9 APPENDIX

subjects

I. Insuring Homes

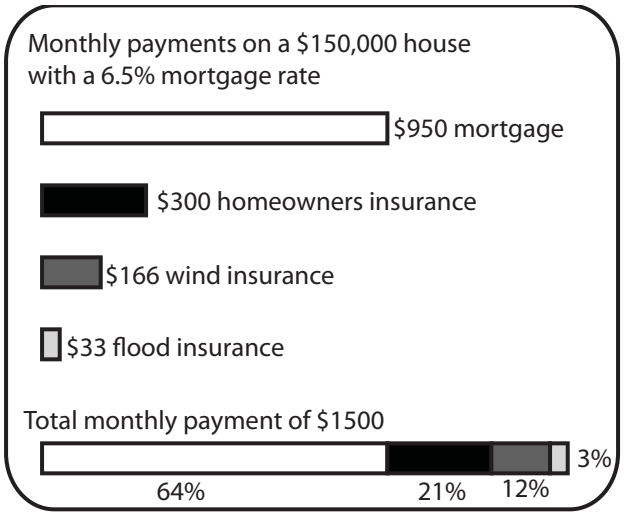
This research is only a small introduction to the issues of insuring a home in the Gulf Coast. Insuring a home is a complex and costly activitly. Anyone purchasing insurance must seek the advise of a trussed insurance professional before doing so. Anyone designing a home to take advantages insurance policies described here must seek the advise of a trussed insurance professional before doing so.

There are 3 common types of insurance for homes: flood insurance, wind insurance, and homeowners insurance. Along the Gulf Coast, homeowners insurance is typically the most expensive on a monthly basis, followed by wind insurance and flood insurance. The cost of insuring a home can be prohibitive for many people. In some cases, monthly rates for the 3 policies can add up to as much or more than a mortgage payment on a home. If this happens the actual cost of home ownership can effectively double, leaving many people unable to meet the expenses of even modest homes.

Homeowners insurance covers damage and liability in a private residence. It can cover either just the home, or the home and its contents, but will not cover flood damage. Mortgage lenders and most recovery grants require that homeowners get homeowners insurance. There are few construction strategies to lower the homeowners insurance rate. Reducing the risk of sudden peril through loss mitigation can lead to lower insurance rates. Sudden peril risks covered by typical homes owners include fire and theft. The more robust the fire protection (hard-wired smoke detectors or sprinklers), the greater the deduction for insurance. Similarly, the installation of a theft alarm or extra locks on doors and windows should reduce the insurance rate.

Other discounts are available, but they are largely based on owner characteristics or habits. Discounts are sometimes offered for non-smokers, seniors, or people with good credit. Homeowners can also leverage their role as a consumer to lower the cost of insurance by purchasing more then one type of insurance from the same provider (auto and homeowner), or by raising their deductible on any claims.

Wind insurance can be purchased from few private providers along the Gulf Coast. This leaves state mandated insurance pools. Each state has its own program, including the Louisiana Citizen Property Insurance Corporation's Citizens Insurance, the Mississippi Windstorm Underwriting Association's Wind Pool, and the Alabama Insurance Underwriting Association's Beach Pool. The Mississippi Wind Pool was established in 1987 to provide wind and hail insurance policies for high risk properties in the 6 Mississippi coastal counties. Today it is the insurer of last resort for more then 43,000 Mississippi residents.[1]



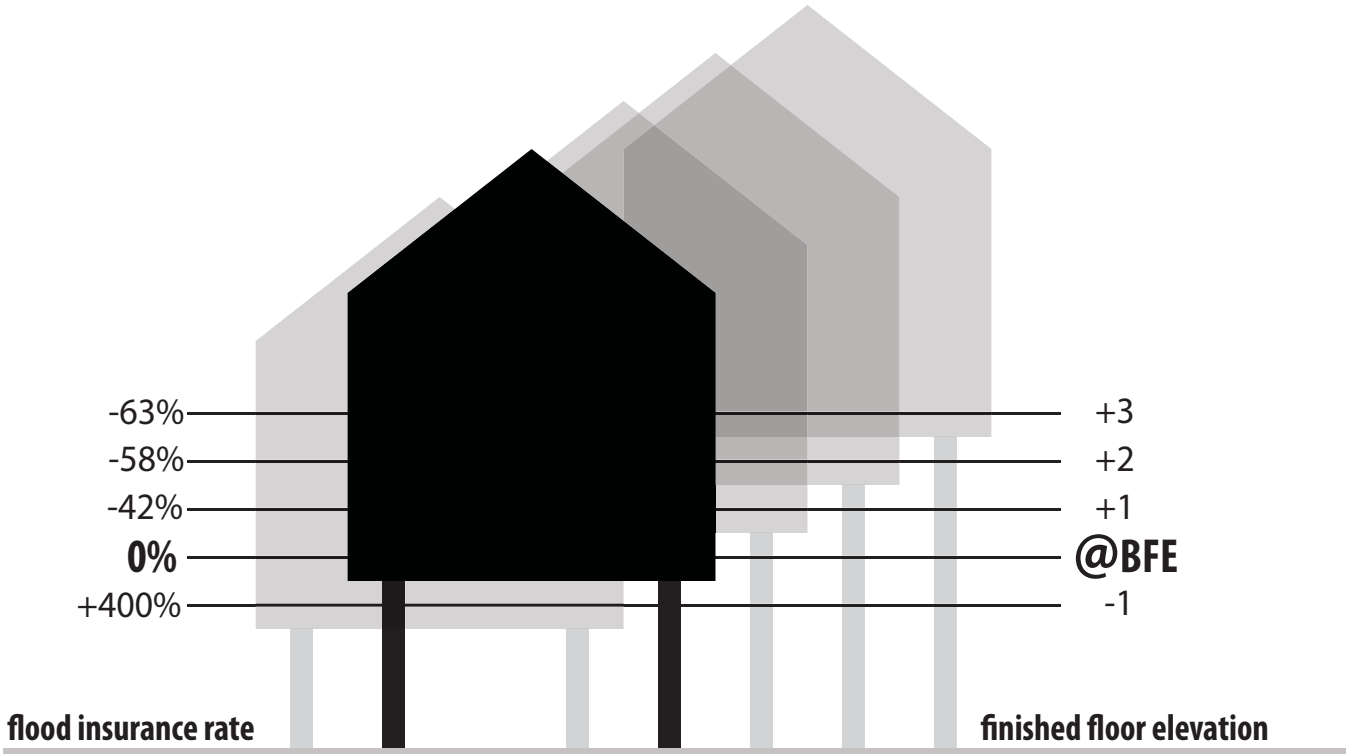
(Fig. 1) Costs and amounts developed from a hypothetical situation for an average home in Biloxi. Estimates based on anecdotal knowledge from GCCDS, Hope CDA, and local insurers and realtors.

Reducing the cost of wind insurance is difficult. The Mississippi Wind Pool offers reduced insurance rates for structures that meet one of two levels of construction standards: wind-resistive or semi-wind-resistive. The Mississippi Wind Pool also recommends the Institute For Business and Home Safety's (IBHS) fortified home program in lieu of its own semi-wind-resistive standard. The IBHS provides for more flexibility in construction and has proven to be an effective program for creating stronger houses and lower insurance costs. If IBHS standards are met, the homeowner qualifies for a reduced insurance rate. The rate credit for meeting the IBHS standards is close to that given for meeting the wind pool's semi-resistive standards. In the first year of insurance, a 55% reduction is awarded. In the second year a 50% reduction is awarded. In the third year a 45% reduction is awarded, and every year afterwards a 40% reduction is awarded. For information on the construction methods used in the IBHS see their website (www.ibhs.org) or "Fortified…for safer living," their builders guide for the standards.

Flood insurance is funded through a federal program called the National Flood Insurance Program (NFIP), which is managed by the Federal Emergency Management Agency (FEMA). The NFIP offers flood insurance to homeowners, renters, and business owners in communities that have adopted and enforced ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. The insurance policies are sold and serviced by private companies but backed by the federal government through FEMA. The NFIP sets rates and requirements that dictate the cost of flood insurance.

The cost of flood insurance is based on the year of construction, the building occupancy, the location of immobile contents, flood zone classification, lowest level in relation to the base flood elevation (BFE), the deductible, and the amount of coverage. Most of these factors are not easily manipulated to achieve lower rates. The most effective way to reduce flood insurance rates is by elevating the building. Raising a home one foot above the BFE can yield a 42% reduction in the cost of flood insurance. Raising the home a total of 3 feet above the BFE can reduce the cost of flood insurance by 63%.

The Gulf Coast Community Design Studio has begun to research flood proof construction for commercial or mixed-use buildings. In some cases, these buildings can be floodproofed below the BFE (or the appropriate design flood elevation) to meet regulatory and flood insurance requirements. Residential spaces must be elevated above the BFE whether or not they are flood proof. Check the community floodplain management ordinance, the applicable building codes, and other federal, state, and regional codes for additional requirements.



(Fig. 2) Reductions and rates for 'A zones' based on information published by the National Flood Insurance Program in the "Rate Comparisons" section of the Flood Insurance Manual.[2] (Note: Different requirements apply for 'V-zones' and other High Hazard Areas.)

II. Energy Efficiency in Homes

Topics relating to energy efficiency are some of the most widely discussed issues in the building industry today. A broad scope of information relating to techniques, technologies, and products, while useful, at times undermines the clarity of the core concepts of energy efficiency. This inundation of information can be intimidating to builders who may choose to maintain their current standard of energy performance rather than risk being overwhelmed by the quantity of information. Understanding some of the core concepts of energy efficiency and synergies between lowering energy consumption and human and environmental health can help an energy-consious builder harness the relevant information and find productive methods from the larger discussion.

BACKGROUND

Ideas relating to increasing the energy efficiency of equipment and buildings was first popularized during the oil crisis in the early 1970s, when demand for energy began to outstrip supply. The notion that Americans could meet their energy needs by increasing efficiency rather than increasing energy production was presented as a means to reduce our foreign dependence on fossil fuels (which remains our main source of energy, accounting for 71% of our energy production today[3]). Conservation of energy was effective in both decreasing the nation's energy demand and lowering the energy costs in buildings.

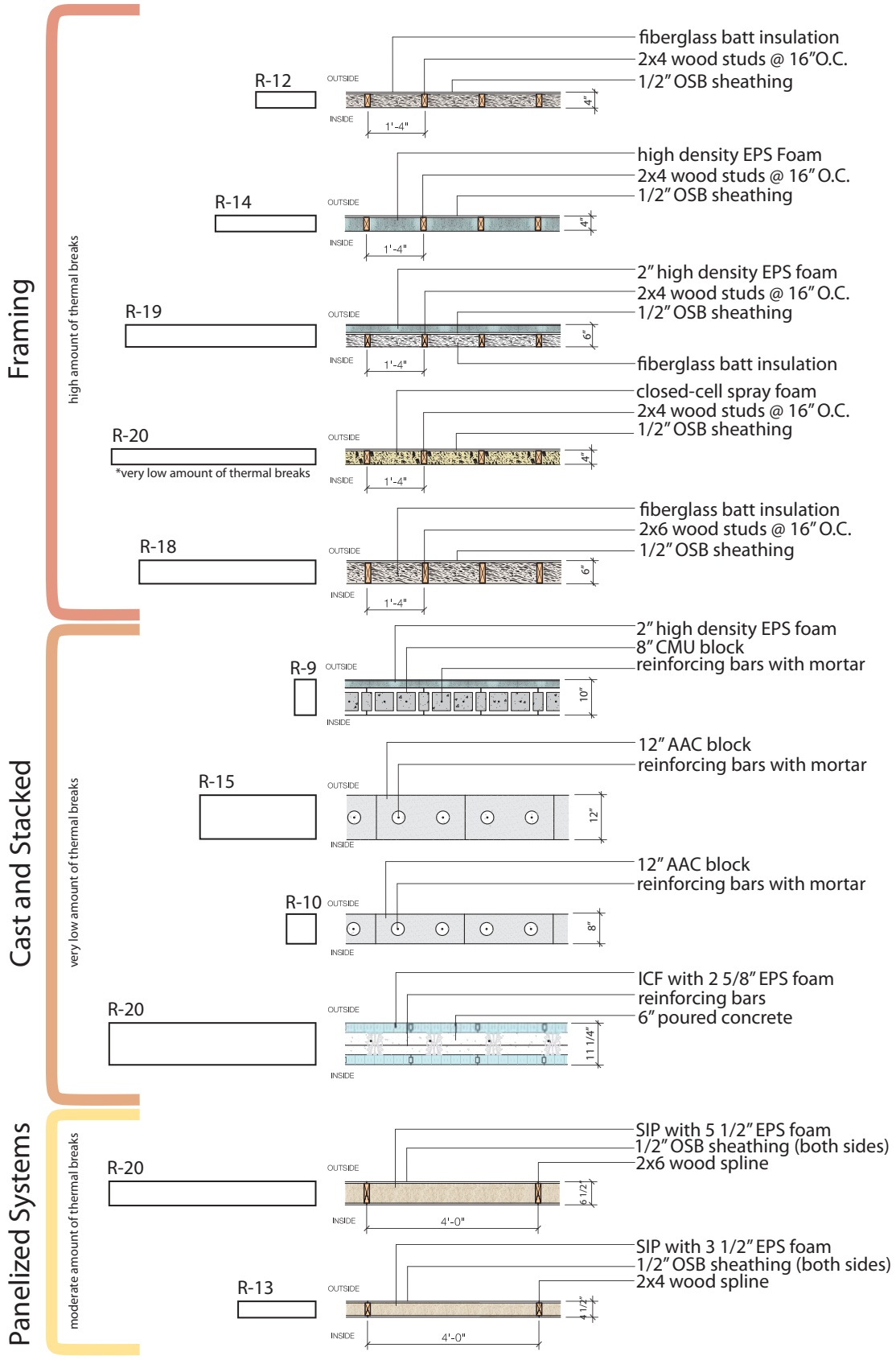
More recently, a second position has emerged that promotes energy-efficiency for reasons other than lowering net energy costs for buildings. This position endorses energy-efficient measures as a way to cut down on the environmentally dangerous emissions from fossil-fueled power plants that contribute to global warming and ozone depletion. Buildings currently use 73% of the electricity produced in the United States[4], so even minor reductions in the quantity of energy demand can have significant effects on the health of humans and the environment related to carbon dioxide levels, airborne pollutants, and environmental contamination. Additionally, a reduction in fossil fuel demand could translate into decreased mining and drilling activity in environmentally sensitive areas and nature preserves.

It has been shown that many measures that seek to increase energy efficiency also have quantifiable benefits for the health and comfort of building occupants. Locating windows with adjustable shades near work areas in offices, for example, can lower energy bills by decreasing lighting demand and increase occupant well being by providing direct lines of sight to the outdoor environment, which has been shown to increase both worker productivity and satisfaction.

STRATEGY

Regardless of whether developers, architects, and builders choose to seek energy-efficiency for reasons of cost, human health, or environmental impacts, the strategies are largely the same. The 2 main strategies to decrease energy consumption are reducing demand and increasing efficiency. Reducing demand means lowering the need for energy consumption by using preventative measures. For instance, roof overhangs can reduce solar heat gain and lessen the demand for mechanical cooling. Increasing efficiency means installing equipment that uses less energy during operation. For instance, some air-conditioning systems use less energy than conventional models.

It is important to understand how the strategies of reducing demand and increasing efficiency work together. For example, the most effective way to reduce negative impacts from automobile use is to reduce demand by driving less and increasing efficiency by making cars that use less fuel when in use. When these strategies are not used together, they are significantly less effective. For instance, to install an energy-efficient air conditioner but then keep the building overly cooled by running the unit unnecessarily would undermine the goal of energy efficiency.



(Fig. 3) Comparing the thermal performance of different wall sections shows that thickness and material affects the R-value of an assembly. Despite their thickness concrete walls do not have high R-values, highlighting the need to insulate if the performance of a framed or panel wall is going to be matched.

TACTICS

Although it would be impossible to outline all of the tactics used to implement the stratigies of energy efficiency in a brief appendix, the following are several measures that can have quantifiable impacts on the consumption of energy. New tactics and technologies are becoming available every day, and ongoing research is recommended.

The following measures are broken into the 2 main strategies of Reducing Demand and Increasing Efficiency, although there is some overlap between the tactics.

Reduce Demand

Shading Building Surfaces: Blocking buildings, particularly windows, from excessive amounts of direct sunlight can have a dramatic impact on the amount of solar heat gain on buildings. Shading can be accomplished by placement of trees, roof overhangs, louvers, vertical shades, and other buildings. The southern and western sides of the building are the most important to shade. Additional information can be found in the Environmental Appendix III.

Adequate Ventilation: Thermal comfort is affected by a combination of radiant temperature, air movement, and humidity. By inducing air movement through buildings, occupant comfort can be improved considerably without the use of a air conditioner. In particularly hot and humid climates like the Gulf Coast, these measures can extend the number of days per year when mechanical air conditioning is not required. Ventilation can be increased by capturing air flow through windows with cross-ventilation, or exhausting air from the building via vents, thermal chimneys, or whole-house ventilation fans. It can be achieved more simply through the generous and thoughtful placement of ceiling fans.

Building Envelope: An efficient building envelope can help maintain desired temperatures and prevent swings in temperature as exterior conditions change. Windows with low solar heat gain coefficients (SHGC) and low U-values, proper insulation of walls, and comprehensive sealing of all joints can create an envelope that helps maintain a consistent temperature inside the building envelope while lowering loads on HVAC systems. Additionally, employing advanced framing techniques (such as 2x6 studs at 24" on center) allows for a more continuous insulation barrier and thicker insulation in wall cavities. Addional information on insulation can be found in Chaper 7.3 and in Chapter 4.2

Rainwater Collection: Collecting rainwater in holding tanks for irrigation or for non-potable uses (i.e. flushing toilets, washing clothes, etc) can lower the amount of energy used to harvest, treat, and transport water from municipalities facilities. Additional information can be found in the Environmental Appendix III.

Efficient Floor Plans: Perhaps the most overlooked aspect of energy-efficient construction is space-efficient floor plans. By avoiding excessive square footage and underutilized spaces, heating and cooling loads for a building can be dramatically reduced.

Durability (materials, flashing, protection, water/vapor barriers): Durability is perhaps the most critical aspect of sustainability. Buildings with low quality materials and construction have great potential to be destroyed during hazardous weather or be a source of homeowner dissatisfaction, which can lead to the buildings' deliberate demolition. The materials that once comprised buildings ends up in landfills or pollutes landscapes and bodies of water upon demolition. The production of new materials often involves highly environmentally detrimental manufacturing processes using toxic chemicals and large amounts of energy.

Material Use (reused, reclaimed, salvaged, recycled, rapidly renewable, engineered wood): Tremendous amounts of energy are used in the production of construction materials. Material lifecycle processes such as harvesting, manufacturing, transportation, installation, use, and disposal all have economic, environmental, and human health impacts that should be understood and considered during the material selection process. Materials should be chosen that have fewer negative effects on human and environmental health and less energy embodied in there production.

Regional Materials: Buying local products increases demand for building materials and products that are created within the region, supporting the use of indigenous resources and reducing the enegry used in transportation.

Solar Water Heating: The sun's heat can meet much of a home's water heating needs without using electricity or gas. Solar water heating systems are typically used in combination with an electric or gas-fueled backup system, thus reducing the amount of energy required to heat the water while maintaining a consistent hot water supply.

Motion Sensors or Occupancy Sensors for Lights: Automatically shutting off lights can reduce the process loads for lighting in a building, which can be quite significant.

Light-Colored Roofing: Light-colored and reflective roofs can reduce the solar heat gain absorbed by a building. The most common type of metal roof comes in sheets made of galvanized aluminum and can reflect much of the heat that would be absorbed by other materials, such as asphalt shingles. Additional information on metal roofing can be found in Chapter 8.4.

Radiant Barriers: Radiant barriers are reflective sur-

faces that can be installed in attic areas to significantly reduce heat gain from radiation from the exterior. Additional information on radiant barriers can be found in Chapter 8.1.

Venting Attics: Venting hot air from attic spaces reduces the amount of heat transfer from hot attics into homes, which lowers cooling loads. It also provides a route for moisture to escape from attic spaces, preventing problems associated with moisture buildup in warm attics. There are mechicanical and passive methods for expelling air from an attic, both with advantages and disavantages. Information on venting attics can be found in Chapter 8.1.

Increase Efficiency

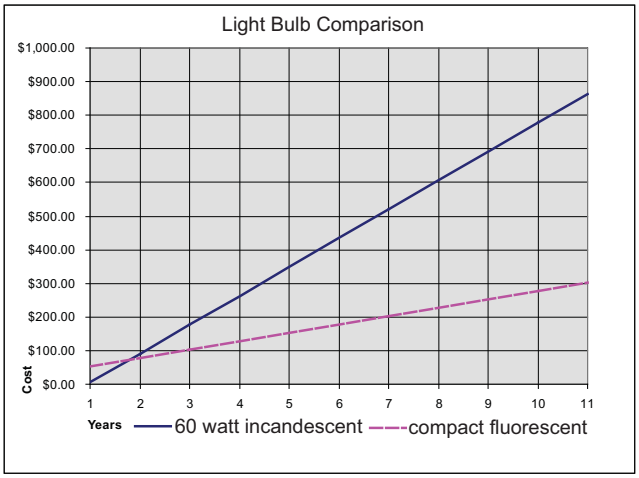
CFL Bulbs: Compact fluorescent light bulbs are perhaps the easiest way to reduce energy costs in buildings. Each light provides an estimated $62 savings over the life of each bulb, and lasts 6-15 times longer than an incandescent bulb.[5]

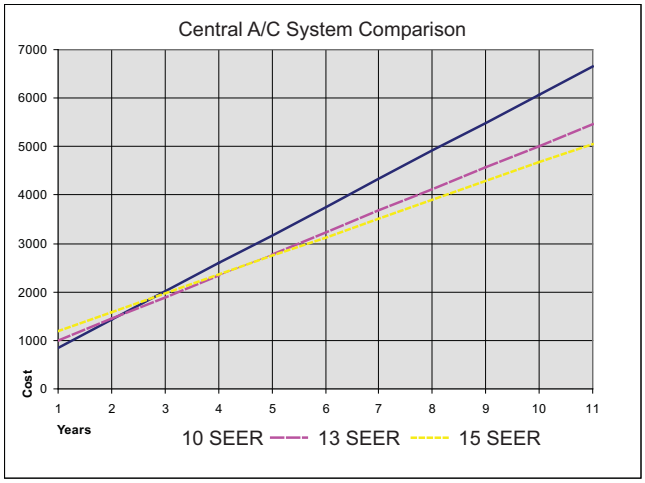
HVAC SEER Rating: The seasonal energy efficiency ratio for HVAC systems measures the efficiency of heating and cooling systems during their heating and cooling cycles. As of January 2006, no HVAC system with a SEER rating of less than 13 can be sold in the United States. Systems are currently available with SEER ratings up to 22.

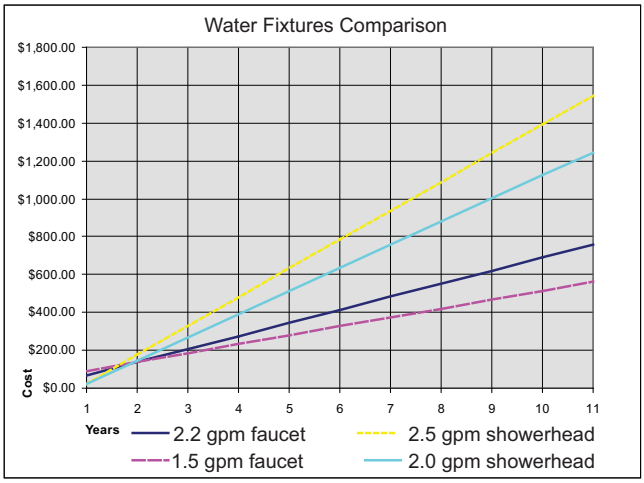
Water Fixtures: Fixtures that exceed the United States Energy Policy Act of 1992 requirements for flow and flush rates can help save tens of thousands of gallons of water over their lifetime. Using less water lowers both utility bills and the amount of energy used to harvest, treat, and transport water for municipalities.

Tankless Water Heaters: Tankless water heaters (also called instantaneous, inline, flash, on-demand, or instant water heaters) eliminate the standby heat loss of conventional water heaters by heating water instantly as it flows through the device. This differs greatly from conventional water heaters, which heat a large quantity of water to a certain temperature and maintain that temperature indefinitely until the water is used.

Energy Efficient Appliances: Appliances that have the Energy Star label have demonstrated a quantifiable energy savings over comparable appliances, often yielding a savings of up to 20-30% over their conventional counterparts.[6]







(Fig. 4-6) Cost comparisons, over time, of various energy efficiency products. Data based on market research by GCCDS.

III. Site Work

There are many systems to consider when designing and integrating a building into its site. The following systems deal with environmentally sound approaches to two major factors that affect the Mississippi Gulf Coast, storm water and heat.

Porous Paving

Porous paving systems provide surface stability and allow storm water to filter through the material into the ground rather than sheeting off the site at a high velocity. This takes advantage of the natural capacity of the soil to filter out pollutants and return the filtered water to the water table, reducing pollution and the need for expensive stormwater management infrastructure such as culverts and drains.

Porous paving materials include gravel, shells, stone fines (various rocks crushed to a size smaller than gravel), unit pavers of various materials, porous asphalt, porous concrete, flexi-pave, and grass pave, among others. Porous paving can be as sturdy as non-porous paving and offer additional advantages. Porous paving often will have lower surface temperature and less glare than non-porous paving. Porous paving has the added value of being more attractive and environmentally preferable than materials like asphalt.

Porous paving systems can cost more than conventional paving systems due to their slightly longer preparation and installation processes. Conventional concrete paving, once poured, can set in a few days and be ready for use, whereas porous concrete has to set for up to a week. Because porous concrete has a low water content, it must be misted and covered while curing to ensure full hydration.

It is important to prepare a sub-base that is appropriate for the porous paving being installed. The sub-base should not be compacted, as it must be more porous than the final paving material in order for water to penetrate through to the soil.

Rain Gardens and Bioswales

Rain gardens and bioswales use simple site grading, vegetation, and minimal infrastructure to passively manage stormwater on site. As a result, they reduce the need for expensive constructed infrastructure such as concrete and metal culverts, and they reduce the amount of water entering a municipality's treatment system. Bioswales, which are vegetated channels, and rain gardens, which can take many forms, are inexpensive and simple to build with typical site forming machinery as part of the overall site grading process.

By creating depressions in the ground that hold rainwater and allow it to be absorbed by plants or gradually percolate into the ground, rain gardens and bioswales reduce the quantity and velocity of water runoff. They keep stormwater from overloading local water bodies, especially within urbanized areas, thus reducing flooding. They also provide habitat for birds, insects, and small animals.

Existing low-lying areas can easily be converted into a rain garden. The soil in the area must be able to absorb water and provide nutrients for the plants. If a low-lying area drains into an area drain, that area can be converted into a rain garden as well, by raising the drain pipe. The height above grade of the drain pipe will determine how large the rain garden is, depending on the site's topography. For plant choices, consult your local university extension agency for a native plant species list that will be appropriate for a rain garden or bioswale.

(Fig. 7) Porous paving systems are available in many different forms and materials, which allows for flexibility in choosing the right paving system for each project.

(Fig. 8) Rainwater collection systems are used to store rainwater for irrigation, and for reuse with building greywater systems.

Rainwater Collection

A third strategy for managing storm water runoff on site is to install rainwater collection systems. Rainwater collected from the roofs of buildings can be stored and later used for things like flushing toilets or irrigating plants. Rainwater collection systems hold this "grey water" above ground in a cistern or below ground in a vault. Above-ground cisterns work well for irrigation because they use gravity to force the water out. However, the system should be enclosed to reduce potential mosquito breeding. Cisterns vary in price and size and are easy to install. Below-grade vaults are better for the use of internal systems that require a pump. They can be expensive but because they are installed below grade they do not interfere with other site uses. Installation of a rain water system requires an up-front investment that will pay off with use. It is important to properly calculate the amount of water that will be used and to consider available space when sizing a water collection system. Average rainfall amounts and the amount of water that can be collected should also be considered and a proper runoff strategy should be designed to handle large rainstorms. Check with governing municipalities before installation, as many along the Gulf Coast limit or ban the use of these systems.

Planting Screens

Planting screens are vertical screens of vegetation that provide shade, privacy, and security. These systems are usually made of a metal mesh or wire along which vines grow. By using deciduous vines, which lose their leaves in winter, a planting screen can provide shade from the summer sun and still allow warm light to pass during the winter, helping to lower energy bills year round.

There are a number of products on the market that are made specifically for creating planting screens. They can be attached to a building or be freestanding and can be made to fit most any form. There are also a number of climbing plant species that can be used to create a planting screen including climbing roses, ivy, jasmine, grapes, and beans.

Native Plants

A native plant is one that grows in the habitat from which it originated. Just because a plant is growing in the forest or field does not mean that it is native. Many plant species that grow in this area were introduced and are invasive, such as Chinese Privet, Kudzu, and the Chinese Tallow Tree. It is best to refrain from using invasive species, as they can choke out other desired species. Even if an invasive species is in a yard, wind, water, and animals will spread the seeds to other areas where the invasive species can take over and result in native habitat loss.

When developing a site plan it is important to identify what plants exist on a site and which of those plants should be salvaged. Native plants require less irrigation and provide healthy habitats for local animal species. Taking an inventory and striving to reuse existing plants in a new design can lead to cost savings. Many nurseries will have native species in stock. These plants, which have often been grown locally, are already adapted to the local climate and therefore more likely to survive after being planted.

The local extension agency can provide both native and invasive species lists.

(Fig. 9) Planting screens provide shade, beauty, and security for structures and can either be attached to the structure or stand independently. (photo: Jakab®)

site work	construction process	speed	delivery method	required equipment	specialized labor	wind resistance	water resistance	fire resistance	thermal performance	life span	environmental impact	product versatility	market exposure	code approval	affordability	coastal considerations
porous paving	+		+	+	−					+	+	+	−			
rain gardens & bioswales	+	+	+	+	+					+	+				+	+
rain water collection	+	+	+	+	+				+	+	+	+		−		
planting screens	+	−	+	+	+						+				+	
native plants										+	+		−		−	

IV. Further Research

Gulf Coast Community Design Studio
www.gccds.org
A digital version of this document as well as updates and additional information are available for download on the Gulf Coast Community Design Studio web site.

Materials / Products

Toolbase
www.toolbase.org
A resource for technical information on building products, materials, new technologies, and housing systems. Researched by the NAHB with funding from HUD and PATH.

PATH
www.pathnet.org
PATH is a public-private partnership for the advancement of housing technology. Funded by HUD and industry partners, PATH provides technology guides, studies, and other housing technology resources.

Building Science Corporation
www.buildingscience.com
A resource for information on building performance of all types. Web site contains reports and studies, as well as information on books, seminars, and consulting.

Porous Paving Systems
www.perviouspavement.org
www.uni-groupusa.org
www.invisiblestructures.com
Resources for information on porous paving systems. Web sites contain reports and studies, as well as information on appropriate product applications.

Rainwater Collection Systems
www.invisiblestructures.com
www.harvesth2o.com
www.ecofriendlyhouses.net
Resources for information on rainwater collection systems for small to large applications. The sites also contain information on specific products and manufacturers.

Planting Screen Systems
www.greenscreen.com
www.jakob.ch
Companies that manufacture planting screen systems for small to large applications. The sites also contain information on specific products and how and where to apply specific systems.

Native Plants
www.msucares.com
This website provides lists of Mississippi native plant species as well as invasive species to avoid.

Builders Guide to Hot Climates
Joseph Lstiburek, Building Science Press, 2005. This book is a particularly good resource for coastal construction.

DESIGNhabitat
www.cadc.auburn.edu/soa/design-habitat/index.html
A resource of the ongoing program at the College of Architecture at Auburn University investigating new methods for using manufactured housing to build high quality affordable housing.

Safety Standards

International Code Council
www.iccsafe.org
The International Code Council is a membership association dedicated to building safety and fire prevention. The building codes developed by the ICC are adopted (often with modifications) in the majority of United States cities, counties, and states. The ICC is also in the process of developing energy and environmental standards.

The Coastal Construction Manual
www.fema.gov/rebuild/mat/fema55.shtm
The Coastal Construction Manual is intended to help design professionals, state and local officials, and builders mitigate the impact of natural hazards on one- to four-family residential buildings in coastal areas.

Recommended Residential Construction for the Gulf Coast
www.fema.gov/library/viewRecord.do?id=1853
FEMA published the Recommended Residential Construction for the Gulf Coast, a design manual available online that provides recommended designs and guidance for rebuilding homes destroyed by hurricanes on the Gulf Coast. The manual also provides guidance in designing and building new homes to reduce the risk to life and property.

National Flood Insurance Program
www.floodsmart.gov
This web site contains information on the National Flood Insurance Program. It also has answers to frequently asked questions and links to more resources. Technical definitions used for the NFIP can be found at http://www.fema.gov/business/nfip/19def2.shtm

Environmental Standards

Southface Energy and Environmental Resource Center
www.southface.org
Southface is a nonprofit providing environmental education and outreach. A resource for home rating systems such as EarthCraft and other efficiency testing.

The U.S. Green Building Council
www.usgbc.org
The U.S. Green Building Council is an organization that certifies buildings, products, and professionals according to their level of environmental practices. The main program of the USGBC is the LEED program. There is also a "LEED for Homes" program.

NAHB National Green Building Program
www.nahbgreen.org
The National Association of Home Builders is an industry group. They have developed a green building program that includes competitions and awards for home builders meeting the NAHB green building standards.

National Green Building Standards 2008
NHAB/ICC, Builderbooks.com, 2009.

U.S. Department of Energy
www.eere.energy.gov/
The clearinghouse for the Department of Energy's programs on energy efficiency and renewable energy. A source for home technologies, practices, and grants relating to better energy efficiency in the home.

U.S. Environmental Protection Agency
www.epa.gov
The Environmental Protection Agency has several programs relating to construction materials and their effects on the environment as well as programs and information for ensuring that site work is responsive to the local environment.

Mississippi State University Extension Service
www.msucares.org
This web site offers extensive information on environmental issues and solutions for residents of Mississippi, including information on local weather, animals, plants, and habitats.

Green Home Guide
www.greenhomeguide.org/
Another program from the USGBC aimed at environmentally friendly buildings. Green Home Guide is a resource more focused on living and maintaining a home in an environmentally positive way.

Earth Craft House
www.earthcrafthouse.com/Earth
Earth Craft is a certification program based out of Atlanta.

V. Glossary of Construction Terms

Air Barrier: *Air barriers control the movement of air, which helps limit the movement of moisture, but they are not impermeable to water. Air leakage through a building envelope (wall) is controlled by an air barrier.*

Base Flood: *The base flood is defined as a flood having a one percent chance of being equaled or exceeded in any given year. Also known as the '100-year flood,' it is the standard used by the National Flood Insurance Program to determine flood insurance and floodplain development requirements.*

Bearing Capacity: *In geotechnical engineering, bearing capacity is the capacity of soil to support the loads applied to the ground. This is a measure of how much pressure between the soil and the foundation can be supported without a shear failure in the soil.*

BFE: *The Base Flood Elevation is shown on the Flood Insurance Rate Map (FIRM) for Zones AE, AH, A1-A30, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO, V1-V30, and VE, indicating the water surface elevation resulting from a flood that has a one percent chance of being equaled or exceeded in any given year. The relationship between the structure's elevation above grade and the BFE determines insurance rates.*

Black/Blacked In: *"Blacked in" typically means that the house is structurally complete and covered in a weather protective layer. Historically, the housing paper that was applied to house once the structural and framing work was complete was made with tar and black in color, hence the term "blacked in."*

C.O.: *The certificate of occupancy, referred to as the C.O., is the final inspection and certification that allows the completed building to be occupied.*

Coastal Comfort Advantage: *Comfort Advantage is an energy-efficient home program offered by the Coast Electric Power Association, providing homeowners with the latest energy efficiency standards and cash rebates when they sign up and qualify.*

Compression: *Physical compression is the force pushing on an object or squeezing it. In residential construction, compression normally happens along the vertical axis, as with the weight of a roof structure loaded onto a wall.*

Continuous Load Path: *A method of construction that ties a building together from the roof to the foundation provides a continuously tied path for load forces to be transmitted through the building. A building built with a continuous load path can withstand forces from high winds.*

DFIRM: *Digital Flood Insurance Rate Maps are an online resource for base flood information and other information related to FEMA's National Flood Insurance Program.*

Dry In: *A level of completion during construction. Once the exterior windows and doors have been installed and the roofing is complete the house is considered "dried in." This is because the interior of the house is secure and protected from the weather.*

Energy Star: *ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that promotes energy-efficient products and practices. Appliances and fixtures with an ENERGY STAR rating consume less energy than comparable non-ENERGY STAR products. An entire house can be ENERGY STAR certified through the purchase of these appliances and additional energy saving construction practices.*

Embodied Energy: *Embodied energy refers to the amount of energy used to create a product, transport it to the site, and install it. This is more comprehensive way of measuring the environmental impact of a product.*

Fill: *Often referred to in foundation work, "fill" refers to the soil, stone, or other material used for building up the level of grade at a site.*

Finished Floor Elevation (FFE): *A measurement from the finished grade to the top of the first finished floor surface.*

Footing: *The lowest part of a subgrade foundation system. Footings are wider than the foundation structures they support in order to distribute the load effectively and to resist uplift.*

Form work: *Form work is the structure (often wood or cardboard) into which concrete is poured and allowed to set. It gives concrete its final shape and surface texture.*

Freeboard: *In addition to the base flood elevation, some municipalities choose to require additional elevation, called freeboard, as an additional safety factor. Freeboard is typically described in number of feet above the base flood elevation. Adding freeboard can lead to lower flood insurance rates for an individual building and for the community at large.*

Grade: *The finished surface of the soil or ground layer on a site.*

Grade Beam: *A grade beam is a reinforced concrete beam installed on or at grade, often used to provide horizontal support to piles or deep foundations.*

Gravel: *Aggregate composed of hard and durable stones or pebbles, crushed or uncrushed, often mixed with sand.*

Grout: *In masonry, grout is a thin, coarse mortar poured into cavities and cracks in masonry to fill and join the blocks into a solid. When referring to tile, grout is a thin fluid mortar used to fill the spaces between the tiles and create a finished surface.*

HVAC: *Heating, ventilation, and air conditioning are the mechanical systems that handle climate control and movement of air in a building.*

IBC: *The International Building Code. Most municipal building authorities adopt some version of this document to ensure buildings are constructed to a safe standard. There is also an* **IRC,** *International Residential Code, which is written specifically for small residential construction.*

LFE: *The lowest floor elevation is the measured distance of a building's lowest floor above the National Geodetic Vertical Datum (NGVD) or other datum specified on the FIRM for that location, and defining the topographical grade of a site.*

Life Span: *The life span of a product refers to its time of use and its time as waste. Its important to know how long a product will be of use when comparing cost and installation times.*

Load: *Structural loads are physical forces on a structure such as weights or natural forces . The weight of the building itself is called the dead load; the weight of people and objects in a building is called the live load; and other forces, such as environmental or wind loads, are called dynamic loads.*

Load-Bearing: *A load-bearing element is one that transfers a building's live- and dead-load forces to other parts of the structure. A load-bearing wall, for instance, transfers the weight and forces resting atop the wall to the floor structure and foundation. By contrast, non-load-bearing walls simply form partitions between spaces and are not integral to a building's structure.*

Load Bearing: *Generally refers to structural walls in a home. Walls which support the roof or floor above them and cannot be removed or reduced without consideration for the houses ability to stay stable. "Non-load Bearing" refers to the walls which can be removed without danger of the house falling down.*

Lowest Floor: *The lowest floor of the lowest enclosed area (including a basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a building's lowest floor provided that such enclosure is not built so as to render the structure in violation of requirements.*

Mechanical Systems: *Refers to the HVAC systems in a building.*

Moisture Barrier: *A moisture barrier is similar to an air barrier, but is used to resist the diffusion of moisture through a wall.*

Mortar: *Mortar is a mixture of lime and cement with sand and water, used as a bonding agent between bricks and stones.*

Offgassing: *The evaporation of volatile chemicals in materials at normal atmospheric conditions. Building materials can release chemicals into the air through evaporation continuously for years after the products are initially installed. Materials such as paints, stains, varnishes, carpet, insulation, flooring, kitchen cabinets, countertops, plywood, particleboard, and paint strippers can be prone to offgassing. Absorbent materials like drywall and carpet can absorb these gases.*

Overturning: *Lateral forces from wind can cause buildings or parts of buildings to rotate, overturn, off their foundation.*

Porous Paving: *Paving constructed from materials that permit percolation of storm water to the soil below.*

Pressure Treated Wood: *Wood treated with chemicals applied under pressure to reduce decay in the field. Types of pressure treated wood include; ACQ (Alkaline Copper Quaternary), MCQ (Micronized Copper Quat), CCA (Chromated Copper Arsenate), and CAB (Copper Azole).*

R-Value: *R-value is the measure of the thermal resistance of a material. The higher the number, the better a material insulates. R-value is used to measure the insulative effectiveness of individual components such as windows and insulation as well as whole wall or roof assemblies. Local energy codes require construction to meet certain R-values.*

Racking: *Lateral forces such as wind acting on the frame of a house can cause deformation called "racking" in which a rectangular shape is tilted into a parallelogram with oblique angles.*

Rebar: *Steel bars or rods used to reinforce concrete. As concrete can only handle compressive forces, rebar is necessary to absorb any tensile forces applied to a concrete element.*

Runoff: *The amount of precipitation carried away from the area on which it falls.*

Shear: *A force acting parallel to a surface.*

Shear Wall: *Walls braced to counter the lateral forces on a building. Typically if a building is a rectangle, the shear walls will be the short sides, braced in a way to keep the long side from deforming. They can be bearing or non-bearing, exterior or interior.*

Sliding: *Wind exerts horizontal pressure which can cause a home to slide off its foundation if not properly anchored.*

Stick Framing: *Light wood framing using dimensional lumber is a construction method commonly called stick framing. It is a common form of residential construction.*

Sonotube: *Sonotube is a brand name of cardboard concrete formwork. It is used as a formwork for concrete when pouring foundations. The product can be easily removed from the concrete once it has hardened.*

Stone Fines: *Stone that is crushed into pieces smaller than gravel and larger than sand. Stone fines are normally used as paving in low volume traffic areas such as park pathways or residential drives and paths.*

Subbase: *The layer of aggregate material between the subgrade and the final layer of paving.*

Tension: *Tension is the measure of a force pulling on a object. It is the opposite of compression. Tension can be applied to cables, chains, and rods, but it is also a force in action when a beam spans between two points.*

Thermal Bridge: *Materials with low thermal resistance conduct heat. When these materials make contact with both the interior and exterior faces of a building, like the studs in a typical stud wall assembly, they create a bridge through which heat is transferred between the interior and exterior of the building. This can considerably reduce the insulative performance of a wall and make the interior more expensive to condition.*

Thermal Break: *A material of low thermal conductivity placed in an assembly between two materials of high conductivity is called a thermal break. Thermal breaks are used to stop the transfer of heat through a thermal bridge.*

Turn Key: *The stage of construction at which a house is ready to be occupied.*

Tyvek: *Tyvek is a registered trademark of DuPont. It is a water intrusion barrier that allows vapor, but not water, to pass through. It is often used to wrap houses once the sheathing has been installed, but before exterior siding has been installed.*

Unit Pavers: *Manufactured pavers that are made to interlock to create a patterned, paved surface. Unit pavers can be laid in various ways to create either porous or impervious surfaces.*

Uplift: *The force of the wind pushing and pulling a building or its components upward. This force causes roofs to lift off of buildings and houses to lift off of foundations.*

Vapor Barrier: *A layer of material, such as plastic, used to prevent condensation inside a wall by retarding moisture transmission.*

V.O.C.: *Volatile organic compounds are harmful gases that are emitted from a material. The term volatile refers to the fact that these compounds vaporize, entering the air, under normal conditions.*

Wind Load: *The force created by the wind on the vertical surfaces of a building.*

VI. Endnotes

Chapter 1: Factory Assembled Systems

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Chapter 1: Factory Assembled Systems

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Fig.4	*Image from the Gulf Coast Community Design Studio*
Fig.5	*Image from www.flickr.com member "excel_homes"*
Fig.6	*Image from Eggrock LLC promotional material, http://www.eggrock.com/downloads.html*
Fig.7	*Image from Eggrock LLC promotional material, http://www.eggrock.com/downloads.html*
Fig.8	*Image from Eggrock LLC promotional material, http://www.eggrock.com/downloads.html*
Fig.9	*Image from Paddington Offsite promotional material, http://www.paddingtonoffsite.com*
Fig.10	*Image from Jade apartment building in NY, NY designed by Jade Jagger, http://jadeny.com/*
Fig.11	*Image from Jade apartment building in NY, NY designed by Jade Jagger, http://jadeny.com/*
Fig.12	*Image from Kb-pods web site, http://www.kb-pods.com/products.php*
Fig.13	*Image from Sears Online Archive, Homes 1933-1940, http://www.searsarchives.com/homes/1933-1940.htm*
Fig.14	*Image from the Gulf Coast Community Design Studio*
Fig.15	*Image from the Gulf Coast Community Design Studio*
Fig.16	*Image from the Gulf Coast Community Design Studio*
Fig.17	*Image from the Gulf Coast Community Design Studio*
Fig.18	*Image from the Gulf Coast Community Design Studio*
Fig.19	*Image from DESIGNhabitat web site, http://www.cadc.auburn.edu/soa/design-habitat/production2.html#*
Fig.20	*Image from DESIGNhabitat web site, http://www.cadc.auburn.edu/soa/design-habitat/production2.html#*

Chapter 2: Panelized Systems

Fig.A	*image from ACH Foam Technologies, http://www.achfoam.com*
Fig.B	*Image from ICS Rocky Mountain, http://www.ics-rm.net*
Fig.C	*Image from InnoVida, http://www.innovida.com*
Fig.D	*Image from Dynabilt, http://www.dynabilt.com*
Fig.1	*Image from Normanton Laminating Services Ltd., http://www.normanton.co.uk/images/*
Fig.2	*Image from ACH Foam Technologies, http://www.achfoam.com/ACH/media/images/SIPs/MISC021005%20052.jpg*
Fig.3	*Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*
Fig.4	*Image from IQ-Home, http://iq-home.com/SIP/SIP.htm*

Fig.5 *Image from Structural Insulated Panel Association, http://www.sips.org/content/technical/index.cfm?pageId=159*

Fig.6 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.7 *Image from Residential Advantage Building Systems, http://resadvan.com/index.htm*

Fig.8 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.9 *Image from Housing Constructability Lab, http://www.housingconstructabilitylab.com*

Fig.10 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.11 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.12 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.13 *Image from SIPS Team USA, http://www.sipsteamusa.com/gallery/FSUZERO/SIPS-01.html*

Fig.14 *Insulated Component Structures of Florida, http://ics-sips-fl.com/PhotoAlbum/Residential/index.htm*

Fig.15 *Image from InnoVida, http://www.innovida.com/projects.asp*

Fig.16 *Image from Green Building Talk, https://www.greenbuildingtalk.com/Forums/tabid/53/view/topic/postid/39155/Default.aspx*

Fig.17 *Image from ThermaBuilt, LLC, http://www.thermabuilt.com/flash_mod.php*

Fig.18 *Image from Insulated Component Structures – Rocky Mountain, http://www.ics-rm.net/en/index.php*

Fig.19 *Image from Marquis Construction & Development, http://www.southernsips.com/catisland.html*

Fig.20 *Image from Dynabilt, http://www.dynabilt.com/photos/*

Fig.21 *Image from Dynabilt, http://www.dynabilt.com/photos/*

Fig.22 *Image from Dynabilt, http://www.dynabilt.com/photos/*

Fig.23 *Image from Thermasteel Corportation, http://www.thermasteelcorp.com/media.html*

Fig.24 *Image from Thermasteel Corportation, http://www.thermasteelcorp.com/media.html*

Fig.25 *Image from Stormfighter Precast Homes, http://precasthouse.com/index.html*

Fig.26 *Image from National Precast Concrete Association, http://www.precast.org/publications/solutions/2006_spring/green_zone.htm*

Fig.27 *Image from Precast Building Solutions, http://www.precastbuildingsolutions.com/*

Chapter 3: Stacked Unit Systems

Fig.A *Image from Gulf Coast Community Design Studio*

Fig.B *Image from http://www.vobb.com*

Fig.C *Image from http://www.johnbooks.com*

Fig.1 *Image from Arrowsmith Homes, http://www.arrowdev. com*

Fig.2 *Image from the Portland Cement Association, http://www.concretethinker.com/*

Fig.3 *Image from Insulated Concrete Formwork Association, http://www.icfinfo.org.uk/pages/what-is-icf.php*

Fig.4 *Image from Upland Corporation, http://www.uplandteam.com/icf/*

Fig.5 *Image from Free ICF Homes Guide, http://www.buildyourfreehouse.com/icf-homes.php*

Fig.6 *Image from the Gulf Coast Community Design Studio*

Fig.7 *Image from Quality Communities, http://www.qcinc.net/images/icf10.jpg*

Fig.8 *Image from Verot Oaks Building Blocks, http://www.vobb.com*

Fig.9 *Image from Mason Contractors Association of America, http://www.masoncontractors.org*

Fig.10 *Image from Photobucket User blesht, http://www.s180.photobucket.com*

Fig.11 *Image from Clark Menefee, http://www.archidose.org/Blog/clark_manefee1.jpg*

Fig.12 *Image from the Gulf Coast Community Design Studio*

Fig.13 *Image from Arbuckle Costic Architects, http://www.arbucklecostic.com*

Fig.14 *Image from Precision Crafted Concrete Masonry Units, http://www.blocklite.com*

Fig.15 *Image from Hebel AAC, http://www.hebel.co/nz*

Fig.16 *Image from Encon Construction, http://www.enconconstruction.net*

Fig.17 *Image from Xella Aircrete North America, http://www.xella.com*

Fig.18 *Image from FlexCrete Building Systems, LLC., http://www.flex-crete.com*

Fig.19 *Image from the Portland Cement Association, http://www.cement.org*

Chapter 4: Framing Systems

Fig.A *Image from the Gulf Coast Community Design Studio*

Fig.B *image from "Family Handyman Magazine"*

Fig.C *Image from www.flickr.com*

Fig.1 *Image from the Gulf Coast Community Design Studio*

Fig.2 *Image from the Gulf Coast Community Design Studio*

Fig.3 *Image from the Gulf Coast Community Design Studio*

Fig.4 *Image from the Gulf Coast Community Design Studio*

Fig.5 *Image from the Gulf Coast Community Design Studio*

Fig.6 *Image from inHabit, http://www.inhabitdwellings.com/materials.htmlFig.7*

Fig.7 *Image from National Renewable Energy Laboratory, http://www.nrel.gov/docs/fy01osti/26449.pdf*

Fig.8 *Image from BuildingScience.com, http://www.buildingscience.com/documents/insights/bsi-018-westford-house/images/bsi018_photo_02.jpg*

Fig.9 *Image from ARCH 2602-Wood Properties and Connections, http://courses.cit.cornell.edu/arch262/notes/images/06b.08.jpg*

Fig.10 *Image from Kurowski Development Company, http://www.kurowski.com/dreamhomes/construction/Woodhaven/images/2008-12-09/07-We%20use%20LSL%20headers%20even%20for%20large%20nonstructural%20openings..jpgFig.12*

Fig.11 *Image from Flickr User sweden bygg, http://www.flickr.com/photos/swedenbygg/1445637529/sizes/o/*

Fig.12 *Image from Kurowski Development Company, http://www.kurowski.com/dreamhomes/construction/Woodhaven/images/2008-11-26/05-LSL%20headers%20-%20no%20drywall%20cracks..jpg*

Fig.13 *Image from Renovation Headquarters, http://www.renovation-headquarters.com/images/screwing%20track%20to%20floor.jpg*

Fig.14 *Image from Reader's Digest: The Family Handyman, http://www.rd.com/images/tfhimport/2001/Feb01_Using_Tools/20010201_Using_Tools_page001img001.jpg*

Fig.15 *Image from Home Construction Improvement, http://www.homeconstructionimprovement.com/wp-content/uploads/2009/03/metal-studs-300x300.jpg*

Fig.16 *Image from Center Circle Construction Corporation, http://www.centercircleconstructioncorp.com/images/steelframe.jpg*

Fig.17 *Image from PSL: Innovative Aluminum, http://www.partitions.co.nz/images/studs.jpg*

Fig.18 *Image from Okaw Truss Inc., http://www.okawtruss.com/images/floortruss.gif*

Fig.19 *Image from Casmin Inc., http://www.casmin.com/images/products_truss.jpg*

Fig.20 *Image from Lami Design, http://www.lamidesign.com/blog/imgs/oktray_const_22oct07_19s.jpg*

Fig.21 *Image from Flickr User: Barry Tse/B.Tse, http://farm4.static.flickr.com/3279/3035611249_17d954b98c.jpg*

Fig.22 *Image from Warren Truss Company Inc., http://warren-truss.com/assets/images/RoofTrussSys.gif*

Fig.23 *Image from Architecture for Humanity*

Fig.24 *Image from Blue Scope Steel, http://www.bluescopesteelasia.com/BlueScopeSteel/image/content/productgroup/Picture%20084.jpg*

Fig.25 *Image from Universal Forest Products, http://www.ufpi.com/product/rooftrusses/images/truss_manufact2.jpg*

Fig.26 *Image from Alan Richardson*

Fig.27 *Image from Roof-Truss.ie, http://www.roof-truss.ie/attic_window.jpg*

Fig.28 *Image from FTruss Technologies Inc., http://www.trusstechnologies.com/images/cranetruck.jpg*

Chapter 5: Elevated Foundations

Fig.A *Image from the Gulf Coast Community Design Studio*

Fig.B *Image from the Gulf Coast Community Design Studio*

Fig.C *Image from the Gulf Coast Community Design Studio*

Fig.D *Image from the Gulf Coast Community Design Studio*

Fig.1 *Diagram from the Gulf Coast Community Design Studio*

Fig.2 *Image from the Gulf Coast Community Design Studio*

Fig.3 *Drawing from the Gulf Coast Community Design Studio*

Fig.4 *Image from the Gulf Coast Community Design Studio*

Fig.5 *Image from the Gulf Coast Community Design Studio*

Fig.6 *Drawing from the Gulf Coast Community Design Studio*

Fig.7 *Drawing from the Gulf Coast Community Design Studio*

Fig.8 *Image from the Gulf Coast Community Design Studio*

Fig.9 *Image from the Gulf Coast Community Design Studio*

Fig.10 *Image from the Gulf Coast Community Design Studio*

Fig.11 *Image from The Old House Web, http://www.oldhouseweb.net/how-to-advice/concrete-floor-slabs-on-ground.shtml*

Fig.12 *Image from the Gulf Coast Community Design Studio*

Fig.13 *Image from the Gulf Coast Community Design Studio*

Fig.14 *Image from the Gulf Coast Community Design Studio*

Fig.15 *Image from Alan Richardson*

Fig.16 *Image from Architecture for Humanity*

Fig.17 *Image from the Gulf Coast Community Design Studio*

Fig.18 *Drawing from Architecture for Humanity*

Chapter 6: Flooring

Fig.A *Image from Gulf Coast Community Design Studio*

Fig.B *Image from Gulf Coast Community Design Studio*

Fig.C *Image from The Owner-Builder Book, http://www.ownerbuilderbook.com*

Fig.D *Image from http://ballutblocks.com*

Fig.1 *Image from Architecture for Humanity*

Fig.2 *Image from the Gulf Coast Community Design Studio*

Fig.3 *Image from the Gulf Coast Community Design Studio*

Fig.4 *Image from The Owner-Builder Book, http://www.ownerbuilderbook.com*

Fig.5 *Image from SpeedFloor USA, http://www.speedfloorusa.com*

Fig.6 *Image from Advanced Construction Concepts, Inc., http://www.accproducts.com*

Fig.7 *Image from Advanced Construction Concepts, Inc., http://www.accproducts.com*

Fig.8 *Image from Advanced Construction Concepts, Inc., http://www.accproducts.com*

Fig.9 *Image from Green Fever, http://greenfever.wordpress.com/2008/09/09/just-to-make-things-a-little-more-clear/*

Fig.10 *Image from U.S. Floors, http://www.usfloorsllc.com/*

Fig.11 *Image from Lumber Liquidators, http://www.lumberliquidators.com/*

Fig.12 *Image from Lumber Liquidators, http://www.lumberliquidators.com/*

Fig.13 *Image from Woolshire Carpet Mills Inc., http://www.woolshire.com/*

Fig.14 *Image from ECOsurfaces, http://www.ecosurfaces.com/*

Fig.15 *Image from Photoshop Textures, http://www.photoshoptextures.com/floor-textures/floor-textures.htm/*

Fig.16 *Image from BuildDirect, http://flooring.builddirect.com/*

Fig.17 *Image from Lowe's, http://www.lowes.com/*

Fig.18 *Image from Forbo, http://www.forbolinoleumna.com/*

Fig.19 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.20 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.21 *Image from the Gulf Coast Community Design Studio*

Fig.22 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.23 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.24 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Chapter 7: Walls

Fig.A *Image from the Gulf Coast Community Design Studio*

Fig.B *Image from the Gulf Coast Community Design Studio*

Fig.C *Image from http://www.pghsprayfoam.com*

Fig.D *Image from © Alan Karchmer*

Fig.1 *Image from House-Painting-Info, http://www.house-painting-info.com*

Fig.2 *Image from Escape Estates, Inc., http://www.escapeestates.homebuilders.com*

Fig.3 *Image from WE Masonry, http://www.wemasonry.com*

Fig.4 *Image from James Hardie, http://www.jameshardie.com*

Fig.5 *Image from Carol Mattson, http://www.surfpix.net*

Fig.6 *Image from Picasaweb user at http://www.picasaweb.google.com*

Fig.7 *Image from the Gulf Coast Community Design Studio*

Fig.8 *Image from Picasaweb user at http://www.picasaweb.google.com*

Fig.9 *Image from Berwyn Fire Company, http://www.berwynfirecompany.org*

Fig.10 *Image from Morris Farms Cypress Sawmill, http://www.morrisfarmscypresssawmill.com*

Fig.11 *Image from Lowe's Home Improvement Online, http://2.bp.blogspot.com/_XEQbaTzjzsw/SQEg_Z3FDYI/AAAAAAAAC70/UV7OPYQjOR8/s320/ZIP+system+sheathing+and+taped+joints.jpg*

Fig.12 *Image from the Gulf Coast Community Design Studio*

Fig.13 *Image from Windstorm OSB, http://windstormosb.com/images/methodbig/diag01.png*

Fig.14 *Image from Windstorm OSB, http://windstormosb.com/images/methodbig/diag01.png*

Fig.15 *Image from the Gulf Coast Community Design Studio*

Fig.16 *Image from Georgia Pacific, http://www.gp.com/build/images/products/nautilus_wallsheathing.jpg*

Fig.17 *Image from Directory M Articles, http://2.bp.blogspot.com/_XEQbaTzjzsw/SQEg_Z3FDYI/AAAAAAAAC70/UV7OPYQjOR8/s320/ZIP+system+sheathing+and+taped+joints.jpg*

Fig.18 *Image from Construction Links, http://www.constructionlinks.ca*

Fig.19 *Image from the Gulf Coast Community Design Studio*

Fig.20 *Image from Southwest Mobile Storage, http://www.swmobilestorage.com*

Fig.21 *Image from L&D Adhesives, http://www.adhesives.com*

Fig.22 *Image from Tianjin Huali Thermal Insulation Building Materials Co., Ltd., http://www.tradew.com*

Fig.23 *Image from M&D Insulation, http://www.mdinsulation.net*

Fig.24 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.25 *Daniel Friedman, InspectAPedia, http://www.inspect-ny.com/sickhouse/Green_Mold_Pictures.htm].*

Fig.26 *Image from Magnesiacore Inc., http://www.magnesiacore.com/*

Fig.27 *Image from Magnesiacore Inc., http://www.magnesiacore.com/*

Fig.28 *Image from Magnesiacore Inc., http://www.magnesiacore.com/*

Fig.29 *Image from Magnesiacore Inc., http://www.magnesiacore.com/*

Fig.30 *Image from Build LLC., http://www.buildllc.com/*

Fig.31 *Image from The Wood Whisperer, http://thewoodwhisperer.com/*

Fig.32 *Image from Alan Karchmer, http://www.alankarchmer.com/*

Fig.33 *Image from Earth and Wood Creations, http://www.earthandwood.bix/work/kitchen.html/*

Fig.34 *Image from Vincent Baudoin, Gulf Coast Community Design Studio*

Fig.35 *Image from Magnesiacore Inc., http://www.magnesiacore.com/*

Fig.36 *Image from Stonecleft LLC., http://www.earthrox.net/*

Fig.37 *Image from ArchiExpo, http://www.archiexpo.com/prod/cupamat/natural-stone-veneer-facing-interior-and-exterior-51785-125329.html*

Fig.38 *Image from Tim McKeough, New York Times, http://www.nytimes.com/2008/02/28/garden/28room.html*

Chapter 8: Roofing Systems

Fig.A *Image from www.flickr.com member "Christopher.johnson"*

Fig.B *Image from www.flickr.com users "Chubfisherman","Vinylindustries", and "Korrynne"*

Fig.C *Image from www.delafleur.com. the 168 elm "one drop at a time" project.*

Fig.1 *Image from "Radiant Barriers: Energy Fact Sheet," Southface Energy Institute, www.southface.org*

Fig.2 *Image from www.flickr.com member "van wagner_skzat"*

Fig.3 *Image from promotional web site for BTU Busters, http://www.btubusters.com/04RADIANT-BARRIER-PRODUCT.html*

Fig.4 *Image from promotional web site for Efficient Attic Systems, http://www.btubusters.com/04RADIANT-BARRIER-PRODUCT.html*

Fig.5 *Image from www.flickr.com member "van wagner_skzat"*

Fig.6 *Image from www.flickr.com member "van wagner_skzat"*

Fig.7 *Image from www.flickr.com member "van wagner_skzat"*

Fig.8 *Image from www.flickr.com member "pointnshoot"*

Fig.9 *Image from Austin Roofing Inc., http://www.austinroofing.ca/*

Fig.10 *Image from GAF Materials Corp., http://www.gaf.com/*

Fig.11 *Image from the Gulf Coast Community Design Studio*

Fig.12 *Image from Architecture for Humanity*

Fig.13 *Drawing from the Gulf Coast Community Design Studio*

Fig.14 *Image from Mueller, Inc. http://muellerinc.com*

Fig.15 *Image from 5-A Enterprises, Inc., North Carolina*

Fig.16 *Image from www.flickr.com member "editor B"*

Fig.17 *Image from www.flickr.com member "pizzodisevo"*

Fig.18 *Image from Hans RoofTile. http://www.construction.com*

Fig.19 *Image from "Tile Roofing for High-Wind Areas" Technical Fact Sheet 21. FEMA*

Fig.20 *Image from www.flickr.com member "sverjans"*

Fig.21 *Image from London Flat Roofing, http://www.london-flat-roofing.co.uk/EPDM-Rubber-Roofing/EPDM-Rubber-Roofing.htm*

Fig.22 *Image from Firestone Building Products, http://www.firestonebpe.com/roofing/rubbergard/_en/*

Fig.23 *Image from Firestone Building Products, http://www.firestonebpe.com/roofing/rubbergard/_en/*

Appendix

Fig.1 *Image from the Gulf Coast Community Design Studio*

Fig.2 *Image from the Gulf Coast Community Design Studio*

Fig.3 *Image from the Gulf Coast Community Design Studio*

Fig.4 *Image from the Gulf Coast Community Design Studio*

Fig.5 *Image from the Gulf Coast Community Design Studio*

Fig.6 *Image from the Gulf Coast Community Design Studio*

Fig.7 *Image from http://www.flickr.com*

Fig.8 *Image from http://www.flickr.com*

Fig.9 *Image from Jakab®*