Collins & Aikman Floorcovering
with Powerbond E3™ Zero VOC
Adhesive



Johns Manville
Formaldehyde Free
Fiberglass Insulation



Medite II Medium Density
Fiberboard that is
Formaldehyde Free

Typical sources for harmful Volatile Organic Compounds (VOCs) and other chemicals that cause health problems are:

- Paint
- Adhesives
- Carpet
- Vinyl & PVC Products
- Engineered Wood products
- Insulation
- Upholstery
- Office equipment
- Rubber

Material Resources



Regional Agricultural
Waste Turned into
Particle Board

Recycled Polyethylene
Turned Into Upholstery
Fabric

Rapidly Renewable
Bamboo Turned into
Wood Flooring

Leap™ Chair by
Steelcase Designed so
That Every Piece Can
be Recycled at the
End of Its Life

Whenever possible a sustainable
design project will contain
materials that are:

- Regional
- Durable
- Recycled content
- Recyclable
- Rapidly renewable

Energy Trading Facility



Gross Square Footage
423,500 GSF

Gross Footprint Dimensions:
360 feet by 220 feet

Total Capacity of Occupants:
2200 seats

Combined Heat and Power System (CHP

Energy Trading



- Raised Floor distribution
- High energy and heat intensities
- 35% optimization above ASHRAE 2004
- measurement and verification
- high performance envelope

Discovery Tower Houston, TX

- * Energy Use Intensity (EUI) = 119.9 kBtu/sf/yr
- * Percent CO₂ Reduction = 6%
- * ENERGY STAR Design Rating = 99

Annual Savings Statistics

Compared to an average building EPA rating of 50

- * Energy Savings = 221,070,025 kBtu
- * CO₂ Savings = 13,816.1 tons CO₂

- Pre-certified LEED Gold for Core & Shell
- 30-story office building with pedestrian plaza
- Site Adjacent to new 12 acre Urban Park
- Space on first floor for potential retail tenants
- 10 Building Integrated Wind Turbines on roof
- High efficiency glazing reduces energy loads
- Energy Recovery Wheel reduces energy consumption
- Salvaging 75% of construction waste
- Landscape irrigation supplied by Air Conditioning Condensate
- Procuring 30% of materials from regional sources, both extracted and processed within a 500 mile radius.



View of Hess Tower overlooking Discovery Park

- Pursuing LEED CS 2.0 Gold (design precertification in hand)
- “Design to Earn Energy Star” Award



Astronaut Quarantine Facility



Morris Architects

Rives Taylor FAIA
Gensler

PROJECT PROFILE

WEST BRAZOS JUNIOR HIGH SCHOOL

Columbia-Brazoria Independent School District
Brazoria, Texas

LEED NC

6% Total site disturbed

55% Construction waste diverted from landfill

17% Recycled Content

LEED® Facts

SHW Group LLP
Houston, TX

LEED for New Construction
Certification awarded July, 2007

Certified 27*

Sustainable Sites 7/16

Water Efficiency 4/5

Energy & Atmosphere 1/22

Materials & Resources 4/10

Indoor Environmental Quality 6/18

Innovation & Design 5/5

*Out of a possible 69 points



"Our goal was to demonstrate that "green schools" were achievable without spending extra money during the process. The key was smarter choices, not more money."
-Martha Buckner, Assistant Superintendent, Columbia-Brazoria ISD



Owner: Columbia-Brazoria Independent School District
Architect: SHW Group LLP
Engineer: DBR Inc.
Contractor: Tellepsen
Project Size: 91,500 sf
Total Project Cost: \$3,931,000
Cost P&F: \$108.54
Completion: May 2006

Photography courtesy of Richard Payne Photography

Satterfield Pontikes HQ



“BIM and Green Building are the future of our industry and we embraced both with this project.”

**-George A. Pontikes, Jr.,
President, Satterfield &
Pontikes Construction, Inc.**



Owner: Satterfield & Pontikes Construction, Inc.
Architect: Kirksey Architects
Engineer: Walter P Moore
Contractor: Satterfield & Pontikes Construction, Inc.
Project Size: 65,000 sf
Total Project Cost: \$11,500,000*
Cost PSF: \$176.92
Completion: November 2006
* Includes tenant finishes

REMINGTON SQUARE

CLASS A OFFICE SPACE



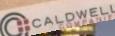
BRINGING CONVENIENCE TO THE WORKPLACE.

Remington Square surpasses the typical suburban Houston office complex – making the work week more manageable for employees and more efficient for businesses. This Class A office community is centered on business, personal development and convenience offering employee training facilities, restaurants, retail and a fitness center on site. Enter the grounds and immediately exit the hustle and bustle of the city. This is what “going to the office” should be.

A CONVENIENT NORTHWEST HOUSTON LOCATION



www.remingtonsquare.com

 CALDWELL
RESIDENTIAL

For more information contact Mary Caldwell, CCIM at 281-664-6636 or email her at mcaldwell@caldwellcos.com

FEATURES

- Mixed Use development with over 383,000 SF of office and retail space
- Great visibility and easy access from Beltway 8
- Landscape park area with sculptures, water features and community gathering places
- Green building construction – LEED certified
- Secured parking garage

FOR LEASING INFORMATION EMAIL STEWART.ROBINSON@HINES.COM OR CALL 713.223.1312

ThreeEldridgePlace
737 NORTH ELDRIDGE PARKWAY • HOUSTON, TX 77029
WWW.ELDRIDGEPLACE.COM



NOW UNDER CONSTRUCTION



A development of
BEHRINGERHARVARD

LEASING INFORMATION

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CBRE
CB RICHARD ELLIS

MAINPLACE

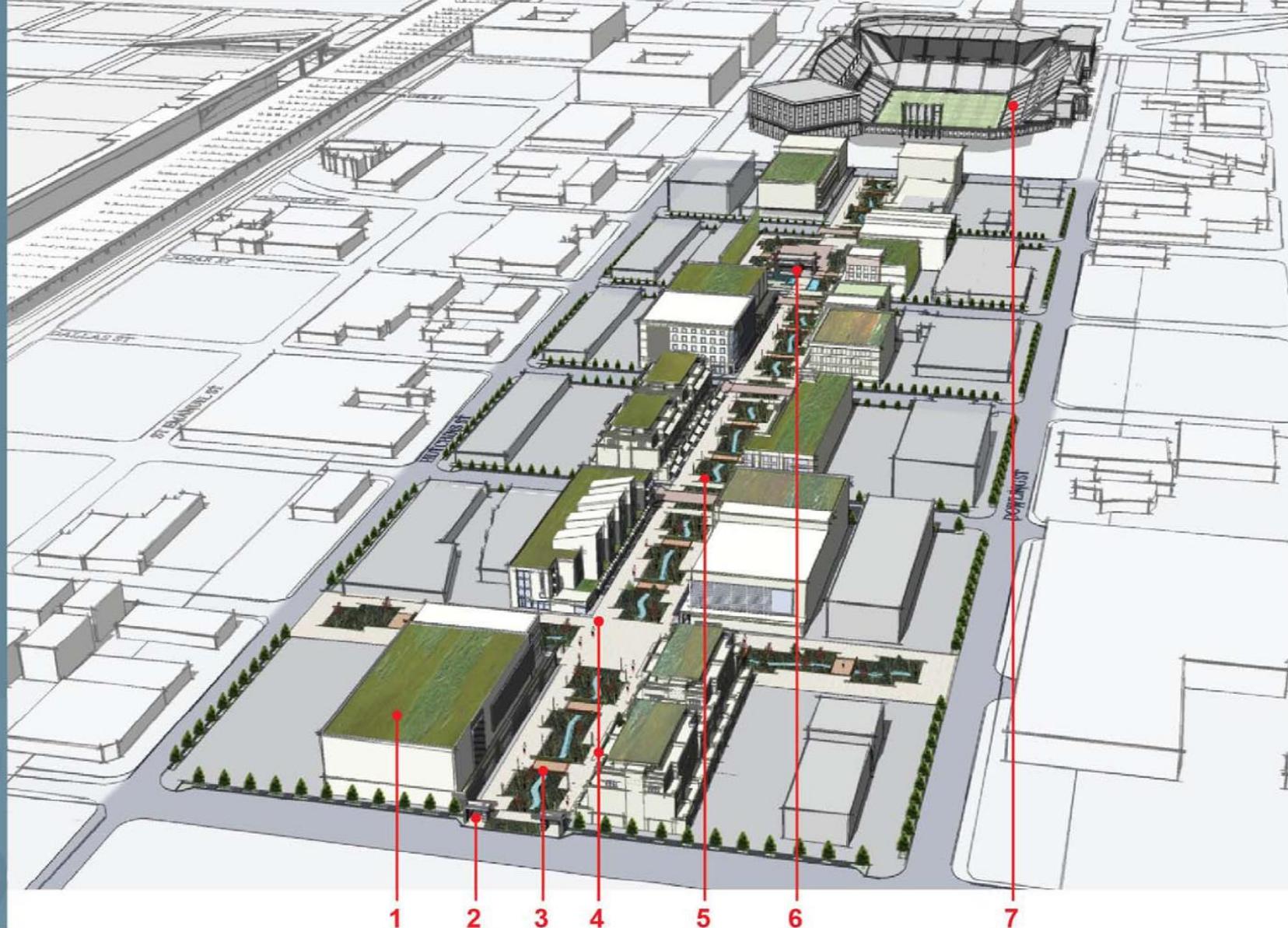


Hines

City Center



1 GREEN ROOFS
2 ENTRY PORTAL
3 PEDESTRIAN BRIDGE
4 PEDESTRIAN ZONE
5 BIOSWALE DETENTION BASIN
6 PAVILION
7 FUTURE STADIUM



Low Impact Design Competition

EaDo PROMENADE

- BIOSWALES TO SLOW DOWN AND RETAIN STORMWATER.
- FACILITATE INFILTRATION OF WATER WITHIN THE PROJECT LIMITS.
- USE OF NATIVE PLANTS TO MAXIMIZE EVAPOTRANSPIRATION.
- DOWNSPOUTS AND CISTERNs ALSO PROVIDE VISUAL ELEMENTS PLUS COLLECT AND RETAIN STORMWATER.
- DRIP IRRIGATION TO MAINTAIN PLANT VIABILITY IN DROUGHT CONDITIONS.
- NATIVE PLANTS ARE ADAPTED TO THE LOCAL CONDITIONS AND WATER LEVELS AND WILL REQUIRE LITTLE MAINTENANCE
- PERMEABLE PAVERS FACILITATE PERCOLATE WITH BASIC ANNUAL MAINTENANCE.

LOW IMPACT DEVELOPMENT

PERSPECTIVE - TYPICAL STREET VIEW



The water we use today is the same water the dinosaurs used.

EaDo PROMENADE

Rives Taylor FAIA
Gensler

Springwoods Village



SPRINGWOODS
VILLAGE

ILLUSTRATIVE PLAN

COVENTRY
REEDER HARRIS
VIEZ SIE

LIVABILITY



Lagos 2009



Industrializing cities
Rapid growth

Polluted air
Noise
Congestion & lack of transit
Infectious diseases



Vancouver 2009

High tech cities
Green infrastructure

Fresh air
Integrated parks & trees
Efficient mass transit
Accessible medical care

CATALYST FOR A LIVABLE CITY

- STREET AND BLOCK SCALE
- WALKABLE DISTRICTS
- TREM RIGHT-OF-WAY WELL PLACED WITHIN THE REGION
- EXISTING LAND USES
- FAIRLY DIVERSE, LOW DENSITY
- AVAILABILITY OF DEVELOPMENT SITES
- PROPOSED STATION LOCATIONS:
GOOD SERVICE COVERAGE
- INTERMODAL LINKS



LIVING BUILDING CHALLENGE™ 2.0

A Visionary Path to a Restorative Future

WHAT

- SITE 1. Limits To Growth
2. Urban Agriculture
3. Habitat Exchange
4. Car Free Living
5. Net Zero Water
- WATER 6. Ecological Water Flow
7. Net Zero Energy
8. Civilized Environment
9. Healthy Air
- ENERGY 10. Biophilia
11. Red List
- MATERIALS 12. Embodied Carbon Footprint
13. Responsible Industry
14. Appropriate Sourcing
15. Conservation + Reuse
- EQUITY 16. Human Scale + Humane Places
17. Democracy + Social Justice
18. Rights To Nature
- BEAUTY 19. Beauty + Spirit
20. Inspiration + Education



COURTESY: MILLENNIUM