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POROUS CONCRETE PAVEMENT

By W. R. Cauthan, P.E.



Porous concrete pavement has been around the construction industry for a quite a number of years. Essentially, porous or pervious concrete is a structural concrete pavement with a large volume (15 to 35 percent) of interconnected voids containing a mixture of cement, coarse aggregates and water. Porous concrete has always been a tantalizingly interesting paving material but, due to the lack of proven durability as a construction material and its ability to maintain porosity and permeability, engineers have been hesitant to use this material. There is still relatively limited practical experience with porous concrete pavement for most engineers as compared to traditional pavements and, at some sites where it has been used, there have been either structural or functional failures. These failures have been primarily attributed to poor design, inadequate construction techniques, its use

on soils with insufficient permeability, and poor maintenance. In the past, there has been neither a clear and easy method of taking advantage of the lower curve number (CN), nor the ability to take advantage of the storage capacity of porous concrete in the State and local Stormwater permitting process. Therefore, there has been no advantage to designing with this material.

This might be changing, however, as cities like Green Cove Springs, Stuart, Titusville and Winter Park, along with the counties of Brevard, Charlotte, Hernando and Pasco, have developed ordinances to address porous pavements. For example, the Code of Land Development Regulations for the City of Titusville reads, "When pervious concrete pavement is used in development of the site, twenty-five (25) percent of the area covered by the pervious pavement shall be regarded as impervious and shall be constructed per City of Titusville Specifications on file with the Water Resources Department."

Due to the porosity of porous concrete and the reduced rate of runoff from the first inch of rainfall, one of the advantages of porous concrete, as it relates to water quality, is the removal of stormwater pollutants. Removal of total nitrogen and total phosphorous is accomplished as these pollutants become trapped or absorbed and broken down in the underlying soil layers. Pollutant removal can be improved through routine vacuuming and high pressure washing of the porous concrete.

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EOHS NEWS

The Challenges of H1N1 (Swine Flu)

- The CDC strongly urges more people to accept seasonal flu vaccines
 - 2009-10 recommended target is 83% or more of the population
 - 2008 only 40% vaccinated
- The CDC strongly recommends the H1N1 (Swine Flu) vaccine (when it's ready – projected to be around October)
- Some public health officials predict 50% or more of the population will experience H1N1 (Swine Flu) this upcoming fall flu season

Florida Back-To-School Health Safety

- A video message from Governor Charlie Crist: www.youtube.com/fldoh
- School Boards and employers are encouraging individuals who experience flu like symptoms to stay home rather than report to school or work
- The Hillsborough County School Board has rescinded its Perfect Attendance incentive programs to encourage students to stay home when experiencing flu symptoms

Florida Department of Health H1N1 (Swine Flu) Hotline & Website

- 1-877-352-3581
- Public Health Information - 7 days a week, 8AM to 8PM EST
- Information available in English, Spanish and Creole
- www.myflusafety.com

CDC H1N1 (Swine Flu) Website:

- www.cdc.gov/swineflu/swineflu_you.htm

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GREENHOUSE GAS ACCOUNTING HEATS UP

By James R. Chastain, Jr., PhD, PE, MPH



There has been extensive media attention recently on the topic of Greenhouse Gas (GHG) emissions and their potential effect on the earth's climate. The rhetoric has ramped up considerably since the term entered the general vocabulary roughly twenty years ago. Some authorities point to the enormous volumes of fossil fuel combustion products released to the atmosphere from anthropogenic (human) activities such as power generation, transportation and manufacturing. Other authorities point out that the earth has always experienced cycles in climate variability and as a natural phenomenon we should expect to see warming cycles. Interestingly, few experts disagree that a significant warming trend is underway. The major debate revolves around the cause of the warming and whether the warming trend will reverse itself or whether systems are being set up that will cause the trend to continue upward. This discussion might be relegated to an arcane scientific debate were it not for the fact that the causes and consequences point toward a change in life as we know it if the wrong answer is selected. So which analysis is correct?!

What is the Greenhouse Effect and What are GHGs?

In order to address the question it might be helpful to provide a brief tutorial on the greenhouse effect and greenhouse gasses. The "greenhouse effect" in simplistic terms is caused by certain gases in the earth's atmosphere that allow the energy from sunlight's incoming short wavelength (ultraviolet) radiation to pass but absorbs a portion of the long-wave (infrared) radiation that is reflected after the sunlight strikes earth. This results in additional heat energy remaining in the atmosphere and being re-emitted back to earth. The greenhouse effect is a completely natural phenomenon and is a critical factor in the development of life on earth. Without it, the earth's surface would be too cold to support life as we know it. The key issue is that the heat level (temperature) in the atmosphere seems to be rising at a more rapid rate than expected and threatens to upset a number of key environmental and ecological systems.

That being the case, what are the gases that contribute significantly to the greenhouse effect? In order of abundance, the greenhouse gases are water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and chlorofluorocarbons (CFCs). Of these gases, those that are considered "anthropogenic" are CO_2 , CH_4 , N_2O , and CFCs. These are the gases over which humans exercise significant influence with respect to their discharge into the atmosphere, and are the gases covered in the Kyoto Protocol. It is useful to note that CO_2 is not the only greenhouse gas of interest, and it is of key interest due to the volume emitted and some characteristics that will be sketched below.

A Brief History of the GHG Theory

Although the GHG concept has only risen to the public consciousness in recent years, its genesis is over 150 years old. The phenomenon was initially postulated in 1824 by Joseph Fourier

in that he noted that energy in the form of visible light from the sun easily penetrates the atmosphere to reach the surface and heat it up, but heat cannot so easily escape back into space. (Fourier is most commonly known as the mathematician who developed the Fourier series, which he applied to the solution of heat transfer problems.) British physicist John Tyndall was interested in the unproven concept, and in 1858 was the first to provide experimental evidence that a greenhouse effect does exist. In 1896, Svante Arrhenius was the first to provide a theoretical basis for GHG activity and further proposed the concept that, as human activity results in increasing release of CO_2 to the atmosphere, the temperature of the globe will also increase. (Yes...this is the same Arrhenius that developed the Arrhenius definition of acids and the Arrhenius rate equation encountered in freshman chemistry.) The concept lay dormant for almost 50 years until Guy Chapman published a paper of his findings that the atmospheric CO_2 levels had increased by 10% since the 1890s. Up to this point in time the greenhouse effect was not considered to have negative connotations because it was believed that the oceans would absorb the vast majority of CO_2 buildup, so his paper was largely ignored. Then, in 1956, Gilbert Plass published a paper based on the results of a computer program that he had developed. It analyzed CO_2 and seawater absorption characteristics to show that adding CO_2 to the atmosphere would, in fact, cause a temperature rise. Although his computer model was a much-simplified version of nature, it indicated that a doubling of background CO_2 levels would result in a $3.6^\circ C$ rise in surface temperature. The other startling result of his computations was that water vapor would not mask a CO_2 effect. At that point, Dr. Charles Keeling began his measurements of CO_2 at the Mauna Loa Observatory in Hawaii. The Scripps Institute monitoring record continues to the present day and is one of the primary data sources documenting the steady CO_2 rise over the last half-century. The most recent plot of the data is provided as Figure 1 (source: Scripps Institute of Oceanography/ CO_2 program).

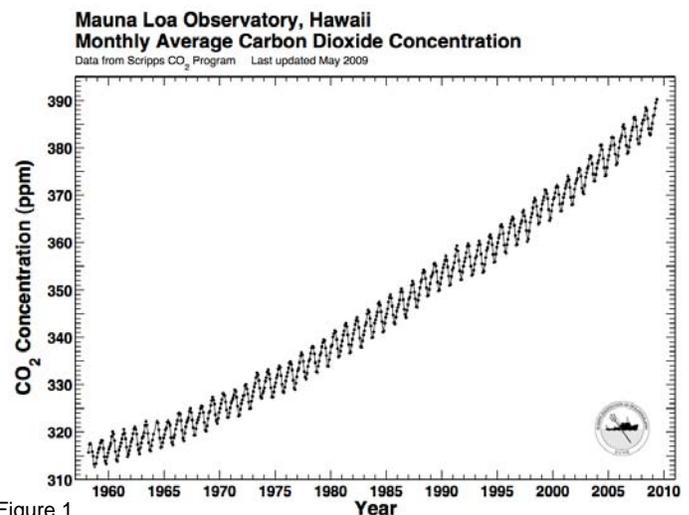


Figure 1

(Greenhouse—Continued on page 3)

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So What?

This might be an interesting scientific investigation, but who cares that CO₂ levels are rising and what does that have to do with our day-to-day lives? Two key components of the scientific and political debate revolve around the concepts of **radiative forcing** and **climate feedback**. Radiative forcing is the term associated with a change in the earth's radiative balance. Several definitions and variants are possible (e.g., direct radiative forcing, indirect radiative forcing, adjusted radiative forcing, instantaneous radiative forcing, etc.), but the concept involved is an attempt to identify and measure factors that influence the sun's irradiance and the energy balance (general units are in W/m²). Radiative forcing can be positive or negative. These perturbations are caused by such things as volcanic eruptions, solar variation (e.g., sun spot occurrence), changes in radiatively active species concentrations (e.g., CO₂, aerosols) and changes in the reflective properties of the earth or its atmosphere.

Climate feedback is an internal climate process that increases or decreases the climate response to an initial forcing. In other words, it is a process that reinforces or dampens the radiative forcing. As a brief aside it is probably helpful to note the difference between climate and weather. Weather is the short-term day-to-day mix of temperature, humidity, precipitation and wind experienced in a particular location. Climate is the characteristics and processes that control weather in a particular area of the globe. It can also be considered the long-term average and variability of weather in a particular location.

The key point here is that radiative forcing and climate feedback can enhance or adversely affect the environment or ecology we experience. It is important to note that natural and/or human processes can cause the resulting effects. In addition, the feedback mechanisms can be influenced initially by one cause but reinforced or dampened by another. This leads us to the primary cause of the fierce debates.

Difficulty in modeling these processes

To tease out the "cause" of the global warming requires theoretical and empirical analyses that are incredibly difficult. Each factor is typically characterized by com-

plete spatial and temporal variability that is then compounded by interaction with other factors that exhibit the same variability. The physics and chemistry of GHGs on atmospheric radiation are fairly well known and reasonably quantifiable. The controversy centers primarily on the fact that it is difficult to extract a completely unambiguous greenhouse gas warming signal from the climate record. This is not completely unexpected because the time scale of the climate record is quite limited when compared to the recent rise in GHG levels. In what may be one of the great ironies of the topic, a significant complicating factor ostensibly arises from the aerosols circulating around the globe. Aerosols can influence climate by altering cloud formation and reflectivity, as well impacting solar radiation absorption and reflectivity, which mask the warming effect of GHG. The aerosols result in large part from the air pollution generated in the industrialized world. Consequently, as air pollution regulations reduce air pollution emissions, some researchers hypothesize that the global warming may increase because of loss of those aerosols!

In recognition of the difficulty and uncertainty associated with the measurements and computations, the Intergovernmental Panel on Climate Change (IPCC) has adopted a ranking scheme to indicate the level of confidence associated with the various projections they make. A common basis of comparison of various models and scenarios is to use a doubling of the pre-industrial atmospheric CO₂ levels (indicated as 2 x CO₂). While no source is completely unbiased, the IPCC presentation of data and findings are represented as being objectively based. Also, due to the complexity of the modeling undertaking, absolute statements on either side of the debate should be viewed with caution. The magnitude of the risk, though, demands a precautionary approach to the topic.

The way forward

In summary, there appears little doubt that global temperatures are rising and significant changes in global climate patterns are occurring. While natural processes create an ebb and flow of temperature ranges over time, emerging evidence indicates that anthropogenic sources are a significant contributor, if not a driver, of this trend. Public thinking on the topic tends to be too linear. A proper view should consider the

interplay of causes and feedback loops. In other words, this is not a chain, but a web of causes. For example, increased forest fire activity generates considerable CO₂ emissions. What proportion of the wildfire activity is natural and what proportion might result from slight changes in precipitation or temperature aggravated by human GHG loads? The key point is that there is less and less likelihood that this is primarily a natural cycle that will shortly reverse itself resulting in a rapid cooling trend (although it should be noted that some credible authorities do assert this).

As if the problem isn't complicated enough, the solution must be mediated through an economic and political process. Indeed, the issue lies at the intersection of fundamental drivers of society. The economies of all of the world's developed societies are based on energy derived from the combustion of fossil fuels. Thus, dictating rapid curtailment of its use could cripple the economic viability of a country and potentially result in social unrest, if not anarchy. Politically, this is an unacceptable solution. Yet, inaction at this point is not a prudent option either, as the more GHGs emitted, the greater the potential long-term effect on our environment. Further complicating matters, this problem does not present itself at a calm point in history. Other serious issues are competing for governmental and business leaders' attention, such as healthcare reform and recovery from a severe global economic crisis, as well as ongoing geopolitical unrest in the Middle East and Korea. These are all enormously important issues that must be competently addressed in a short period of time.

The House of Representatives did pass the Markey-Waxman bill by a slim 219-212 margin, and it has now moved to the Senate for consideration. It's difficult at this point to tell if this is a good piece of legislation, and that probably depends on how one defines "good." A key deadline looms, however, in that the United Nations Copenhagen Climate Conference is to be conducted in December of this year. This conference will debate the extension and modification of the Kyoto Protocol. If the United States expects to have any input into that worldwide body, it must develop a coherent policy to prior to that meeting.

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Project Spotlight

The City of Auburndale, Florida, in conjunction with Polk County, now boasts one of the premier amateur sports complexes in central Florida, in the new Lake Myrtle Park. This outstanding facility will serve multiple uses, attracting regional and national tournaments. It includes five college-level baseball fields (one stadium complex), eleven full-size soccer fields (one stadium style), and a dog park, as well as future little league fields. The 130-acre site also includes a walking trail, playgrounds, passive recreational areas, and on-site caretaker facilities. The facility will also be home to the Florida Youth Soccer Association.

As the City of Auburndale began to move toward construction of the Lake Myrtle Park complex, they realized there were several issues that needed resolution. Among those, the construction cost estimates for the project (designed by an outside professional firm) significantly exceeded the City's \$15 million budget. Additionally, the

schedule for bidding was lagging, and the City had agreements in place to host college baseball tournaments in Spring 2009. To resolve these issues, the City turned to CSI for assistance in separating the project into manageable packages, expediting the bidding process, and value engineering the project.

CSI worked with the City and the outside design consultant to fast-track bidding and construction of the college baseball fields. Less than six months passed from the initial ground-breaking to completion of the fields, and the first game of the tournaments. CSI's value engineering also resulted in a 40% reduction in constructed cost in comparison with the original estimate. CSI provided construction review and program management services throughout this construction period, working with multiple architectural, civil, electrical, and landscape architectural design firms, as well as multiple site contractors. This value engineering program continued through construction of the soccer fields, where CSI again worked with

multiple design firms and contractors to complete construction of the fields and the accompanying hardscaping, despite a very rainy construction period. The value engineering also lowered the construction cost for the soccer fields by approximately 40% in comparison with the original estimates. The park is located off Berkeley Road, north of Highway 92 in Auburndale.



(Greenhouse—Continued from page 3)

In the meantime, a number of socially responsible businesses are moving ahead with voluntary sustainability initiatives that include GHG accounting measures to reduce their carbon footprint. Larger corporations such as Pepsico, Walmart, and others are, in turn, requiring their vendors and trading partners to take steps to reduce their carbon footprint and GHG emissions as a prerequisite to conducting business with them. In conjunction with this activity, a number of voluntary reporting guidelines and carbon trading schemes have developed. The remarkable thing about this effort is that, in many cases, it has been discovered that hidden savings can reduce the economic burden that was initially projected.

It remains to be seen how much progress can be made to reduce the GHGs in the atmosphere and the associated climate change, but you can be sure to hear much more about ways to reduce GHGs at all levels of society. Considerable effort is necessary to reshape our energy practices and sources while maintaining our standard of living. It may be that new technologies can be developed to sequester or convert CO₂ to other compounds to remove it from the atmosphere. If so, this must be done in a reliable and sustainable manner. The most effective technology would be one that could absorb the CO₂, utilize the carbon, and emit the oxygen back to the atmosphere. We, in fact, currently have such a technology...it is called a

tree. It is not likely that any program or set of policies will be successful if a major component doesn't include a reduction in clear cutting of the global rainforests and an increase in reforestation of older areas. It has been estimated that it takes 800 mature pine trees to offset the current carbon footprint of each American. A little reflection on the implications of that statistic is sobering.

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CHANGING BEFORE WE HAVE TO

By Mike Jacobson, President, Habitat for Humanity, Highlands County, Florida

Did it ever occur to you that the more people talk about changing certain things the more those things just seem to stay the same? Such is the not so rich history of affordable workforce housing. People like talking about the need for such housing, especially local governments, but for some strange reason the gap just doesn't seem to close. Recently I was hit with a dose of reality; reality the way it really is, not reality the way others imagine it to be. During lunch a few weeks back, I grabbed a magazine and looked for a good story to read. My blind choice from a pile of options happened to be an issue of The National Association of Home Builders magazine. Thumbing through the pages I found a great story, "The Dream of Home Ownership Still Far Away For Many," and it was written by the President of the Association as well. Now you have my attention! We are Habitat, after all, and that's what we do—make owning a home within reach for our hard working families in need. It was a wonderful piece, focusing of course on our lower income workers who, for decades, have been relegated to being perpetual renters. It talked about obstacles to change and creating solid partnerships to overcome those obstacles. Now, we're on to

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RECENT PROJECTS AND CONTRACTS OF INTEREST

The School District of Manatee County selected Chastain-Skillman, Inc. (CSI) to manage environmental projects and provide asbestos, radon, lead, indoor air quality, and industrial hygiene related services, as well as geotechnical and soil material testing. We have provided similar services to the School District of Hillsborough County for several years. CSI has also been selected by Okeechobee County to provide continuing engineering services. We're both proud and excited to add these entities to our client family.

Final civil site design on the Grasslands Medical Center in Lakeland, FL is wrapping up and construction is expected to begin by year's end. At Florida Southern College construction is complete on both new dormitories, the Nursing building, and the McKay Archive building, and underway on the Humanities and Technology buildings. Design is underway for the Polk Street Park in Bartow. Construction has also been completed on the Ring Power facility just southwest of Lakeland, and the Citizen's Bank on Edgewood Boulevard.

A few of the environmental group's recent projects include: lift station design and utilities relocation on Capital Circle for the City of Tallahassee; preliminary design for a wastewater treatment plant expansion and a capacity evaluation for the City of Winter Haven; design services for the City of Tarpon Springs' Lake Tarpon Sewer Collection System (Phase 2) project; and utility improvements design for Polk County's northwest service area.

PLANT WATCH

By Arthur "Art" D. Wade III, PWS

It's very common these days to look across the Florida landscape and see vines taking over natural plant communities. At first glance, one might conclude the plant is the infamous Kudzu (*Pueraria lobata*). After all, Kudzu, also known as the "vine-that-ate-the-South," has received a lot of press over the years and its effects are well known. Unfortunately, there are a number of "offending" vines within the state. Air potato (*Dioscorea bulbifera*) is one such species.

Air potato is a member of the yam family and a native of Asia. It was introduced to Florida in the early 1900s, where it quickly spread throughout the state. Due to its aggressive nature, air potato is classified as an invasive exotic by the Florida Exotic Pest Plant Council and as a "noxious weed" by the Florida Department of Agriculture & Consumer Services. Identifying the vine and separating it from other plant species is relatively straightforward: look for a vine with large, heart-shaped leaves and numerous aerial tubers. These tubers, which vary in size and can grow to be quite large, provide food storage for the plant, and are the primary method of reproduction. They are also poisonous, making them a bad choice for French fries! It is doubtful that the species will be completely eradicated because of the number of tubers produced by the plant; however, management efforts should include collection and disposal of the tubers combined with herbicide applications.

Reference:

University of Florida Center for Aquatic and Invasive Plants and the Florida Exotic Pest Plant Council (FLEPPC)



Air Potato Vine

(Porous—Continued from page 1)

Additionally, when combined with certain drainage modifications, porous concrete pavements can also provide limited runoff quantity control, particularly for smaller storm events. For some smaller sites, trenches can be designed to capture and infiltrate stormwater. Porous concrete pavement will definitely need to be used in conjunction with other structural controls to provide protection for greater storm events.

Examples of such modifications to the standard porous pavement design that have been used include: placing perforated pipe near the top of a crushed stone reservoir to pass flows to a conventional surface detention pond after the reservoir is filled, connecting the stone reservoir to a stone filled trench, or placing an underground vault system beneath the porous pavement and stone reservoir.

Porous concrete pavement systems are typically used in low-traffic areas such as the following types of applications:

- Parking pads in parking lots
- Overflow parking areas
- Recreations trails
- Golf cart and pedestrian paths
- Emergency vehicle and fire lanes

The primary drawback has always been the cost and the complexity of porous concrete pavement systems as compared to conventional pavements. Porous concrete systems require a very high level of construction workmanship to ensure that they function as designed, and they experience a high failure rate if they are not designed, constructed, and maintained properly.

Slopes should be flat or gentle to facilitate infiltration versus runoff, and the seasonal high water table should be low. Steeper slopes should also be avoided to prevent erosion of the base beneath the pavement as water passes through it. Also, due to the potential for clogging, porous concrete pavement should not be used for removal of sediment.

With greater emphasis on green building and sustainable growth, porous concrete pavement could be an increasingly important design material and an idea whose time has arrived. By capturing stormwater and allowing it to seep into the ground, porous concrete could become a key component in the treatment train and instrumental in reducing stormwater runoff. Porous concrete pavement could play a significant role in designs to accomplish the requirements of the new State of Florida Unified Stormwater Rule and could be prominent as a Best Management Practice (BMP).

While porous concrete pavement is not expected to eliminate use of conventional paving systems, for those of us with limited experience with this building material, it might be time to take another look.

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something! After all, this is the President of the Home Builders Association speaking; he has some clout, right? Well, at the end of the story, that reality thing reared its ugly head. I was reading a story written in 2005 that could have just as well been written today. As I said earlier, sometimes the more we talk about changing things the more they stay the same.

And that is precisely why our Habitat affiliate took a deep, reflective look at itself and came to the conclusion that we must change our paradigm of operating and thinking. If not us, who? And if not now, when? We are, after all, the ninth largest private builder in America. We are one of the most recognized and trusted brands in the world; over 250,000 homes built and counting, and our exclusive customer is that working American who makes up the foundation on which our economy grows. For all of the 20 years we have operated in Highlands County, we have pretty much built the same house in pretty much the same way. We have been destined to build on infill lots, usually at the furthest reaches of our urban services and often beyond. Our homes are simple, frame construction, frankly absent of imagination, and not the best of fits in a wide variety of neighborhood settings. Our homeowners are a mystery to most and, because of their lower income status, often misunderstood and sometimes feared as potentially not the best neighbors. In order for us to truly uncap our capacity and close the housing gap we needed to abandon the status quo and attack those obstacles both real and imagined head on. And, so, our process began.

We started questioning everything; however, for the purpose of this story and this audience I'll focus on the planning, design, and architectural components of our

transition. Why can't we incorporate smart growth and new urban principles into our thinking and planning? Why can't we bring new green building technologies to our product? Why can't we build on large subdivision size parcels and possibly partner with for-profit builders to create mixed income communities? And why can't we incorporate architectural and design imagination to our homes? These were the big four items, and now we needed someone to listen and to partner with us. We needed someone to see what we see and feel what we feel.

As the saying in golf sometimes goes, "I'd rather be lucky than good," we were approached by the Highlands County Housing Department in June of 2008 and asked to rescue a 20-acre affordable housing project whose original building partners had withdrawn and was at risk of losing a \$2.5 million grant from the Florida Housing Finance Corporation. We knew this was our opportunity to break out and create an affordable community unlike any Habitat has ever undertaken.

Habitat's vision for this parcel was to create a mixed income, mixed use community—a first for Habitat anywhere. We wanted to build green, maximize open space and pedestrian friendliness, and include recreational and community gathering locations. We wanted to completely abandon our old home designs and create a diverse portfolio of new home models with garages, front porches and various elevations and exterior finishes. We wanted to landscape "up" our properties with Florida-friendly product, and use everything from tank-less water heaters to solar power. Our measure of success would be simple. No-one driving through this community could point and say "those are Habitat houses" or "this is a low-income community." The rest, they say, is almost history. With Chastain-Skillman's partnership and the support of

many others, within the next six months, we presented a 59-unit single family home community, complete with supporting commercial and retail space, a community center supported by recreational amenities which sits at the gateway to a centrally located park, biking and running trails, and pocket gardens throughout the landscape. We designed seven new home models, ranging in size from two to four bedrooms. Each home has a garage and a front porch and each will be built using Structural Insulated Panels (SIP) to maximize energy efficiency and all but eliminate mold, mildew, rot and termites. One of these new models was designed by South Florida Community College's architecture and design class.

Soon we will be breaking ground for this transformational community. Soon the dream of home ownership will be a reality for 59 hard-working families. Soon we will crush the urban myth that affordable workforce housing is devoid of style and imagination, and soon we believe we will have a template others can follow or improve upon to make affordable housing more welcome in their communities. We also know that this economic rip tide we are in will pass—it always does—and our for-profit builder friends will be breaking ground once again. We hope they will look at what we are about to accomplish and think about us as a potential partner for mixed income communities they may be thinking about or planning.

Two final thoughts, "Change before you have to" is a tried and true principle of Jack Welch, former CEO of General Electric. If you wait too long or remain too comfortable with the status quo the world, opportunity will pass you by. And, lastly, for those policy makers out there, if affordable workforce housing shows up as a priority year after year in your goals, chances are it isn't really a priority at all.

ANNOUNCEMENTS

Dr. Jim Chastain, PE, MPH, President of Chastain-Skillman, Inc., has been invited to join the Scientific Review Panel (SRP) that examines and edits entries into the National Library of Medicine's Hazardous Substances Data Bank (HSDB). The HSDB is one of the world's primary sources of on-line information for chemicals and pharmaceuticals relative to their impact on humans and the environment. The database contains information on over 5000 chemicals and is a key component of TOXNET.

The SRP is composed of 17 individuals at the PhD or MD level who are experts in chemistry, toxicology, occupational medicine, poison control, environmental engineering, industrial hygiene, governmental regulation and public health. Dr. Chastain was selected in part because he has advanced degrees in both environmental engineering and public health as well as over 35 years of experience in professional practice.

This newsletter is provided solely for informational purposes and presents only highly condensed summaries relating to the topics presented. Therefore, it should not be relied upon as a complete record for purposes of regulatory compliance, nor is it intended to furnish advice adequate to any particular circumstances. For additional information on any of the topics in this newsletter, please contact the author, or Allan Duham, (863) 646-1402, or e-mail us.

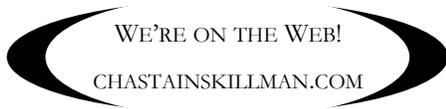
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