



---

## Green Building Ramblings

By Jeff Hersha

### So,...when is green, GREEN?

#### *What is Green Building and how does it affect your community?*

The Green movement has its' proverbial roots in the cultural revolution of the 1960's. Americans saw rivers ablaze, chemical waste leaching from the ground, and waterways turned to sewers. Smog was settling permanently into the LA Basin and agricultural run-off was creating a chemical dead zone in the Gulf of Mexico. Many cities and towns were discovering the byproducts of Civic and Corporate abuse and neglect of the environment.

As the impact of our growing industrial and consumer lifestyle became apparent the country moved to make amends. The formation of the United States Environmental Protection Agency,(USEPA), and the passing of the Clean Air and Clean Water Acts were center stage at the national level. State agencies such as our Indiana Department of Environmental Management,(IDEM), were formed to regulate at a state level, and grassroots organizations in our neighborhoods began picking up garbage and trash from our rivers and roadways. Recycling programs took off. We had made some terrible messes...and now we were cleaning them up.

As the awareness of our environment grew, we started thinking about the buildings in which we live and work. We looked at how the built environment impacted our natural environment. A new generation of architects, engineers, planners and builders began looking at better ways to build. We looked at the environmental impact of how and why we build, as well as the energy and environmental impacts of constructing, powering, and then ultimately razing our structures. We now look more critically at the life cycle impact of a building. The concept of "cradle to grave costs" entered the lexicon.

Leading the way today, is the U.S. Green Building Council, (USGBC) a "non-profit organization committed to expanding sustainable building practices." The USGBC uses the Leadership in Energy and Environmental Design (LEED) Green Building Rating System to quantify and score a building's "Greenness". As the reigning organization of green building principals in residential, commercial, and municipal building projects, a USGBC LEED certification carries clout.

We have all seen the radio and TV commercials, as well as print advertising touting the latest in "Green". My beautiful wife informed me one evening that our quick Thursday night dinner before soccer and Cub Scouts was "processed by an environmentally responsible food manufacturer", and, "was produced in the world's first LEED Certified frozen food manufacturing plant". Wow! I had never felt better about stir-fry.

So what does this all mean to you? You are the leaders of your communities. As you look at your next fire station, wastewater plant, or administrative office building, what does this new "GREEN" mean? I can say, without reservation, "It Depends".

The Green movement has always been about conservation. Conservation of natural resources naturally lessens the impact on the environment. For cities and towns, conservation is as much about green-backs as greenscapes. We have been told by some that "Green" is the right thing, regardless of cost. The reality is that for most of us, the two are inseparably intertwined. Fortunately, doing what is right for the environment and what is right for your wallet does not have to be mutually exclusive.



---

As a twenty year design professional I embrace the goals of USGBC and the LEED process. Any committed professional should seek to build the best, most efficient structure possible. However, I fear the importance of fundamental design principles are being over shadowed by the “latest and greatest” in technology. Core principles and environmental ethos have been hijacked by marketing and advertising. I would argue that the best Architects, Engineers, and Environmental Designers engaged in municipal projects have been building “Green” for a long time. Commercial projects may consider a life cycle of less than 60 months and payback on investments within 12 months. Conversely, one of my recent municipal projects is designing a Lab and Administration facility to replace a structure built in the 1950’s. We must design for maximum building life and flexibility. We must consider the next 10, 20, or even 50 years. As the stewards of your community funds, you must spend wisely. Don’t forget the fundamental requirements for success in a building project. If these are not embraced, you may have the next fifty years to look at your mistakes.

### ***First and foremost...design, Design, DESIGN***

At the point you have decided to take on a building project, seek out an architect or engineer that LISTENS. Network your political connections, find out who is quick to listen; slow to speak. Find out who they would use again. Read, learn, and use the Qualification Based Selection, (QBS) Process. Interview those who appear qualified.

As an architect, I need to (be willing to) hear and understand your needs. If you’ve ever been in a kitchen designed by a “young, single design professional”...you may know what I mean. Twenty years ago, I thought all good kitchens would fit into a small closet. I owned a microwave, a small (beer) refrigerator, and a collection of Pyrex. I was not qualified to design your kitchen. Our needs and perspective were most likely very different. But, if I LISTEN to the client, the client knows what they want and need. It’s the architect or engineers job to facilitate the best design solution. To attempt YOUR design without you is arrogant.

When you select a design professional, give them every opportunity early-on to learn from ALL the employees who will work in the finished project. Pose the question, (preferably during a free pizza employee meeting) “in a perfect world...our new building would ...”. Let them babble freely and make sure the designer is taking lots of notes. You may learn from your employees too. As consulting professionals, we know the fundamentals of your building needs, but to design without heeding your input is folly...and not very GREEN. A building that is not effectively tailored to your need is, by default, not as efficient or effective. This leads to waste. Waste, whether a lifetime of worker inefficiency or a truckload of 2x4’s, is WASTE.

### ***Design and build only the space you need...UNLESS, you’ll need more.***

It is critical to meet your current needs. However, it is also critical and GREEN to review and address your future needs. Some building types and projects may have finite needs. Others, like Utilities, may have already identified future growth. If offices or operator space will grow in the future...consider addressing it in design today.

The structure you will build already has furnaces and air-conditioning. It already has plumbing and fiber-optics. The electrical service and panels are finished. The parking lot and storm water issues are done. The least expensive part of a building is often the office and storage space. It rarely increases the size of your furnace and it won’t likely add bathrooms. Your building is priced with today’s dollar and paid for with next year’s... they won’t buy more in 5-10 years. There can be genuine efficiency in buying the “bigger box.”



---

Don't go crazy, but plan, consider, review, critique,...ARGUE. Design by "committee" is the best way to give your consultants migraines. Eventually, you will need to eliminate the town hall approach to design. However, it is necessary in the early stages. Making your mistakes and exploring options on paper is far better than doing it in concrete and steel. It has been said "a camel is a horse designed by committee." I contend this is slanderous to camels. The horse may be arguably prettier...but the camel may better suit your need. It is my job to give you form AND function. Good design can be a very frustrating journey for everyone involved.

Once you have come to terms with "what" and "how much" you're going to build...CONGRATULATE YOURSELF.

If you have been diligent, you have had the greatest GREEN effect possible...even if you don't use bamboo flooring or L.E.D. lighting.

You have been the kind of steward to your community that will save their green.

A good design is not just a really big stack of papers, it's a treasure map.

The design of a laboratory for a wastewater facility has brought into play many of the design process issues that we discussed previously.

The facilities primary purpose was to replace a functionally obsolete laboratory and move lab operations to the newer of two treatment facilities operated by the municipality.

In the course of defining the original lab project scope, it was discussed and decided that the building would include additional office space for administrative offices, related utility operations, and long term records storage. In addition, the ability to host training and small conference meetings was considered.

The additional space added considerably to the design scope. However, the value and GREEN benefit was great. The extra offices provide great additional function with a greatly reduced cost of construction when compared to the same space built sometime separately in the future.

The additional space would use the same heating and air conditioning, as well as the same electrical and plumbing system. The offices also make use of the same site work, parking, storm water and landscaping.

Despite the fact that Midwest construction tends to sprawl out over the landscape, we chose to add a lifted clerestory roof to create a second floor for the additional offices and conference space. Think "walk-up attic with cathedral ceilings". The idea that we were able to significantly increase our interior square footage without increasing our foundation or roofing should be a cost effective benefit. This increase in function with little increase in material is the essence of GREEN thinking.

Using a pitched roof creates headroom quickly. This gave us our usable square footage and did away with the flat roof that the client truly hated.

The basic footprint of the building was a very simple "two square" rectangle. Simply put, the building was twice as long as it is wide. Geometrically, this isn't the most effective way to enclose space: a circle or a square encloses more square footage for a given exterior wall length. However, it allows the separation required by the laboratory space and it fit well on the long, narrow building site.

In our earlier "town hall" design sessions, the three most important building attributes for my client were:

- 1) Function...A lab is very function specific...it has to work properly.
- 2) Budget...if they can't afford it...they can't have it.
- 3) GREEN...as a Wastewater Utility charged with protecting the environment...we should do our best in ALL respects.



---

To a lesser degree, there were other aspects important to the client:

- 1) zoned temperature controls
- 2) as much natural lighting as feasible
- 3) operable windows

I had quizzed a number of lab directors and personnel throughout the state and, surprisingly, they had very similar wish lists. A number of these individuals were operating out of newer facilities and they weren't happy. Clearly some design opportunities had been missed in their projects.

Laboratories are a unique design challenge. Labs have a number of health and safety issues to address. Beyond that, the function and comfort of the personnel is critical to the performance of their task. The accuracy of the lab analysis is the basis for the success of a wastewater facility.

Labs create a lot of waste heat as well as unpleasant odors. The ability to control the environmental and ventilation conditions are critical to both daily operations and safety of the occupants. Giving the lab its' own zoned heating, ventilation, and air conditioning (HVAC) is the best solution. Despite the fact that we could not utilize one system for the lab, offices and training space, it allowed us to fine tune the design and improve the overall efficiency. Zoned heating was easily accommodated with the choice of radiant floor heat.

Radiant floor heat is a wonderful way to heat a building. In the winter your feet are the warmest and your head is the coolest...exactly the way we human beings prefer. Lower ambient air temperature means we have reduced the heat load without reducing the comfort level. The primary drawback is that ducting will still be need for the air conditioning system. The simplicity and efficiency of the building plan allowed a cost effective solution to cooling.

### ***All aspects of heating and cooling will benefit from our chosen building system.***

Insulated Concrete Forms (ICF') use a design best described as a giant "LEGO" tm. block. These ICF blocks are the formwork for your concrete. Rigid foam insulation makes up the "bread" of your sandwich and the concrete poured inside is the "meat". When you're done, you have created a super-insulated wall with the benefits of the massive concrete walls acting like an energy "battery". The building "envelope" or outer shell is now very efficient. When this wall is combined with a super-insulated roof system you have truly done your best for the environment. We chose to add a low earth berm to the building to reduce exposed siding and to "hug" the building with the benefits of the earth contact.

In my opinion, Super insulation and High Thermal Mass Design don't get the respect they deserve. I suspect this is because it's not "proprietary", it's not "glamorous", and it has no "gee-whiz, look at that technology" factor. It also does not break, it does not require a computer, it does not use a lot of energy. "If it ain't there, it can't break." "The latest in high-tech"...when it has become ten years old, and needing repair with discontinued parts from a bankrupt supplier is quickly rendered functionally obsolete. Ancient Roman civilizations used floor heat and stone buildings. Before that, men huddled in caves because they were easier to heat. Many of us head for the cool basement for the benefits of thermal mass and earth shelter when the heat of August is unbearable. The benefits of super insulation and high thermal mass are working all the time. Hot or cold, you reap the benefits of this design type.



---

This building maximizes the value to the utility in both form and function. The efficient design plan, combined with super-insulation and high thermal mass will be just as effective and efficient in 50 years as it is today. The occupants should be happy and effective employees...and all of them should be feeling a little GREENER.

Green Buildings should be an intense green that permeates the design. It should be green through and through, not just a skin of tech gadgetry or a cloak of green fashion. If your green design gets the fundamentals right...it's' beauty is far more then skin deep.

*Jeff Hersha is employed by Jones & Henry Engineers, Ltd. An Environmental Engineering firm specializing in all aspects of drinking water, wastewater and storm water treatment. Mr. Hersha's current projects include laboratory and administrative building designs. He holds a B.S. degree in Environmental Design from Ball State University and has over 20 years of environmental design and construction experience.*