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COUNCIL REPORT VII

ON GREEN ARCHITECTURE AND URBANISM

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ALEXANDRIA, VIRGINIA

Council Report VII
Contributors

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THOMAS M. GALLAS is a principal of Torti Gallas and Partners. During his 22 years with the firm, he has developed an expertise in managing complex community design projects involving diverse teams and in working collaboratively with resident and community stakeholders to form consensus on community revitalization strategies. Gallas, a LEED-accredited professional, has been instrumental in incorporating sustainable design principles into the firm's projects. He has been a frequent speaker on sustainable design for professional organizations nationwide.

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ELIZABETH MOULE is a founding partner of Moule & Polyzoides, Architects and Urbanists. Her distinguished career involves architecture, urbanism, real estate development, teaching, writing and civic involvement. She is a co-founder and emeritus board member of the Congress for the New Urbanism. Moule has designed high-profile, award-winning sustainable projects on the building, neighborhood and regional scales. She is a frequently invited public speaker and has contributed to several books and periodicals.

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JOHN O. NORQUIST is president and CEO of the Congress for the New Urbanism. As mayor of Milwaukee from 1988 - 2004, Norquist drew widespread recognition for his leadership in numerous initiatives to revitalize and promote the livability of the city. A leader in national discussions of urban design and educational issues, Norquist is the author of "The Wealth of Cities," and has taught courses in urban policy and urban planning at several universities.

BEN PENTREATH is an architectural and urban designer and founder of the London firm Working Group. Pentreath has worked on a number of significant new developments in the United Kingdom, including Upton, Northhampton and Sherford. He has designed a large number of buildings at Poundbury, Dorset, and authored the design code for Crewkerne, Somerset which won a CNU Charter Award in 2004. He is co-author of *Get Your House Right* and is working on a similar volume for the British market.

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INSIDE

Council Report VII

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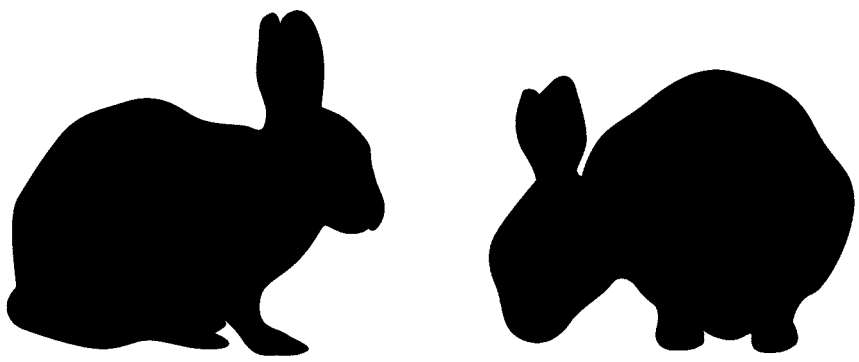


Good News Bad News

By John Massengale

A man asks a fortune teller what Heaven is like. "Well, I have some good news and some bad news. I see you're a golfer, and Heaven has many incredibly beautiful golf courses."

"Wow, terrific, what's the bad news?"

"You have an 8:30 tee time tomorrow morning."

In the public mind, we've passed a tipping point. In a very short time, global warming and climate change have gone from something most of us were skeptical of to a fact we ignore only at our peril. And we know that some of the most convenient solutions to this Inconvenient Truth are things we urbanists value. But how many of us are ready for our 8:30 tee time?

I live in a small Manhattan apartment and walk or take public transit everywhere, so that's good; but I've got a BMW 540 that gets about 18 mpg if I only drive on the highway with the cruise control on all the time. If I drive it the way the engine and the sport suspension want to be driven, the mileage goes down to 8 mpg. I've looked at other cars, but …

"This is a global problem, a local problem, a collective problem and a personal problem. If we don't solve the last one, we'll never fix the others."

Am I very different from most of us? According to carbonfootprint.com, I use more than two times as much energy as the average Briton every year. And while it sometimes seems we'd be making major progress if we just lived similar to the way Britons did 50 years ago, or Americans did 75 years ago, the fact is that if we turn off every electric plant in America, and China and India continue growing at the pace we've introduced them to, we're all screwed.

All life is connected. This is a global problem, and it has to be dealt with at a global scale. At the same time, many of the solutions must be local. How did they know this in the 1960s?

This Green Council started with a breakfast meeting at CNU XV. People came to the breakfast with the *New York Times Sunday Magazine* and its cover story on "Eco-Tecture." Eco-Tecture, it turned out, was a new all-glass house in the middle of the Arizona desert, designed by the 2007 Starchitects of the Year. I rebranded it Ego-Tecture.

We knew before we met for the Green Council that Ego-Tecture won't solve climate change. Walkable neighborhoods, historic preservation and the green virtues of traditional building are all needed, as this issue shows. Our job is to make new urbanism the new black and to make people understand why glass buildings don't make it. But we have to do more than change the patterns of the way we live; we actually have to change the way we live.

The post-carbon future is coming faster than any of us acknowledge. The modernization of the lives of 2.5 billion people in China and India is accelerating. China owns our debt and has a much bigger army than us. And we're not even ready to give up our cars.

This is a global problem, a local problem, a collective problem and a personal problem. If we don't solve the last one, we'll never fix the others. In the words of Mahatma Gandhi, "You must be the change you want to see in the world."

The good news is that if we individually realize what we can do, we can do just about anything. The bad news is this change is hard to make.

A wild rabbit was caught and taken to Philip Morris research laboratory. A rabbit born and raised in the lab saw his confusion when he was trapped in a cage and befriended him.

One evening the wild rabbit noticed that his cage hadn't been properly closed, and he decided to make a break for freedom. He invited the lab rabbit to join him. The lab rabbit was unsure, because he'd never been outside the lab, but the wild rabbit finally convinced his friend to give it a try.

Once they were free, the wild rabbit said, "I'll show you the third-best field," and led the lab rabbit to a field full of fresh, ripe lettuce.

After they had enjoyed some lettuce, the wild rabbit said, "Now I'll show you the second-best field," and took the lab rabbit to a field full of delicious carrots.

After they had had their fill of carrots, the wild rabbit said, "Now "I'll show you best field," and took the lab rabbit to a warren full of female bunnies. It was Heaven — nonstop lovemaking all night long.

As dawn was beginning to break, the lab rabbit announced that he would have to be getting back to the lab.

"Why?" asked the wild rabbit. "I've shown you the great field with the lettuce, the field with the delicious carrots, and the best field, with the ladies. Why do you want to go back to the lab?

"I can't help it," the lab rabbit said. "I'm dying for a cigarette."

Green Urbanism and the Long View

By Hank Dittmar

I am happy to have played a small part, alongside John Massengale and John Torti, in organizing this Green Council. It comes at an opportune time, as new urbanism is increasingly being recognized in policy and media circles as part of the toolkit in combating global climate change. I want to begin by putting this Green Council in a slightly wider context than the United States, as the problems we face are global, and our work needs to recognize this international context.

A few facts will help to make the needed connections. In 2007, we officially became an urban planet, with over half of the world's population living in cities for the first time. In the United States this shift occurred in the 20th century, with the move from farms and towns to cities and suburbs. Globally, the 21st century will be the urban century. According to the United Nations Environment Programme, of the global population increase of 2.2 billion by 2030, 2.1 billion will live in urban areas.

Two issues arise here: First, if all these urban dwellers adopt the suburban living patterns and lifestyles of the United States and Western Europe, the climate problem will be greatly exacerbated. Surely the new urbanism has a role to play in proving that an alternate course is possible.

Second, many if not most of the urban dwellers in the Southern Hemisphere live in grossly overcrowded slums, rife with cholera and other diseases, and where infant mortality, malnutrition and lack of secure land tenure are endemic problems. These slums may be environmentally sustainable, but only because their residents have next to nothing.

Global urbanization is thus both a social and environmental issue, and the challenge of raising global living standards and addressing the Millennium Development Goals while reducing carbon emissions is a knotty problem.

Urbanism as opposed to urbanization is at the core of addressing this challenge. For when we look at the principles of new urbanism, we find not only solutions to the personal transport part of the climate problem — density, connected streets, accessible public transport and mixed use; what I have elsewhere called location efficiency — but also solutions for the broader social challenge of truly sustainable development that meets the goals set by the Brundtland Commission so many years ago.

Figure 1

New urban principles and techniques including mixed-income housing, mixed-use walkable neighborhoods that are part of connected city regions, civic engagement through charrettes, Enquiries by Design and regional visions, all can ensure that we are addressing the climate issue alongside the sustainable development issue in a comprehensive manner. As the Charter says, it is all one interrelated community building challenge.

We don't yet have all the answers, but we do have the right approach. The Green Council was about assessing that approach and inventorying the techniques at our disposal, so that we can begin to evolve our practice toward a more ecological urbanism. Unlike some, I don't see this as mainly a communications challenge for the CNU; I see it as a fundamental need to raise our game as designers.

Over the course of the Green Council's three days, my colleagues at The Prince's Foundation provided examples from our own work, in new communities, sustainable urban extensions, and infill projects, as well as at the level of the building, where we are working hard to evolve traditional architecture to meet the challenge of a low-carbon economy. As new urbanism grows toward greater sustainability, I look forward to sharing what we have learned and to learning from all of you.

It seems to me, though, that there is a great muddle about green design, and that

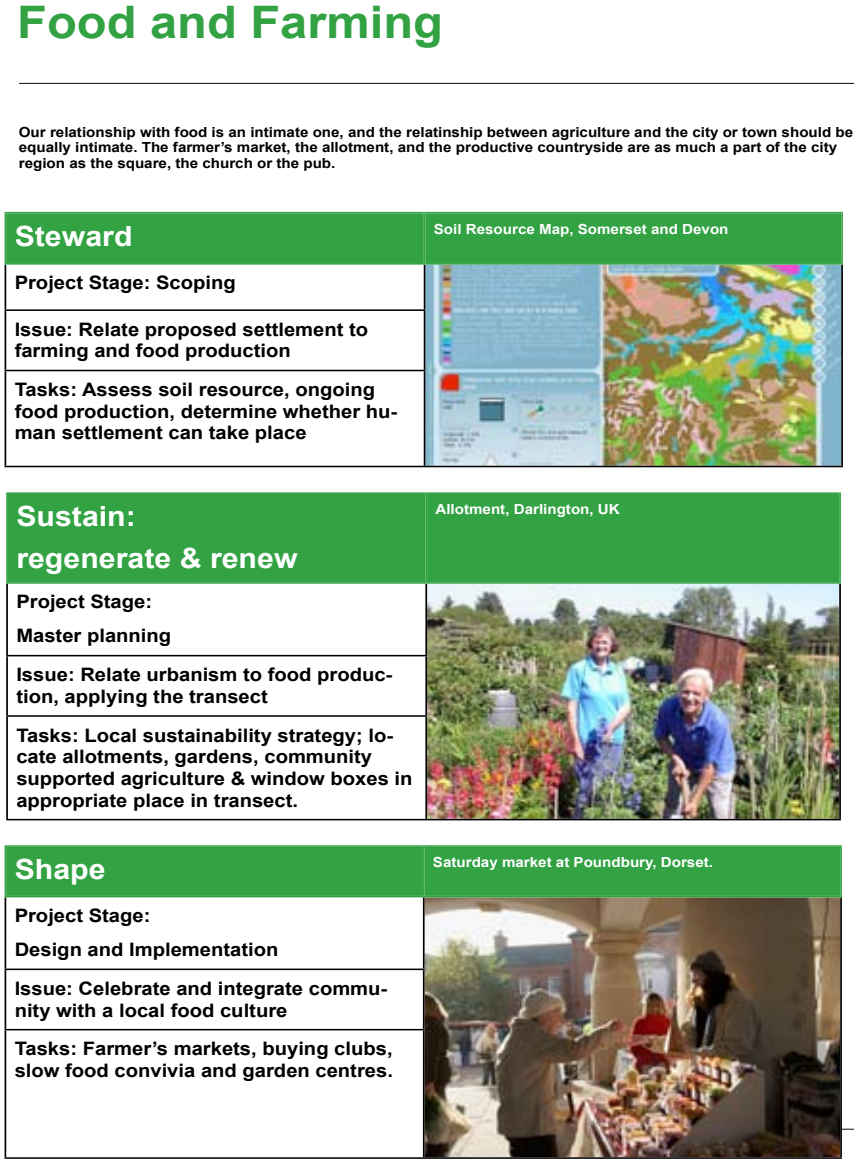


Figure 2

Water

Integrating and managing water and water systems is key to ecological development. Conventional development practices tend to treat water as a resource to be mined, channeled, used and discarded, rather than a renewable and renewing resource.

Steward	Flood risk map for Swanpool, Lincolnshire
Project Stage: Scoping	
Issue: Relate human settlement pattern to watershed, groundwater table & elevation	
Tasks: Identify flood risk now and projected, elevations, understand water flow on site, identify areas appropriate for development, understand recharge, capacity and water quality issues.	

Sustain: regenerate & renew	Sustainable urban drainage & street at Upton, Northampton
Project Stage: Charrette & Masterplanning	
Issue: Manage water on site	
Tasks: Maximise groundwater recharge, relate drainage to transect, preserving surface flow where appropriate, and relating to ground cover.	

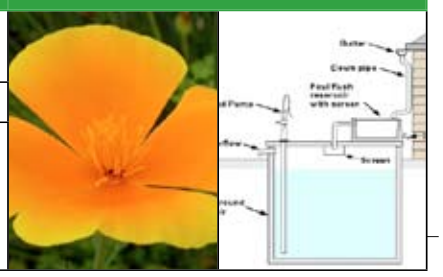
Shape	Rainwater catchment system.
Project Stage: Design and Implementation	
Issue: Water conservation	
Tasks: Water conserving appliances, rainwater and greywater systems, planting appropriately, maintenance of SUDs	

Figure 3

Energy

We are trapped in a cycle where energy use means fssil fuels and fossil fuels mean carbon emissions. Breaking out of this cycle will involve designing communities where accessibility rather than mobility is valued, where our buildings require little or no energy to heat or cool, and where we both conserve energy and utilise renewable sources.

Steward	Solar map of the United Kingdom
Project Stage: Scoping	
Issue: Understand local energy resources: biomass, solar, wind and water	
Tasks:	

Sustain: regenerate & renew	"Quiet Revolution" Vertical Axis Wind Turbine
Project Stage: Master Planning	
Issue: Create a sustainable energy strategy	
Tasks: Define and scale technologies to the development, utilising local, renewable sources and generation as much as practicable.	

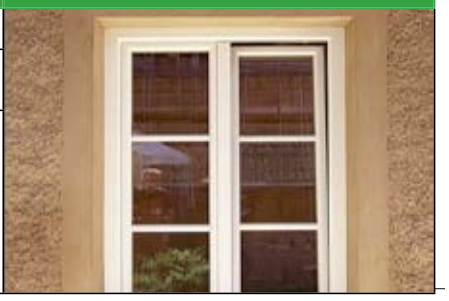
Shape	Caption here:
Project Stage: Design & Implementation	
Issue: Reduce demand through design and management	
Tasks: Employ simple, hackable passive design of buildings, utilising thermal-mass; reduce embodied energy through local sourcing, materials selection and recycling, develop conservation strategies	

Figure 4

everyone is trying to do everything at every scale, without clear guidance as to what works in different situations, and when various techniques are appropriate. For one example, in the United Kingdom we are simultaneously promoting wind power as an industrial technology through big wind farms and as a solution for the individual homeowner through micro wind turbines, when the evidence indicates that wind farms may not be that efficient due to distribution losses and micro wind may be ineffective. Surely wind needs to be pursued at the level of the municipality or the level of the neighborhood, where economies of scale can be balanced against effectiveness of siting.

In some places, much-lauded ecocities are being planned on islands of silt in river deltas that are barely a meter above sea level. Shouldn't someone have asked whether there was a better place to build a new ecocity before applying all that ingenuity to designing it to accommodate sea level rise?

All of this confusion leads to cynicism among the public, elected officials and new urbanists. A clear set of rules is needed, complementing the Charter but at the subsidiary level of technique, and that is what Elizabeth Moule, Stefanos Polyzoides and I have tried to do with the "Canons of Sustainable Architecture and Urbanism."

In thinking about the state of the practice in greener new urbanism, I was reminded of one of the great lessons I learned from Christopher Alexander — that the order in which one does things really matters — and I began to think about the role of the city in nature and in society.

The notion that cities are composed, like ecosystems, of basic types that change slowly but are flexible and adaptable, is being applied in the Foundation's work in town planning for historic town centers, including Lincoln. In his book "How Buildings Learn: What Happens After They Are Built," American author Stewart Brand introduced the concept of pace layering, meaning that different parts of a building — or a city — change at different rates. When applied to civilization, pace layering implies that certain deep structures, like the relationship between a city and nature, or the culture of a city, ought to change slowly; while other activities, like entertainment or retail, shift more quickly, and need to be accommodated in a flexible manner within these more permanent layers of the city.

We are beginning to understand that part of the problem in our cities is that we have been fundamentally altering basic underlying structures — the relation between the city and nature, movement patterns, the role of neighborhoods in the city structure, the size of blocks — to accommodate short-term trends like retail packaging. A better understanding of the basic types that compose the city is needed in order to define ways to accommodate urban "fashions" like big box retail in a flexible and adaptable way.

When one looks at the recent history of planning, we are finding that recent planning interventions tend to alter the basic layers of the city for the sake of more transitory functions, such as retail trends or commercial needs. This is insane when one considers that retail exemplifies Schumpeter's idea of the creative destruction of capitalism, with merchandising trends succeeding one another at increasingly rapid rates. This trend of turning the layering upside down can fundamentally harm the basic functioning of the city by denying the reasons why it came to be in the first place. At the same time, far from being composed of basic adaptable types, recent development tends to be single-purpose, functional and specific — and hence short-lived and fundamentally unsustainable.

Figure 1 depicts Brand's "pace layers" with his labels in the left hand column. In the right hand column I have tried to outline the role of the urban designer with respect to these layers. Brand said in a recent lecture: "Fashion changes quickly, commerce less quickly, infrastructure slower than that, then governance, then culture, and slowest is nature. The fast parts learn purpose and absorb shocks; the slowest parts remember, integrate and constrain. The fast parts get all the attention. The slow parts have all the power." Planning and urban design happen at the level of governance, and to my mind it is the responsibility of the planner and designer to mediate between the stewardship and sustaining of nature and culture, and the shaping of the city, to create a framework for accommodating its economic life and absorbing short term trends. Green urbanism happens at the level of the bottom four layers — it is not about short-term trends but abut enduring frameworks.

The Prince's Foundation for the Built Environment utilizes a sort of deep charrette methodology called Enquiry by Design (EbD), developed with English partnerships with the assistance of Paul Murrain, Chip Kaufman and Wendy Morris. The EbD methodology involves an iterative process working between specializations and the whole, and balancing local intelligence with the principles of new and traditional urbanism.

As we began to try to reflect broader notions of sustainability such as local food strategies, sourcing of local materials and reliance upon renewable energy, the Foundation first used sustainability consultants, much as we would include highways engineers on our team. We soon found two things: that these issues were fundamental throughout the project, and that while certain aspects of sustainability were technical and engineering-based, the larger share were integrally related to urbanism — that is, to the relationship between the city, its hinterland and nature. Sustainability thus became not a special issue, but a core part of our EbDs, and we began to understand that it must be negotiated at each stage: scoping, master planning, final design and operations and management.

Figures 2, 3 and 4 depict some early attempts to answer the questions about rates of change and relationships in our work with respect to some key issues related to sustainability. These are part of a larger effort to integrate green issues with urban issues in a fundamental way.

Figure 2 deals with food and farming, from the kind of issues that relate to stewardship/scoping — what is the site's role in the local food economy and what can be its role, or should we build here? — to issues of food production and gardening in the design of a place, to management issues such as provision for farmer's markets or food cooperatives.

Figure 3 deals with water, which includes at the scoping phase issues related to flooding and water supply, and at the design phase, issues related to sustainable drainage, water quality and water conservation.

Figure 4 relates to energy, and attempts to unpick the thorny questions related to how far one decentralizes the production of renewable energy as well as addressing energy conservation through urban design, building typology and block layout and architecture.

Canons of Sustainable Architecture and Urbanism

A Companion to the Charter for the New Urbanism

GLOBAL CLIMATE CHANGE, habitat destruction, dwindling oil reserves and their increasing costs, accelerated by global settlement patterns of sprawl, pose imminent and irreversible threats to the viability of human culture and civilization, the food supply, biodiversity, and water and air quality. This constellation of challenges is as serious, formidable and urgent as humanity has ever faced, and the consequences of failure are as catastrophic as ever.

TOGETHER, the transportation and building sectors account for the majority of energy and nonrenewable resource usage, making the design and planning of the totality of the built environment essential in tackling these problems.

THESE ENVIRONMENTAL CHALLENGES complicate equitable development the world over. Holistic solutions must address poverty, health and underdevelopment as well ecology and the environment.

TO AVOID ECOLOGICAL DISASTER, humanity needs to renew its relationship with the natural world and the other species with which it symbiotically shares the planet. The industrialized world must recalibrate its ethos of rapacious consumption of natural resources and wanton pollution of the environment, as well as its sense of entitlement and dominion over nature.

SMART GROWTH, GREEN BUILDING AND NEW URBANISM each has produced advances in resource and energy efficiency. Yet they alone are insufficient and are sometimes even at odds with one another in tackling this challenge. It is time for each of their specific strategies to be integrated.

THE CHARTER FOR THE NEW URBANISM provides a powerful and enduring set of principles for creating more sustainable neighborhoods, buildings and regions. Yet the profound nature of the environmental crisis calls for amplification and more detailed enrichment of the Charter.

IT IS IMPERATIVE for a unified design, building and conservation culture to advance the goals of true sustainability. Such a culture must be global in scale and in information sharing; in application, the actions must respond to local conditions.

THIS NEW SUSTAINABLE DESIGN CULTURE must address the stewardship of all land and the full range of human settlement: water, food, shelter and energy. It must simultaneously engage urbanism, infrastructure, architecture, landscape design, construction practice and resource conservation.

IT MUST EMBRACE the fact that human interventions in the built environment tend to be long lived and have long-term impacts. Therefore design and financing must recognize long life and permanence rather than transience. City fabric and infrastructure must enable reuse, accommodating growth and change on the one hand and long-term use on the other.

TRULY SUSTAINABLE DESIGN must be rooted in and evolve from adaptations to local climate, light, flora, fauna, materials, and human culture as manifest in indigenous urban, architectural and landscape patterns.

AT ALL SCALES, design must preserve the proximate relationships between urbanized areas and both agricultural and natural lands in order to provide for local food sources; maintain local watersheds; a clean and ready water supply; preserve clean air; allow access to local natural resources; conserve natural habitat; and guard regional biodiversity.

GLOBALLY, HUMAN SETTLEMENTS must be seen as an integral part of the earth's ecosystem and biosphere. The Transect is one tool that provides a framework for the organization of the natural, agricultural and urban realms.

ABOVE ALL, buildings, neighborhoods, towns and regions must serve to maximize human dignity, social interaction, economic and cultural activity, spiritual development, energy, creativity, time and therefore productivity, a high quality of life and sustainability.

AS A SUPPLEMENT to the Charter for the New Urbanism, this new sustainable design culture must follow these principles at the full range of scales:

The Building and Infrastructure

1. The primary objective in the design of new buildings and the adaptive reuse of older ones is to create a culture of permanence with well-crafted, sound, inspired and beloved structures of enduring quality. Places shall promote longevity and the caretakership of both our natural and man-made environments.

2. Architecture and landscape design derive from local climate, flora, fauna, topography, history, cultures, materials and building practice.

3. Architectural design shall derive from local, time-honored building typologies. Building shells must be designed to be enduring parts of the public realm. Yet internal building configurations must be designed to be flexible and easily adaptable over the years.

4. The preservation and renewal of historic buildings, districts and landscapes will save embodied energy, as well as contribute to cultural continuity.

5. Individual buildings and complexes shall both conserve and produce energy wherever possible in order to decentralize and reduce energy infrastructure.

6. Building design, configuration and sizes must reduce energy usage and promote easy internal vertical and horizontal walkability. Approaches to energy conservation are to be low-tech, passive and in harmony with local climate.

7. Renewable energy sources such as non-food source biomass, solar, geothermal, wind, hydrogen fuel cells and other nontoxic, non-harmful sources shall be used to reduce the production of greenhouse gases and emphasize carbon reduction.

8. Water captured as precipitate and internally harvested in and around individual buildings shall be cleaned, stored and reused on site and allowed to percolate into local aquifers.

9. Water usage shall be minimized within structures and conserved through landscape strategies that mimic native climate, soil and hydrology.

10. Building materials shall be locally obtained, rapidly renewable, salvaged, recycled and recyclable, and have low embodied energy. If not, heavy materials shall be chosen for their durability, exceptional longevity and sound construction, taking advantage of thermal mass properties to reduce energy usage.

11. Building materials shall be nontoxic and noncarcinogenic with no known negative health impacts.

12. Food production of all kinds shall be encouraged in individual buildings and on their lots, irrespective of use, in order to promote decentralization and self-sufficiency as well as reduced transportation impacts on the environment.

The Street, Block and Network

1. The design of streets and the entire right-of-way shall be directed at the positive shaping of the public realm in order to encourage shared pedestrian, bicycle and vehicular use.

2. The pattern of blocks and streets shall be compact and designed in a well-connected network for easy, safe and secure walkability. This will reduce overall vehicular usage by decreasing travel time and trip length. Design shall strive to minimize material and utility infrastructure.

3. The positive shaping of the public realm shall focus on creating thermally comfortable spaces through passive techniques such as low albedo and shading with landscape and buildings. The techniques shall be consistent with local climate.

4. The totality of the design of the streets, blocks, platting, landscape and building typologies shall be configured for both reduced overall energy usage and an enhanced quality of life in the public realm.

5. Roadway materials shall be nontoxic and provide for water percolation, detention and retention, for reuse. Green streets integrate sustainable drainage with the role of the street as defined public space. Their design shall maintain the importance of the building frontage and access to the sidewalk and roadway.

6. A wide range of parking strategies (such as Park-Once districts, shared parking, parking structures, reduced parking requirements, minimized surface-parking areas and vehicle-sharing) shall be used to constrict the supply of parking in order to induce less driving and to create more human-scaled amenable public space.

The Neighborhood, Town and City

1. The balance of jobs, shopping, schools, recreation, civic uses, institutions, housing, areas of food production, and natural places shall occur at the neighborhood scale with these uses being within easy walking distances or easy access to transit.

2. The preference for siting new development shall be underutilized, poorly designed or already developed land. Sites shall be either urban infill or urban-adjacent unless the building is rural in its program, size, scale and character.

3. Prime and unique farmland shall be protected and conserved. In locations with little or declining growth, additional agriculture, parklands and habitat restoration shall be promoted on already urbanized or underutilized land.

4. Neighborhoods, towns and cities shall be as compact as possible, with a range of densities that are compatible with existing places and cultures and that hew tightly to projected growth rates and urban growth boundaries.

5. Renewable energy shall be produced at the scale of neighborhood and town, as well as the individual building, in order to decentralize and reduce energy infrastructure.

6. Brownfields shall be redeveloped, utilizing clean-up methods that reduce or eliminate site contaminants and toxicity.

7. Wetlands, other bodies of water and their natural watersheds shall be protected.

8. Natural places of all kinds shall be within easy walking distance or accessible by transit. Public parklands and reserves shall be protected and the creation of new ones promoted.

9. Within neighborhoods, a broad range of housing types, sizes and price levels for a population of diverse ages, races and incomes can provide for self-sufficiency and social sustainability while promoting compact cities and regions.

10. A steady source of water and the production of a wide range of locally raised foods within an easily accessed distance establish the self-sufficiency and overall size of a neighborhoods and/or small towns. Proximate rural agricultural settlements shall be promoted to preserve local traditional foods and food culture.

11. Projects shall be designed to reduce light pollution while maintaining safe pedestrian environments. Noise pollution should also be minimized.

12. The design of neighborhoods and towns shall use natural topography and shall balance cut and fill in order to minimize site disturbance and avoid the import and export of fill.

The Region

1. The finite boundaries of the region shall be determined by geographic and bioregional factors such as geology, topography, watersheds, coastlines, farmlands, habitat corridors, regional parks and river basins.

2. Regions shall be as self-sustaining as possible for food, goods and services, employment, renewable energy and water supplies.

3. The physical organization of the region shall promote transit, pedestrian and bicycle systems to maximize access and mobility while reducing dependence on automobiles and trucks.

4. The spatial balance of jobs and housing is enabled at the regional scale by extensive transit systems. Development shall be primarily organized around transit lines and hubs.

5. The siting of new development shall prefer already urbanized land. If undeveloped land is used, then the burden for exceptional design, demonstrable longevity and environmental sensitivity shall be more stringent.

6. Sensitive or virgin forests, native habitats and prime farmlands shall be conserved and protected. Imperiled species and ecological communities shall be protected. Projects to regenerate and re-create additional agricultural areas and natural habitat shall be promoted.

7. Wetlands, other bodies of water and their natural watersheds and their habitats shall be protected.

8. Development shall be avoided in locations that disrupt natural weather systems and induce heat islands, flooding, fires or hurricanes.

The Green Mile: Aligning Firm Ideology With Sustainability

By Thomas M. Gallas

Salishan in Tacoma, Wash., where 91 percent of the runoff is treated and infiltrated through bioswales.

Photo: Steve Hall/Hedrich Blessing

At Fort Irwin, Calif., revitalized military housing achieves a 50 percent reduction in energy usage over standard design and construction methods.

Photo: Torti Gallas and Partners

Diminishing natural resources and permanent damage to the earth's atmosphere threaten the quality of life in the future. This condition presents an irrefutable interdependency between environmental conditions, economic prosperity and social equity. Consumption of the earth's resources and the polluting effects of the use of those resources must be minimized to prevent irreversible damage to the earth.

Given this sustainability imperative, the design community must move quickly to respond. As new urbanists we have a particular mandate to lead this effort as we design the communities of the future. By leading our clients to make the right decisions today, we will help to ensure the quality of life for current and future generations, rather than continuing to create problems that may not be fixed for another 100 years. Just like saving for retirement, the longer we wait, the higher the price — and in this case, the more difficult the solution will become.

TRANSFORMING A FIRM

Embracing a green ideology isn't as easy as making a snap decision. It requires us to commit to changing and evolving the fundamental philosophies and cultures of our firms and organizations so we can adequately lead this effort.

The transformation of Torti Gallas and Partners has so far been an eight-year road trip along a circuitous "green mile." To get to this point we have traveled up the hills of doubt and resistance, around the curves of lack of knowledge and confidence, and into the tunnel — not knowing when to lead and when to follow. Each step we take, we see that we are moving in the right direction but are still uncertain of how far we have to travel or when we will get to our final destination.

As a firm committed to the principles of the new urbanism, we previously felt justified that our designs were inherently sustainable, allowing us to practice our beliefs without aspiring to achieve an even more comprehensive, environmentally sustainable level. As we asked ourselves whether we could do more to realize true sustainability through our designs, we agreed that indeed we could. This journey along the "green mile" has set us on a quest to align our new urbanist ideology with an equal commitment to sustainable design.

A CYCLE OF LEARNING AND LEADING

The transformation of Torti Gallas and Partners into a firm committed to sustainable design began in 2000 by a motivated group of interns looking to generate a strong grass roots initiative. These interns lifted us up in the beginning and carried us quite a distance along the "green mile," with only passive support from the firm. To make this significant change happen over these last eight years, we have undergone a continuous cycle of research, discourse, confidence-building and leadership. Both major and minor advances in learning and leading sustainability initiatives provided stepping stones for future successes. Each step built an organizational foundation that enabled growth through experience and confidence, allowing us to build greater internal capacity. Key milestones included:

- A "low impact development" for Salishan in Tacoma, Wash., utilizing a system of bio-retention swales to capture, treat and infiltrate 91 percent of the storm water on site (2001);
- A list of "10 Materials We Can Use Now," developed by the interns, that identified "low-hanging fruit" that clients could be convinced to include in order to make our building designs more sustainable (2002);
- A "Sustainability 101" discussion series to educate the firm on basic sustainable practices (2002);
- Accreditation of 18 interns and professional staff (no principals) as LEED AP's (2003); and
- A "solar kit of parts" developed to provide passive solar shading for 1,200 new homes. The proactive sustainable design for this livable community in the desert at Fort Irwin, Calif., realized a 50 percent reduction in energy and water usage over conventional construction methods (2003).

Many of these independent inroads were accomplished without a firm-wide commitment to support them. In 2004, the interns realized that their efforts were only going to get so far without the active support of the principals. Taking a more focused approach, the interns planned and taught an in-house sustainability training class, held twice per week at 7:30 a.m. From this valuable coaching, 10 principals became LEED APs. The resultant buy-in by the principals represented a key turning point, igniting a stronger commitment by the firm's leadership to sustainability. Additional important milestones that followed included:

- A strategic plan to realize sustainable design as integral to the firm's design practice through education, our designs and marketing (2005);
- The first annual Torti Gallas and Partners Green Week featured presentations, games, outside speakers and lobby exhibitions to raise awareness and educate clients and staff (2005);
- Adoption of our "green spec" as our standard spec (2005);
- Partnering with a client to submit our first LEED-certified design ($30,000 of our fee was contributed to support a portion of the LEED registration and monitoring costs)

(2005); and

- Integration of sustainable elements in our projects including urban designs that saved grand trees, regional growth management plans, and use of sustainable building materials and systems (2005).

Despite these significant accomplishments, we felt we could achieve an even higher and more consistent level of sustainability in all of our designs. The results of a firm-wide survey gave us the insight we needed to go further, indicating that, as a whole, we were not yet confident in our knowledge and abilities to lead clients in more comprehensive sustainable design solutions. Major obstacles to overcome included the need to change our design process from project inception, and to undertake more research/education of sustainability issues and best practices.

DISCOURSE AS A METHOD OF STRATEGIC CHANGE

At Torti Gallas and Partners we have used discourse as the preferred method for educating the firm and creating change. In our firm, change doesn't just happen because "John and Tom say so." As with any significant change in practices or beliefs, the biggest challenge is the natural human instinct to fear change. Historically at the firm, discourse has been our best weapon in overcoming this challenge by promoting an organic evolution of ideas with a shared sense of ownership, resulting in a better chance for change to be embraced and implemented. By openly discussing our ideas in firm-wide forums, we develop our abilities to convey ideas in a way that fosters leadership.

The formats for our discourse sessions have varied over the years. They usually have been held on Friday afternoons with beer and snacks and involve presentations and/or discussions led by members of the firm from all levels or by outside guests. Sometimes we break up into small groups to achieve a higher level of focused discussion and active participation.

The transformative impact of the discourse method at Torti Gallas and Partners cannot be overestimated. Going back to the mid-'90s, we have utilized this approach to evolve from "Architects of the Suburbs" to "Architects of Community." Again in 2000, at the dawn of the new millennium, discourse significantly helped us transform the firm by better integrating our urban design work with our architectural designs. This enabled us to develop the Torti Gallas Design Charter, which espouses our shared set of principles and beliefs.

Since 2005 we've undertaken a series of discourses to expand our knowledge and beliefs about sustainability. To reinforce these discussions, as part of our biannual strategic plan, we adopted the goal of "realizing sustainable design as an integral part of our practice" through education, project designs and marketing. This marked a significant milestone on our path toward sustainability in that we were finally gaining firm-wide support for a shift in our beliefs about sustainable urbanism and our methods of practicing it.

While we now had the will, we still needed to find the ways to learn more and to better educate and lead clients who were afraid they couldn't afford to be sustainable. One of the particularly unique forms of discourse at this critical juncture in our successful transformation was the Sustainability Charrette Game. The objective of this interactive game was to work in small teams to pick sustainable strategies that would maximize the "green impact" for each unique project, while staying within a prescribed budget.

The Game Committee designed the Sustainable Design Toolbox to embrace a combination of new urbanist principles as well as items from such sources as the USGBC's LEED Scorecard. The Toolbox consisted of a list of strategies within several major categories, such as community involvement, design-construction process, indoor environmental quality, materials and finishes, etc. Each strategy was assigned a predetermined number of points, called "trees." The goal was to maximize the number of "trees" earned by spending the $15 budget to select only three sustainability strategies from each category of the Toolbox. Each randomly selected small team was assigned one of four Torti Gallas projects to figure out the best way to invest their sustainability budget.

All of us went into this game feeling as though individually we lacked the confidence to make these important decisions. We were surprised at how much we already knew — especially as a team — and how much was just common sense. This successful team experience gave us all a big boost of confidence, with the new awareness that if we didn't know about something, someone else on the team probably did. It also sparked a desire to learn more. Another key realization was that we needed to better "walk the talk" in our offices. As a result, in the build out of our Los Angeles office we incorporated a number of sustainable materials including FSC-certified birch desktops, low VOC paint, finishes and adhesives, 40 percent recycled content carpet, and energy efficient light fixtures. Our Silver Spring office also won a local award for recycling.

Green Week at the Torti Gallas offices.

Photo: Torti Gallas and Partners

Each of these steps along the "green mile" has contributed to our confidence and commitment to expanding our ideology to embrace sustainable urbanism. Again, the cycle of research, discourse, confidence-building and leadership proved valuable. In 2006 and 2007, the firm completed a 12-month discourse that focused on continued research/education, redefining our design process to incorporate sustainable design into each project from day one, and promoting our beliefs in sustainability. Much of the discourse involved presenting and discussing the results of assigned research topics including low-impact design, sustainable grading, building envelope design, daylighting and ventilation, and VOCs. Concurrently we developed a number of tools to support our success including a project start-up kit, a sustainability checklist, and a refined green specification as the firm's standard.

The final product of our discourse was to revise the Torti Gallas and Partners Design Charter to incorporate a common language about our beliefs in sustainable urbanism. It includes our commitments to preserving natural resources, reducing the impact of our developments on natural hydrology, promoting compact development, reducing net energy and water usage, connecting people with the outdoors and promoting good indoor air quality. The Charter represents the pact between all of us in making design decisions about urban design, architecture and sustainability.

A LOOK FORWARD

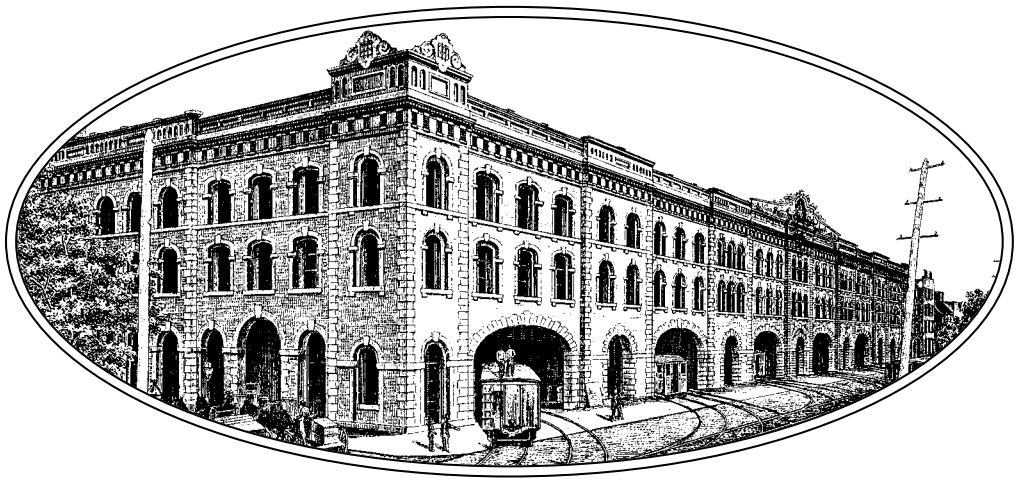
We believe that our efforts have better positioned Torti Gallas and Partners to manage and lead clients through the sustainable design process and to select projects that are more compatible with our combined new urbanist and sustainability beliefs. As a result, clients who are looking for design leadership in the marriage between the new urbanism and the burgeoning "green" market are drawn to us.

Of course, we are still debating several potential conflicts between our new urbanist beliefs and the optimal sustainable solution. For instance, should we take on commissions that require greenfield development … even if a new urbanist design is applied? Should we walk away from non-sustainable commissions … or be satisfied with trying to make them as sustainable as we can? How should solar, wind and climate conditions affect optimal block and building orientation? How do we balance the cost or aesthetic of materials versus the material content, e.g. recycled, recyclable, embodied energy or toxicity? So far, when there is a conflict, the principles of the new urbanism are chosen.

Regardless of the compromises we must make in balancing these and other potential conflicts, there is a lot of room for movement toward sustainability that new urbanists can travel without any conflict. At Torti Gallas and Partners, we know that we still have a long way to walk along the "green mile." The key for all of us as design leaders is to make haste in ensuring that our designs are more sustainable tomorrow than they were yesterday so that economic prosperity, environmental quality and social equity can be preserved for future generations.

The Arthur Capper Community Center in Washington, D.C., a LEED-certified project in a HOPE VI redevelopment.

Image: Torti Gallas and Partners



A Convenient Remedy to the Inconvenient Truth

By John Norquist

Conservatives tend to view efforts to address climate change as a drag on the economy. And even those who take climate change seriously, like *New York Times* columnist Tom Friedman, view sacrifice as a necessary component of CO_2 reduction. There may be some economic cost and some suffering, but both sides miss the opportunity presented by our climate challenges.

CO_2 is a waste product caused largely by inefficiency. Removing inefficiency by converting to fluorescent lighting and thermal windows and by insulating power plants will actually add value to the economy and to our quality of life. Ed Mazria, who leads an organization called Architecture 2030, estimates that CO_2 emissions can be slashed by green building techniques. Likewise CO_2 emissions could be slashed even further by tightening our development patterns. This also will add value to the economy and add to quality of life. In fact, more urban development is what the market wants and what the market will increasingly want according to demographic and economic research by Arthur "Chris" Nelson of the Metropolitan Institute of Virginia Tech University.

Move from a subdivision with two units per acre to a leafy inner-ring suburb with connected streets and eight homes per acre, and you can expect to average about half the driving you did before.

While Detroit puts its hopes in yet-to-be realized technology — the stars of this year's auto show were plug-ins that are years from the market — the technology for building highly efficient neighborhoods exists. It's a convenient remedy to these inconvenient truths and it doesn't require new gizmos or energy sources. In fact, millions of Americans use it every day to live amazingly high quality, low-carbon lifestyles.

The United States was once very good at building neighborhoods with highly efficient transportation systems. These were traditional neighborhoods with well-connected street grids and building stock ranging from cottages to townhomes to apartment buildings and offices with retail below.

While they're not as prevalent as newer cul-de-sac subdivisions, these existing green neighborhoods are still all around us in the hearts of rail suburbs such as New Rochelle, N.Y., or Oak Park, Ill., or Pasadena, Calif. Or as great city neighborhoods such as Forest Hills, Hyde Park or Venice Beach.

Research shows that people in these kinds of neighborhoods drive less than people in the sprawling new neighborhoods commonly built today.

Starting around 1950, we began forgetting how to build these traditional neighborhoods. Modern communities became designed first to accommodate — and then require — the automobile. Outlying areas today are simply zoned for lots of driving; residents have no choice but to rack up lots of miles driving from home to school to office park and mall.

Those who live in neighborhoods where stores, schools and workplaces are within walking distance, or are reachable by frequent transit service, drive far less. Peer-reviewed studies, including one in 2002 by John Holtzclaw and other researchers, prove this. Move from a subdivision with two units per acre to a leafy inner-ring suburb with connected streets and eight homes per acre, and you can expect to average about half the driving you did before. Move to a neighborhood of tightly packed rowhouses and mid-rise apartments, and your driving will likely average about one-third what it was before.

Fortunately, innovative alternative zoning codes — form-based codes — are now available to encourage main streets. And they're gaining popularity. Miami is one of several cities reworking its zoning to encourage neighborhood-based development. Hurricane-damaged Gulfport, Miss., just adopted an alternative that can be used to ensure that rebuilding creates neighborhoods of character and value, not sprawl.

There are signs everywhere that people want these alternatives. A recent GFK Roper poll found 90 percent of Americans view "the ideal neighborhood as one where people live closer together." New urbanist developments like Prospect outside Denver, that overcome zoning challenges to create traditional mixed-use neighborhoods, are cited as "the most desirable places to buy a home." While Al Gore isn't alone in missing the significance of development alternatives (Tom Friedman seems stuck on the same list as Gore), others are recognizing the potential to rethink development patterns. In a debate with Sen. John Kerry on environmental issues, former House Speaker Newt Gingrich, surprisingly, praised the new infill development Atlantic Station for bringing 10,000 residents and even more jobs to downtown Atlanta. Many Atlantic Station residents will no doubt be able walk to work.

In the next 30 years, our country will build 70 million new dwellings somewhere. With urban life emerging as a market favorite, it's looking more and more like building a good portion of them in livable, walkable, traditional neighborhoods is the most convenient remedy for the Inconvenient Truth.

The Marketing of Sustainable Communities

By Andrés Duany

There are **four environmental target markets:**

They are meta-categories that overlay the 66 household clusters as defined by the ZVA Target Market Methodology.

Presentations must vary according to these target markets, while the intrinsic environmental practices of the **New Urbanism** remain constant.

	Ethicists	Trendsetters	Opportunists	Survivalists
Generational Differentiation				
Greatest Generation				•
Baby Boomers	•	•	•	•
Generation X		•	•	
Millenials		•		
Household Demographics				
Empty Nesters			•	•
Traditional Families				•
Non-Traditional Families	•	•		
Younger Singles/Couples	•	•	•	
Metropolitan Geography				
Cities		•	•	
Towns		•	•	
Suburbs	•	•	•	
Exurbs				•
Behaviors				
Creative Class		•	•	
Knowledge Workers		•	•	•
NIMBYS	•			•
Locavores	•	•		•
Hollywood	•	•		
Group Ten Environmentalists	•			
Political Orientation				
More Liberal	•	•		
More Conservative			•	•

The Ethicists

They are the original environmental activists.
They see themselves as protectors of the environment.
They consider that humans harm nature.
They are activists, moralists, evangelists, regulators.
They may be Luddites.
They tend to be anti-growth.

They read Mother Earth News.

At best, they are a wake-up call on specific issues (i.e., global warming).
At worst, they are aggrieved and demand sacrifice.

Heads up: Guilt holds limited marketing appeal in this country.

Photograph by Koichi Kamoshida

Poster Child: Al Gore

Photograph by Paul Nicklen

Emblem: the Polar Bear

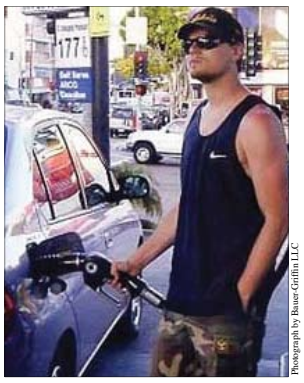
The Trendsetters

They are consumers making the environmental choice (so long as it does not require substantial sacrifice).
They will eat organically (so long as it tastes good).
They will recycle (when convenient).

They read Real Simple or Dwell.

At best, they can attract large numbers of young people to the cause.
At worst, they may be subject to feel-good tokenism.

Heads up: 'Coolhunting' consumers will probably cause the tipping point.



Photograph by Bauer-Griffin LLC

Poster Child: Leonardo Di Caprio with Prius

Photograph by Tesla Motors

Emblem: the Tesla electric sports car (0-60 in 4 seconds)

The Opportunists

They are pragmatic, progressive, optimistic and entrepreneurial.
They are techno-positivist investors and love "gadget-green";
They count on economic self-interest rather than regulation.

They read: Wired.

At best, they can identify market-based solutions.
At worst, they can distract us with ineffective solutions (i.e., ethanol).

Heads up: They will create many jobs.

Photograph by Adrian Dennis

Poster Child: Sir Richard Branson

Image by DPZ

Emblem: Wind Turbines

The Survivalists

They are the pessimists (i.e., global warming is irreversible).
They will adapt their lifestyles for The Long Emergency.
They will circle the wagons for family and community.
They prepare for off-the-grid living.

They read Bushcraft Magazine.

At best, they make us prepare for the worst.
At worst, they are paranoid about security.

Heads up: They may constitute the majority someday.

Photograph by TED

Poster Child: James Howard Kunstler author of The Long Emergency

Photograph by Randy Wells

Emblem: The Amish

Planning Sustainably — Without a Crystal Ball

By Stephen Coyle

Prince Charles spoke a year or two ago on sustainability. He described the sustainability conundrum: How can we determine appropriate policy and strategic actions without the ability to forecast the future, without a crystal ball? How shall we act, now, without the ability to forecast the future? Casting our gaze around us, we see the present circumstances:

- Nationally, we are developing land twice as fast as population is growing.
- Vehicle use in America has more than doubled since 1970 (offsetting all fuel economy gains).
- Most development does not happen one building at a time.
- Transportation now uses almost a third of United States energy consumption; fuel consumes almost a third of our energy.
- Buildings use at least 45 percent of energy consumption.
- Globally, the world's population has grown to 6.5 billion, with more than 4 billion being added since 1950. It may grow another 2.6 billion before beginning to fall, according to the United Nation's lower forecast.
- Today's 3.2 billion city dwellers are likely to increase to 6 billion by 2050.
- The world has consumed more natural resources since World War II than in all of history prior to that time.

Even without our crystal ball, we can see that unsustainable growth or growth that exceeds its resources may be the greatest threat to the future of humanity here at home and across the globe. Without sustainable growth, billions of people — not to mention other species — will be condemned to suffer its unfortunate consequences. So we ask ourselves:

- How can we bring population growth and the increase in human places and spaces into balance with the natural environment to create long-term sustainability?
- How can we accommodate the adverse effects of climate change and degradation of natural protective barriers?
- What strategies, tools and techniques are worth consideration and deployment before we have exhausted our resources?
- In terms of the sustainable growth of human settlement, what should we do?

When we parse the Bruntland Commission's definition of sustainable development ("development which meets the needs of the present without compromising the ability of future generations to meet their own needs"), we discover we can first look back in order to look ahead. So, absent our crystal ball, as we ponder the range of approaches to sustainability — from the technological solutions like hydrogen power, to non-technological strategies like better design and planning practices that don't necessarily rely on technological advances, and the combinations of both approaches — we should ask ourselves four questions, drawn in part by Jeff Vail's essay on technology.[1]

First: "What has worked best, over time in the long run?" While it's true that we cannot accurately predict the future, we can begin to look back in time. We can look back over generations and millennia of human settlement and physical development, to determine what strategies, tools and techniques have allowed certain places to survive, endure and even prosper over time, and which have failed outright or struggled and declined. What decisions allowed ancient settlements to survive and evolve over centuries in response to internal and external forces? We used to build compactly, with our daily needs within walking distance or a streetcar ride away. Many traditional multi-story dwellings included a first floor adaptable as a living room, café, or workplace with housing above, configurable for a wide range of ages. We call this metric *Time-Testing*.

Second: "What sustainable solutions can be employed with relative efficiency and simplicity by the greatest number of people?" Allowing a local stone building wall to absorb the warmth of solar energy has been employed for centuries while photovoltaic panels require relatively expensive labor and materials and a specialized industry. Each member of a community, neighborhood or block, from elders to youngsters, can become an expert in conservation when local systems are in place — reducing and reusing instead of generating land-filling waste; walking instead of driving. This represents our *Vernacular* metric.

Third: "What remedies offer broad applicability for a wide range of circumstances and over a diversity of environments?" Compactness should be encoded in all new development and applied in virtually every jurisdiction through governmental policies and development standards at the scale of the neighborhood, community, and the region. This works in almost all climates, regions and cultures. Connectivity works to improve everyone's mobility, from the elderly and disabled who are limited to wheelchairs or walkers, to toddlers taking their first steps along a public way. People will walk, bike or use transit when the available means are convenient, attractive and efficient. Passive solar can be employed for both heating and evaporative cooling. Until the technology of photovoltaics evolves into a simple, inexpensive and broadly applicable solution, it fails our measure of *Pervasive*.

Fourth: "What strategies, tools and techniques will limit or reduce potential negative consequences, and leverage positive impacts, in the short and long term?" The current ethanol dilemma — a fuel process that consumes nearly as much non-renewable fuel as it yields while displacing agriculture for food — is a poster child for undesirable consequences. Planting native foliage can reduce storm runoff, minimize irrigation, and decrease the "heat sink" effect. Connectivity, combined with compactness, creates a self-sustaining feedback loop. *The New York Times* recently compared actions for reducing global warming gases, including the reduction in oil consumed and the dollar savings. The calculations found while choosing energy-efficient lighting and appliances makes a difference, changing how we travel would make by far the biggest difference. We call this metric *Virtuous*, because the strategy or action produces positive feedback or consequences relative to sustainability.

So even without a crystal ball, we can employ the metrics of Time-Testing, Vernacular, Pervasive and Virtuous to evaluate proposed sustainable solutions, to determine if they are affordable and broadly accessible without the need for specialists or causing unintended consequences that undermine the core objectives. If we apply these measures to our growth strategies and techniques, we can discover what has worked best, and what will work best in the long run.

When we plan and build compactly, with many ways to circulate, within the context of people, place and time, and employing adaptable design and building practices as we did for thousands of years, we conserve non-renewable or environmentally depleting resources and energy-consuming building materials and limit undesirable waste. We must re-compact and reconnect our cities, towns, villages and neighborhoods to increase mobility proportional to the scale and pattern of connections within each. In this way our new places may still be navigated by child or elder within a convenient walk, wheelchair or bike ride, saving energy and reducing pollution with every step.

We need to research the environments and absorb the intelligent regional and local lessons of planning and development as a direct step towards employing "what works best in the long run." Finally, our places and spaces must be designed with the sufficient flexibility of function, and for adaptive response to physical, economic and social conditions that will certainly change over time.

My green crystal ball suggests that we need holistic thinkers/doers to help get us out of this mess. We need generalist architects, planners, engineers, scientist, politicians, educators, environmentalists, economists, urbanists and citizens — educated, motivated and capable of deploying the sustainable strategies and techniques; testing and evaluating the ideas and plans; and implementing the Time-Tested, Vernacular, the Pervasive and the Virtuous. Let us join the growing community of voices that believe that appropriate information, rather than mere technology, represents the building block of sustainability. I look forward to continued collaboration with those at the forefront of this movement so that we can build a more robust and sustainable future.

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[1] Vail, Jeff, "Elegant Technology." *Rhizome: Weekly Notes on Emergent System, Geopolitics, Energy & Philosophy,* November 6, 2006. Accessed from <www.jeffvail.net/2006/11/elegant-technology>.

Formal building wall section built using aerated clay block.

Credit: The Prince's Foundation for the Built Environment

Informal building wall section built using hemp and lime.

Credit: The Prince's Foundation for the Built Environment.

A New Culture in Building

By Ben Bolgar

At the Prince's Foundation we are always interested in looking to the past for successful solutions that may inform our design solutions for future generations. This seems to be working well so far in architecture and urbanism, but when it comes to construction we often find ourselves compromised by the contrasting priorities of available systems of construction and skill sets versus cost. In the worst case this has the impact of sticking a traditional language of building onto a non-traditional form of construction, which can feel a bit like faking it!

The sad situation we find ourselves in, where humans have changed the atmosphere to the extent that it is likely to irreversibly damage life, is also the opportunity to use our creativity to change the way the building industry thinks about investing in and constructing places to live. In this short paper I will focus only on the building envelope, rather than tackle the wider issues of energy production and location efficiency, as they are being covered by others.

So what can be learned from the past about sustainable building? Well, for a start there are plenty of buildings that have survived for hundreds, even thousands, of years that by their nature have sustained because they are robust and simple enough to adapt to the variety of uses they have housed during their life. They are more than likely relatively simple to repair and probably have materials that have aged well and are detailed to keep the rain out (at least in the UK context!). It is quite likely that they are also good-looking or even loved by people of different generations, as buildings that people dislike are easy to knock down when they degrade. After all, it's a tricky decision to plow money into renovating something that you don't actually like, and this often has to do with aesthetics.

Perhaps one of the most profound statements by an architect was when John Soane had the artist Joseph Michael Gandy create paintings of the Bank of England. Gandy did so as a ruin, which had the dual effect of creating a cutaway to reveal the plan of the building and also made a profound statement of thinking about the building as a ruin. The amazing thing about buildings that are built simply, out of natural materials, is that they don't look too bad as ruins. Some even look so good that they are protected and become part of the historic landscape, and they may even add value to their surroundings. It is difficult to imagine the same being true of a 1960s block of flats or office, which even when dirty or vacant can blight an area and encourage "pull me down" graffiti.

The following is a short summary of what we feel we can learn from the last 3,000 years of building in terms of construction techniques that have sustained:

1. They are simple (solid wall) and transferable (self-build to industry).
2. Materials are often sourced locally — organic and reusable/recyclable.
3. The core is straightforward, leaving time for architectural detail.
4. They are usually based on high thermal mass.
5. They allow a little bit of moving without cracking.
6. The materials tend to get better with age.
7. They degrade elegantly, helping to sustain value.
8. The details are designed to be practical and beautiful (evolution).
9. They are easy to patch and repair (by non-specialists).
10. The materials are easy to recycle.
11. They don't have rely-on fast track production systems that may need wholesale replacement due to non-availability of components.
12. They are generally non-toxic (with the exception of lead!).

It is also important to understand what we may be able to improve upon by constructively critiquing these types of buildings, so these are the aspects that are not so good:

1. Slow to construct and labor intensive;
2. Sometimes requires the heavy use of materials — stone/brick;
3. Excessive heat loss through wall and air gaps;
4. Acoustically poor;
5. Limited by small spans;
6. Can be high-maintenance;
7. Can limit building height.

The UK house building industry is almost exclusively dominated by cavity wall construction. Most common is a concrete block interior structure, a cavity (either partially or completely filled with insulation), and a brick external wall. These two leaves are tied together using metal wall ties, and they move in different directions with the block shrinking and the brick expanding slightly. This system also requires drips to let moisture out, vapor membranes to stop moisture getting through, cavity closers to do what they say, and a host of other devices to span openings and turn corners.

In a recent crafts summer program held in Lincoln we set out to explore whether we could build two wall structures that were solid, simple and organic, with high thermal performance to limit the amount of energy required to heat the building. The two systems we settled on were an aerated clay block system and a lightweight timber frame with hemp and lime infill. The clay block is really just an upgraded version of the solid brick wall, only being less labor intensive, lighter on materials and better insulated. It has been used in Germany for nearly 100 years, and although it uses energy in the firing process, is relatively low-impact. The hemp and lime system is not that different from a traditional timber frame with a wattle and daub infill, only you don't need as much timber in the frame and the hemp/lime is a much better insulator than wattle and daub. This was developed in France to create better insulation to timber-framed, historic structures. Hemp can be grown to 15 feet in three months and, as a plant that consumes CO_2, means that the wall has carbon locked in.

With both systems, a 425-millimeter-thick wall (16.7" inches) gives a U-value of around 0.18 (R-value 5.6), which is well below current building regulations of 0.3 (R-value 3.3) and getting towards Passiv Haus standards of housing that require no heating of around 0.15 (R-value 6.7).[1] The hemp and lime mix is typically sprayed onto the timber frame, and permanent shuttering can be left on the internal wall to act as the wall finish. It is finished externally with a lime render allowing for a completely breathable system with no artificial membranes or components. The clay block requires a very accurate foundation, as the blocks are large and the mortar joints only 1 millimeter (0.04 inches"). Once the first course is laid, the blocks go up quickly and can be easily cut using an alligator saw. We also found that cornices and other moldings are relatively easy externally as there are smaller, thinner blocks which can be cantilevered out, and broken-up blocks make an excellent packing material with a high level of suction to allow for running moldings when the two-coat render is being applied.

The Prince's Foundation is building a test house using aerated clay block on the Building Research Establishment's Innovation Park, and on three hemp houses with a developer in Stamford. Other "green" houses are planned using these technologies in Scotland and Wales. Once we have monitored the cost, ease of construction and performance of these dwellings in a UK context, we will be in position to take the next step towards larger-scale delivery or refinement. This is one example of how the Foundation delivers its mantra of "learn, practice, teach."

[1] U-Value is a measurement of heat flow. The lower the U-value, the more slowly the material transfers heat in and out of your home. R-value is a measurement of heat resistance. It is the inverse of the U-value, so the higher the R-value the better the material resists heat transfer. Definitions by the Lawrence Berkeley National Laboratory's Home Energy Saver website (http://hes.lbl.gov/hes/glossary_dat.html).

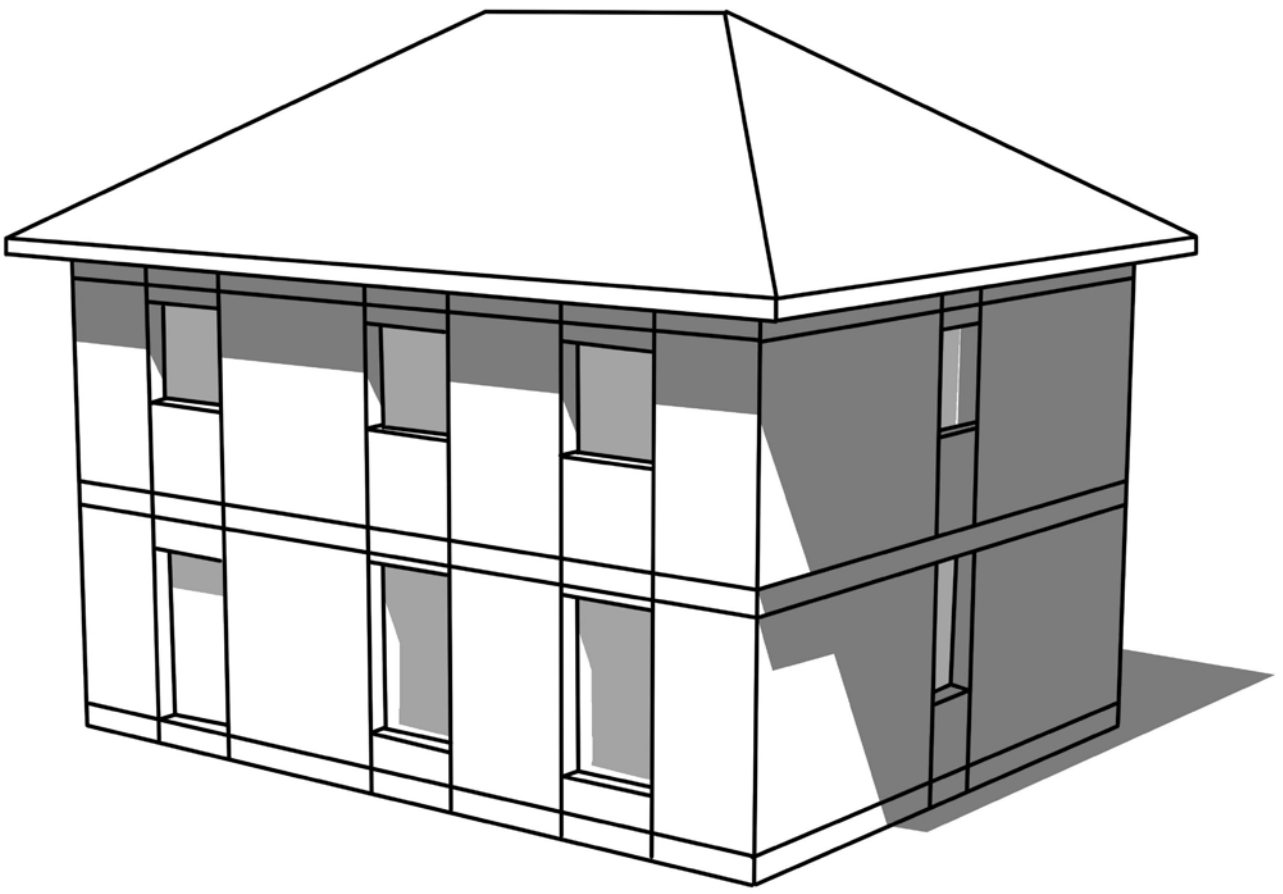


Figure 1

Sustainability and Traditional Architecture

By Robert Adam

When the sustainability debate became serious about 10 years ago, the view in the architectural profession and elsewhere was that the way to reduce energy consumption would be with new technology. Looking back, the evident contradiction in this idea seems obvious, but it is still the great hope for those who want to retain an energy-wasteful lifestyle without consuming energy. At this time the traditional architecture movement, and to a lesser extent the traditional urban movement, defined itself by its opposition to the long-standing technological obsession of the modern movement. Indeed, many traditionalist practitioners were proud to distance themselves from many aspects of modern technology. Consequently, the first reaction of the traditional architecture and urbanism movement to the sustainability debate was at best to ignore it and at worst to deny its relevance. High-tech architects and other modernists claimed the sustainability movement for themselves. In 1997 a book called "Eco-Tech: Sustainable Architecture and High Technology" summed up the mood perfectly. Written opportunistically by a journalist, it did not take much insight to see that the high-tech architecture that was being presented as sustainable was nothing of the sort. The real heroes of this publication were not the architects at all but the environmental engineers who used ever more clever means to make highly unsustainable buildings moderately sustainable.

"On the other side, traditionalists have been taken by surprise. From pariahs often ridiculed by the minor experts on sustainability in the profession, they now find themselves on the side of the gods."

This game goes on, but most environmental engineers and genuine experts have seen through it. The glass and steel buildings that still dominate architectural fashion are major energy guzzlers in their materials, their construction, their use and their lifespan. The environmental engineers, however, are often unwilling to admit this too loudly — their principal clients are the architectural establishment.

On the other side, traditionalists have been taken by surprise. From pariahs often ridiculed by the minor experts on sustainability in the profession, they now find themselves on the side of the gods. This has caused confusion in some circles: While the most sustainable building and urban forms may be low technology, they are technology for all that, and the proof of this is technological. In an unequal debate, technologically driven and often well-funded mainstream architects range doubtful science (which is at least science) against a sometimes bumbling promotion of cast-iron gutters or local materials (which is usually barely scientific).

While it may seem obvious that low-energy design is most likely to have originated in the pre-fossil-fuel era when energy was very expensive indeed (a liter of petrol is worth three days of manual labor), the point needs to be established scientifically. Last year my firm, Robert Adam Architects, formed a consortium with house-building firms, a planning consultant and Atelier 10, a leading international environmental engineer, to provide a properly tested comparison between a largely glass-walled lightweight building and a traditional dense-walled building with punched window openings and traditional materials. This is now published.

As with any research, we had to control the variables. This meant testing two models sufficiently similar to be comparable. We also had to avoid the charge that we had rigged the research to create the results we wanted. As the architectural and technical variables are enormous in practice, this was always going to be a problem. We set up a multi-cell, two-story rectangular building. One had a flat roof, two long walls of glass and two short walls of insulated cladding — the "glass-wall." The

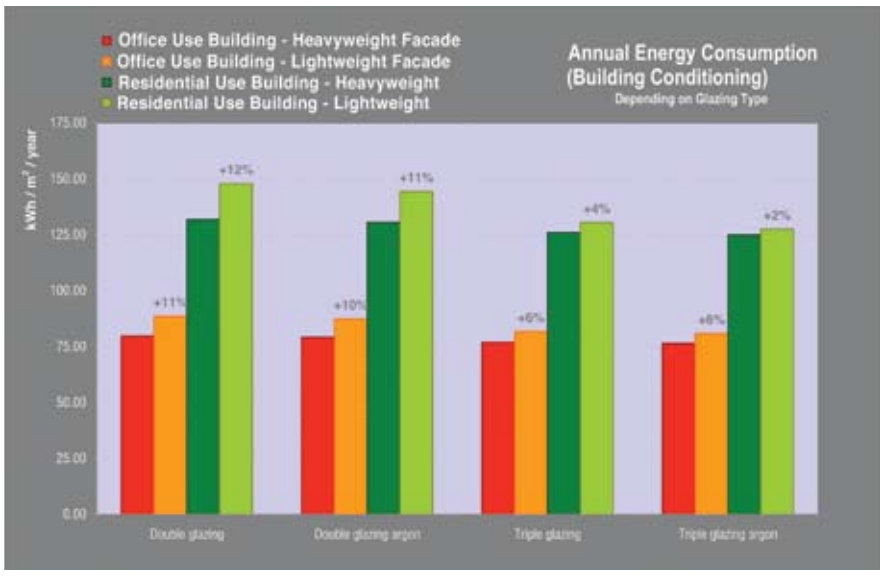


Figure 3

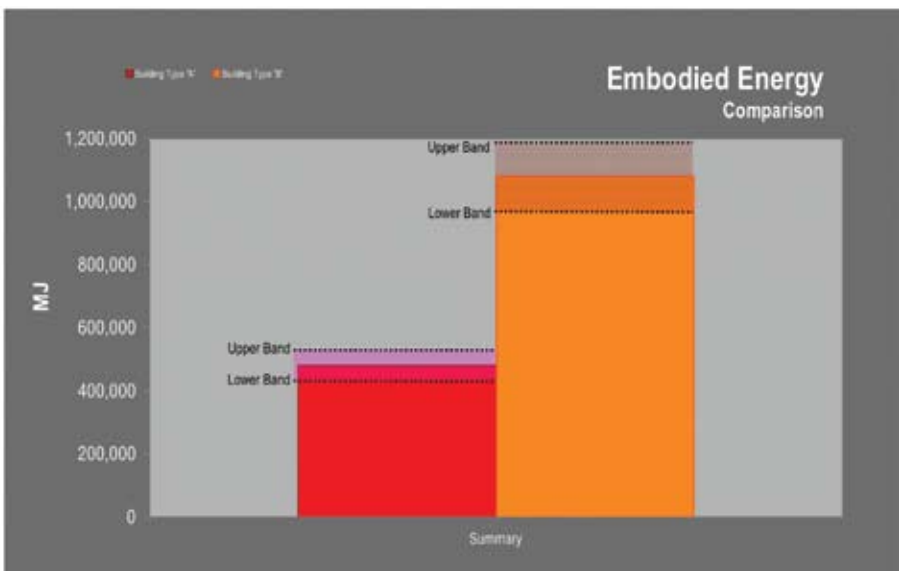


Figure 4

other was a conventional dense-construction, hole-in-the-wall building with a pitched roof — the "traditional." The two types are illustrated in Figures 1 and 2. The construction of the traditional was the conventional UK type: a cavity wall with a brick outer face, insulation in the cavity and a building block on the inner leaf; a timber roof structure with insulation and a clay tile finish. While both versions were tested with double and triple glazing, the construction of the traditional type was not varied, although there are a number of more energy-efficient solid-wall construction types and materials, such as lime and hemp blocks and lime stucco. The glass-wall type, on the other hand, the dominant construction element being glass, was tested with the most sophisticated alternatives: triple-glazed argon filled glazing and solar-controlled glazing (such as shading).

The models were then tested for energy performance both as an office use and as a domestic use. The conclusions were quite clear and are summarized in Figure 3. The differences in both use-types, whether fitted with double glazing or argon-filled triple glazing, are quite marked. The office use and domestic use are at best 10 percent better and 11 percent better respectively for the traditional building. When the highest-performance conditions for the "glass-wall" building are used, the improvement reduces to 6 percent and 2 percent respectively. In other words, with the highest-performance glazing system the glass-wall type cannot reach the thermal performance of even the most elementary traditional type.

There are a number of other factors that cannot be directly correlated with the thermal figures. The energy embodied in the building materials — their manufacture, extraction, transport and construction — has no universally accepted method of measurement. It is clear, however, that lightweight building materials, glass, and specialist glass consume much more energy in production than most traditional materials. The comparison of the two types is shown as a range of values in Figure 4; the results of this range quite clearly favor the traditional type.

One of the beneficial factors in the glass-wall office use is the high level of daylight, which reduces the need for artificial lighting. In practice, the high level of glazing causes discomfort in the areas adjacent to the glass. This is reduced by the use of external shading, internal blinds and screens. These substantially reduce the daylight in these buildings but, as an often ad hoc solution, cannot be included in these figures.

Finally, high-mass, conventional buildings with tested conventional materials have a much longer life in use than lightweight construction. The life-span of many lightweight buildings, with their reliance on mastics and exposed metals, is often quite short; as little as 25 years is quite common. On the other hand, conventional and traditional buildings have already lasted hundreds of years. There are, of course, many variables to any such comparison, and it is not susceptible to measurement. However, the deleterious effects of short-life buildings not only in terms of the more frequent necessity for high-energy building activity, but also on the urban fabric, are not hard to demonstrate heuristically.

The relative benefits of the traditional building type as against the glass-wall type are very clear. Critics can and have already claimed that this is a deliberately manipulated and wholly theoretical condition; that glass-wall or lightweight buildings would not be designed or used in this way; and that better local situations or different design would be employed. This is, of course, true but it is also true for the traditional type. Indeed, in testing this type the most highly developed energy-saving solutions have deliberately been avoided. In all objective studies it is essential to reduce the variables and compare like with like. This study has done this and, without hard-to-measure variables, has shown clear benefits for the traditional type. It confirms in a clear and comprehensible manner what all environmental engineers know but many architects do not want to be revealed: Traditional buildings are the most sustainable type.

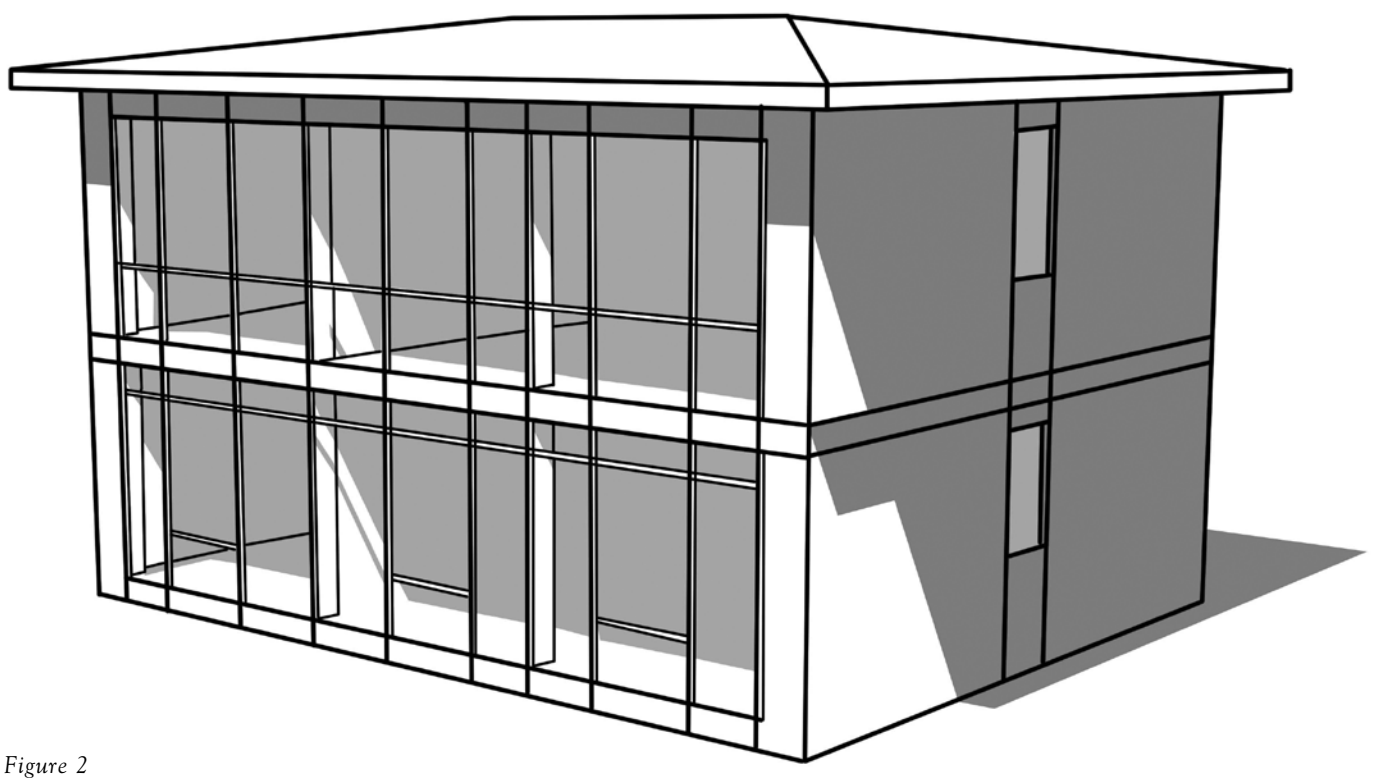


Figure 2

All Images by Atelier 10

Proposed Research and Development Priorities for the Long Emergency

By Michael Mehaffy

THE PROBLEM-STATEMENT

Climate change is the crisis that dominates our attention at present, and for good reason. But it bears remembering that even if we entirely solved *that* crisis tomorrow, we would still face other planetary crises nearly as severe: resource depletion, soil erosion, habitat destruction, mass extinction, massive instability in food sources — and along with these, the economic foundations of anything like normal life.

Less obvious, but also worrying to prominent thinkers on the topic — for example Jane Jacobs, in her final book — is a more insidious erosion of the institutional foundations that support all of our prosperous cultural interactions in the first place. This is not just a lamentable but tolerable modern cultural weakness. It's a matter of the integrity — and the intelligence — of civilization. To put it starkly: If we can't act intelligently as a population, we won't survive.

But we know one thing: that it must be about urbanism, in the deepest sense, and about its revival. This is our contribution: the return of urbanism, adapted to a new context, and therefore accurately enough described as a "new" urbanism.

The hopeful news (in a real sense) is that climate change has created a clear new imperative for global action, and one that is starting to be visible in even the most provincial political minds. As the old saying goes, the bad news is concentrating the mind wonderfully. Strong consensus and even strong leadership is emerging from our cultural institutions, notably the sciences. The sense of science as a meaningless pursuit of ever more technological progress (in the narrowest sense) is being supplanted by a broader project to understand who we are and how we will survive and be well in the future.

The new sciences are also giving us a very useful new understanding of how things must "go together" to function effectively: things like economies and societies — and cities and countrysides. And they are revealing, in the most compelling terms, the systems-power of such underappreciated phenomena as heritage, tradition, and the patterns of time and evolution. As Brian Goodwin and others have noted, the qualitative is finding a new place at the scientific table.

There are early signs of a related progression occurring in the humanities. There is a useful consensus forming around issues of local identity and globalization, heritage and preservation, health and well-being, ecology and sustainability — even aesthetics and the daily experience of beauty, in a world that few now deny is uglifying intolerably. These issues are more interconnected than they appear.

So there is reason to be sanguine. Culture is a tough old thing, and intelligence tends to bubble up remarkably within it. Cities are surely where much of this drama will play out, and there is hope for a resilient, resurgent urbanism to save us yet. But we are the ones who have to act now, to make the changes in the operating system and, even before that, in the ways of thinking about our problems. As Bucky Fuller used to put it, we are entering our final exams.

One immediate problem is that the design world is in the grip of the neomodernists, whose dubious promise is to deliver finally on the failed utopian expectations of the linear technological age (talk about nostalgia). By ideological definition they reject traditional — that is to say, evolutionary — design out of hand, and thus constrain solutions to the present crises arbitrarily and, it turns out, severely. Their magical thinking is that we will be saved by living within works of daring experimental art — as often as not, in the sharp, cold skyscraper cities of yesterday's future.

Never mind that this recycled utopian futurism has been ridiculed even by the likes of Rem Koolhaas as "a failure, a hoax: magic that didn't work." For a while anyway, these ideas are fashionable again in a culture that grabs up and celebrates dumb ideas much too quickly. As noted by people like Kenneth Frampton, these are ideas that apologize for and commodify the current — that is to say, perishing — technological and economic realities.

But the dogmatic form of neo-modernism remains deeply vulnerable to a scientific challenge, for the simple reason that its scientific foundation is outmoded, and its laggard industrial foundation will inevitably be found inadequate to an ecological age. It may seem strong, but in the historic cycle of decades, its pillars are washing away, nearing collapse. The current ecological crisis will not be its moment of final heroics, as some imagine, but its waterloo. The glass curtain wall is only the first thing to go.

But that leaves open the question: What is the real architecture and urbanism of a sustainable future, then? Obviously it is more than a few solar collectors or similar shallow formulations of that much-abused term "sustainability." It will surely be something broad, transformative, hard to see in full detail just yet. This is because it must be, like all tradition, emergent from its conditions, and those conditions are in evolution.

But we know one thing: that it must be about urbanism, in the deepest sense, and about its revival. This is our contribution: the return of urbanism, adapted to a new context, and therefore accurately enough described as a "new" urbanism.

Of course new urbanists have always thought broadly about these interdisciplinary topics — broadly and at times (or so some critics would argue) quixotically. But there is nothing quixotic about the projects actually built or the disciplines actually brought together in new ways. Less clear, and more debatable in an informed forum, is the quality of projects as a whole, the market penetration, and the reforms at the most influential levels of the culture. In going after the realities of the market, new urbanism has always skirted with the edges of its own trivializing commodification. But it can't be avoided. Fight in the mud, and you get muddy.

Now we have passed the tipping point of this challenge and, along with it, a notable moment for new urbanists and urbanists generally. Clearly the pattern of dense human settlement on the earth — urbanism, that is — is a core piece of the puzzle, and therefore it is in the spotlight now. But just as clearly, and increasingly, it's not so much one piece or another in isolation, but how the pieces go together — the ways we can coax them to go together, the processes of combination, growth, and differentiation.

Other connected fields are going to be critical — notably agriculture, carrying one of the biggest ecological impacts of all. It is intimately connected to our urban patterns of existence: where we eat our food, how it is prepared, how it is grown, how far away it comes from, where its nutrients go. Another is the building sector — the resources used in construction, how well buildings perform, how long they last, how adaptable they are, and how well-loved. And there are many other such impacts that

are intimately connected to urban pattern, and from there to resource consumption, energy generation, toxic emissions, ecological destruction.

So urbanism's necessarily interdisciplinary aspect is starting to look very useful just now. So, too, is the generalism and holism of new urbanism — if it can continue to be harnessed to the insights of other disciplines in a more rigorous way, and if it can hone its cutting edge of best practice. There are dullnesses yet to sharpen.

At such a moment, we should be careful not to be too Pollyannish. There won't be so much about the road ahead that will be convenient. Nor will it be enough to continue with the current model of much of anything — energy use, economic assumptions, political assumptions. All is on the table, all is a candidate for reform. And that must include the pleasant, mini garden cities that are the standard-bearers of new urbanism thus far. They have their place, and they may reduce ecological footprint by increments — but we are in need of models that achieve multiples, not increments.

THE PROPOSED AGENDA

So in that light, I would like to suggest some key priorities for new urbanist research and development in this critical time. There's a lot to do — which is not such a bad thing, if you seek a busy life doing useful things.

1. Identify and ally more strongly with existing research.

Remarkable things are happening in parallel, and in potential convergence. They range from the basics (documenting that an efficient urban pattern is critical to lower carbon emissions, for example) to more advanced topics, like adaptive policy tools and codes. Agencies are hungry for resources we can deliver. To raise our game we must expand beyond the realm of the design professions, with their usual unhappy baggage of rationalization and conceit, and into the realm of other disciplines — particularly the sciences, where we have many allies waiting.

There are bits and pieces of extremely useful approaches already available, but they urgently need further development into more functional toolkits. The LEED-ND alliance has been exactly the kind of thing needed. We need more: more metrics, more policy tools, more new approaches. We need to ground this research in actual projects, in messy field conditions — places like New Orleans, or the developing world.

We need to work much more closely with those who are measuring vehicle miles traveled, carbon footprints, and interactions of variables. We need to work with those innovators who are developing new analytical tools, new insights, new metrics, new methods of diagnosis and prescription.

2. Recognize that "it's the economics, stupid."

There is an enormous remaining challenge integrating future costs and so-called "externalities" into current economic processes. There is a requirement, and an opportunity, to bring "pricing signals" and other cost changes to bear on economic processes, incorporating the true cost of unsustainable behavior so that it becomes as economically unsustainable as it is ecologically unsustainable.

This is a particularly acute need for urbanists. Good urbanism also is frequently uneconomic, when seen through the tiny lens of point of sale. But seen through the longer lens of enduring human value, or sustainable living patterns — which are closely related — good urbanism is economical urbanism. We need new ways of trading, exchanging, valuing.

There are promising approaches out there that we would do well to get involved with. For example, mechanism design theory offers the ability to develop localized approaches to achieve targets. New financial instruments and incentive systems are under development. New vehicles like land trusts offer promising strategies to establish and maintain a relationship between human value and tradable economic value. New cultural and scientific institutions, and reinvigorated older ones, promise ways of balancing immediate economic value, and reactive regulatory responses, together with the powerful third force of evolutionary culture.

3. Learn from biophilia.

Architecture has always learned from nature, but there are always new things to learn. Today that is especially true, as the field of biophilia shows us how biological structures influence human well-being in profound but until now underappreciated ways.

There is a more important reason. Aesthetic pleasure — beauty — is more than a biological artifact: It is a highly-evolved ability to perceive the health and wellness of our environment. The aesthetic perceptions that we love are, as Christopher Alexander has long argued, indicators of a precise structural wholeness, and a literal health (a word that shares its etymological root with the word "whole"). If we can apply this deceptively simple insight effectively, we can open a path to many more forms of whole architecture and whole urbanism.

4. Develop evidence-based design.

There is surely an art to medicine, but if physicians shared architects' artistic rationalizations for the treatment of human environments, they would quickly be discharged for malpractice (if not homicide). Instead, physicians take an evidence-based approach, and the best ones do so in a holistic way, assessing the whole patient instead of a collection of isolated organs. So, too, designers of healthcare facilities have taken cues from their medical collaborators and developed an approach called "evidence-based design," which proposes the radical (for architects) notion that we should learn from our mistakes. We can learn much else in a more vigorous collaboration with this promising field.

5. Develop new "generative" methods.

Among the many powerful resources offered by a deeper understanding of the sciences of complexity are the workings of structural processes and in particular rule-based or coded biological morphogenesis. This offers powerful new strategies for structuring the built environment and for reforming the pathological systems that now constitute our "operating system for growth." The insights of game theory, coupled with those of rule-based generative coding in nature (like DNA), give us a rich and fertile domain to explore. Leaders like Christopher Alexander have begun this work, but it is ripe for development by many more.

6. Develop a more robust "urbanist theory of architecture."

New urbanists have tried to stay agnostic on architecture, for fear of falling afoul of reigning stylistic dictates. This has only resulted in new urbanists falling afoul of those same dictates, without a coherent argument. Worse, as far as new urbanist theory is concerned, architecture becomes a "black box" inside which we cannot say what happens. This is theoretically untenable. It prevents the formation of coherent propositions about the relation of sustainable architecture to sustainable urbanism, and the interactions of the two. It prevents us from talking about the critical connective links between scales, and the importance of a finer grain.

Instead we need to storm the gates of theory, after having done our homework. We must explore the realms of complexity — not as a mere art supply for chaotic assemblies of images, but as instructive education about the deeper transformations of real structures in the world. As Jane Jacobs told us almost a half-century ago, the design professions lag horribly. Therein lies our opportunity — for theory, but more importantly, for a rich new kind of architecture. It will be neither pure revival nor pure invention — and it will eschew that simplistic duality — but it will be a richer synthesis of both. In this opportunity we can lead again by example.

7. Shift the emphasis to building process.

Good designs can make horrible buildings, and — let's be honest — we have had plenty of cases in point from within the ranks of new urbanism, greatly damaging our forensic position. A rating system would help. More importantly, as part of our new theory of architecture, we must have a theory of building as the seamless completion of the design process, and design as the seamless beginning of the construction process.

Both must be seen as part of a stepwise, adaptive articulation of space; that is to say, a process of craft. But craft in this sense does not imply smallness in number or extravagance in cost. We can have vastly large numbers, and vastly large economies, by exploiting the processes of living systems that routinely manage this combination of very high quantity and very high quality. To do so we must transcend the template-based mechanization of building, as Christopher Alexander has long argued, and exploit the new opportunities of one-off manufacture, customization, computerized adaptation tools and the like. Following these processes — coded growth, adaptation, differentiation — life routinely produces structures that are beautiful, functional, efficient, and sustainable. We can do so too.

Indeed, for good measure add to the building process the maintenance, repair and modification of buildings over time. Are they readily repairable using local resources? Are they readily adaptable to new uses? Are they crafted to exquisitely fit the people and the place — the surest guarantee of "sustainability"? These adaptive characteristics are the ordinary standards of sustainable living systems. They must be ours too.

Of course there is a lot of work to get this right, starting with already existing and proven design-build methods, methods of sustainable procurement, and methods of craft and art, but adding new methods of management, money flow and economics, contracts and law, generative coding strategies, and much more.

8. Put a new emphasis on collaborative research and development.

In my own recent work I have been delighted to find many people in many other fields who are eager to explore the fascinating and promising similarities in our respective endeavors, and to collaborate on new syntheses. I find they are generally more interested in identifying real collaborative opportunities than in carrying on ideological rivalries. And one does not necessarily need great costly institutions to do great work, as history has readily shown. We already have the laboratories, in our projects on the ground, and the innovations we can introduce there.

I have also found a puzzled reaction to the insularity these potential collaborators sometimes find in our ranks (which may have more to do with the habits of designers as a whole than of new urbanists per se). The name of the game now is balancing coherence and diversity, and doing so through strategies like open-source collaboration, network connection, coevolutionary strategies — that is to say, traditional processes. There is strength in numbers.

Christopher Alexander reminded us that a city is not a tree; it is a resilient and self-organizing evolutionary network. Now we must apply such professional insights to our own activities and the ways we work together. We must learn to self-organize and to integrate, so that we can work our way through the current thicket, to an intelligent and survivable urban future.

In spite of the inevitable messiness, we will know that an intelligent course exists and can be found — and we will find it. In this search our guide should be the dictum of E.M. Forster: "Only connect."

Sustainable Urbanism

By Douglas Farr

The following excerpts are from the book Sustainable Urbanism: Urban Design with Nature *by Douglas Farr.*

INTRODUCTION TO PART TWO: IMPLEMENTING SUSTAINABLE URBANISM

Sustainable urbanism represents a generational shift in how human settlements are designed and developed. Its adoption as a societal norm requires all of the many parties to the process of planning and developing urbanism to perform highly specific tasks in tight coordination. These include city administrators, developers, design professionals and the public at large. This book proposes that sustainable urbanism be implemented continuously, by interdisciplinary teams, working at all scales, on each and every project, one project at a time. To make this easy to do, this section introduces benchmarking, the basis of incremental improvement, and the charrette, sustainability's model of interdisciplinary work. It provides form templates for selecting qualified design professionals, initiating sustainable urbanist projects, and soliciting sustainable urbanist development proposals. In order to ensure that the resulting development will perform as intended, this section summarizes emerging trends in sustainable urbanist-related development controls-codes, covenants, and restrictions (CC&Rs).

"Sustainable urbanism is a powerful but invisible reform movement. The movement has a potential army of reformers, likely now identified with and active in pioneering reforms such as smart growth, new urbanism, and green building."

Sustainable urbanism is a powerful but invisible reform movement. The movement has a potential army of reformers, likely now identified with and active in pioneering reforms such as smart growth, new urbanism, and green building. The goal of the following chapters is to provide an easy means for these committed parties, who do not now identify with sustainable urbanism, to play a coordinated role in implementing its reforms. To accomplish this goal, each contribution details specific steps for senators, governors, mayors, city councils, regulators, developers, bankers, planners, engineers, architects, bond rating agencies and others to implement sustainable urbanism one action at a time. This strategy holds the potential to create immense value simply by coordinating work that people have to do anyway to implement a larger vision. By studying the entire list, individuals will see how their actions fit together with other reforms. The hope is that after a generation of coordinated effort, sustainable urbanism will become the norm.

Outside the pages of this book, "sustainable urbanism" is a highly ambiguous term with neither name recognition nor momentum as a reform movement. As defined by this book, sustainable urbanism uses a knowledge of human and natural systems to integrate walkable and transit-served urbanism with high-performance buildings and high-performance infrastructure. While this all-encompassing definition describes the right thing to do, its complexity can act as a barrier to understanding and action. The goal is to jump-start this reform movement of the built environment and to position sustainable urbanism as the means to shift the American lifestyle toward sustainability over time. This section of the book focuses on implementation of this ambitious goal by offering several practical aids, including tools to facilitate communications and leadership, and a "cookbook" process outlining the first steps of implementation.

An essential strategy in implementing sustainable urbanism is developing a clear and simple message to describe this complex undertaking. For a policy agenda to become widely adopted, it needs to be shaped into a number of written formats to complement this book-length document: a tag line, a 15-second "elevator message," and bulleted talking points describing the strategies and benefits of sustainable urbanism. Because its focus is the nexus of the American lifestyle and the built environment, sustainable urbanism is highly visual. The urban-rural transect introduced in this section is a powerful communications tool for illustrating the spectrum of human place types and their respective sustainability. To communicate the viability of creating value through offering sustainable urbanist choices, this section includes a menu of urban versus sprawl development choices.

INTRODUTION TO PART THREE: EMERGING THRESHOLDS OF SUSTAINABLE URBANISM

Over the last 25 years, leading planners and urban designers have become sophisticated in their ability to conceive and sell attractive infill and master-planned urbanist developments. Against all odds, in the face of runaway sprawl, they have been able to convince developers and municipalities to build excellent urbanism. The projects typically include networks of narrow streets, mixes of housing and building types, a variety of walk-to parks, and address automobile parking in creative ways. The ideas expressed in these leading projects trickle down, raising the bar for the industry and offering proven, successful alternatives to sprawl. Nirvana, right?

Wrong. Urbanism provides the basis for all sustainable human settlements. However, the historic, old urbanist places that inspire the look and feel of much of today's urbanist practice were far from sustainable themselves. Both old and new urbanism dealt with many sustainability issues by putting them out of sight and mind: Stormwater and sewage were and remain funneled into pipes — frequently the same pipe — buried or otherwise hidden. There are many other examples of ignored sustainability issues: energy and resource inefficient buildings; unfiltered stormwater runoff; urban heat island; waste that equals waste; and a complete dependence on global supply lines for energy, food and resources. The inherent sustainability of urban form can be greatly enhanced through sustainable urbanism. But why does this matter?

Over the next 45 years, 100 million new Americans — not to mention an additional 2.6 billion people worldwide — will be housed in new infill and greenfield developments. All of that development needs to be built to sustainable urbanist principles. But it is one thing for early-adopters to design and develop individual projects to meet LEED for Neighborhood Development and another thing altogether for every project in the country to do so. How can thousands upon thousands of mayors, councils, developers, planners and architects across the country hope to integrate the human and natural systems of sustainable urbanism if the rules that govern those systems are unwritten?

This section, called Emerging Thresholds of Sustainable Urbanism, is devoted to teasing out those rules. More than 30 leading national experts propose thresholds, or rules of thumb, for designing and developing sustainable urbanism. These dimensional or relational metrics are based on expert judgment of what will satisfy "the 80 percent rule": guidance that applies most of the time and in most conditions. Every threshold is interdisciplinary and necessarily so. Take, for example, a single strategy:

A SUSTAINABLE NEIGHBORHOOD (BUILDING BLOCKS OF A SUSTAINABLE CORRIDOR)
V1.1

the share car. It can, and arguably should, reduce off-street parking requests and increase allowable development density. When fully integrated, this one strategy can create neighborhood wealth, reduce the cost of living, and increase the quality of life.

The organization of these thresholds into five categories is meant to focus attention on the core integration challenges of sustainable urbanism: increasing sustainability through density, sustainable corridors, sustainable neighborhoods, biophilia, and high-performance buildings and infrastructure.

Through a sustained commitment to design and development, places that integrate human and natural systems with conventional development will rapidly evolve into sustainable urbanism.

THE 2030 COMMUNITY CHALLENGE: ECONOMIC GROWTH WITH SUSTAINABLE URBANISM

The only viable method to meet the challenge of climate change in the transportation sector, while improving community health and well-being, is to greatly reduce the number of miles American families and businesses need to drive annually and simultaneously implement sustainable urbanism. Fortunately, these strategies go well together.

Vehicle Miles Traveled Reduction Standard

According to the Pew Center on Global Climate Change, "Between 1969 and 2001, the average annual VMT per household increased from 12,400 to 21,500 (while average household size fell from 3.2 to 2.6 persons, and the average number of vehicles per household grew from 1.2 to 1.9)." In other words, per capita VMTs increased from 3,875 in 1969 to 8,269 in 2001, a whopping increase of 114 percent. The 2030 Community Challenge proposes to reverse this VMT increase by 2030, moving roughly back to what VMT levels were in 1970.

This standard can be used by individuals and families to set lifestyle goals and by municipalities and other units of government as targets in their comprehensive planning.

2030 Community Challenge — Goals for Per Capita VMT Reduction in a Given Jurisdiction

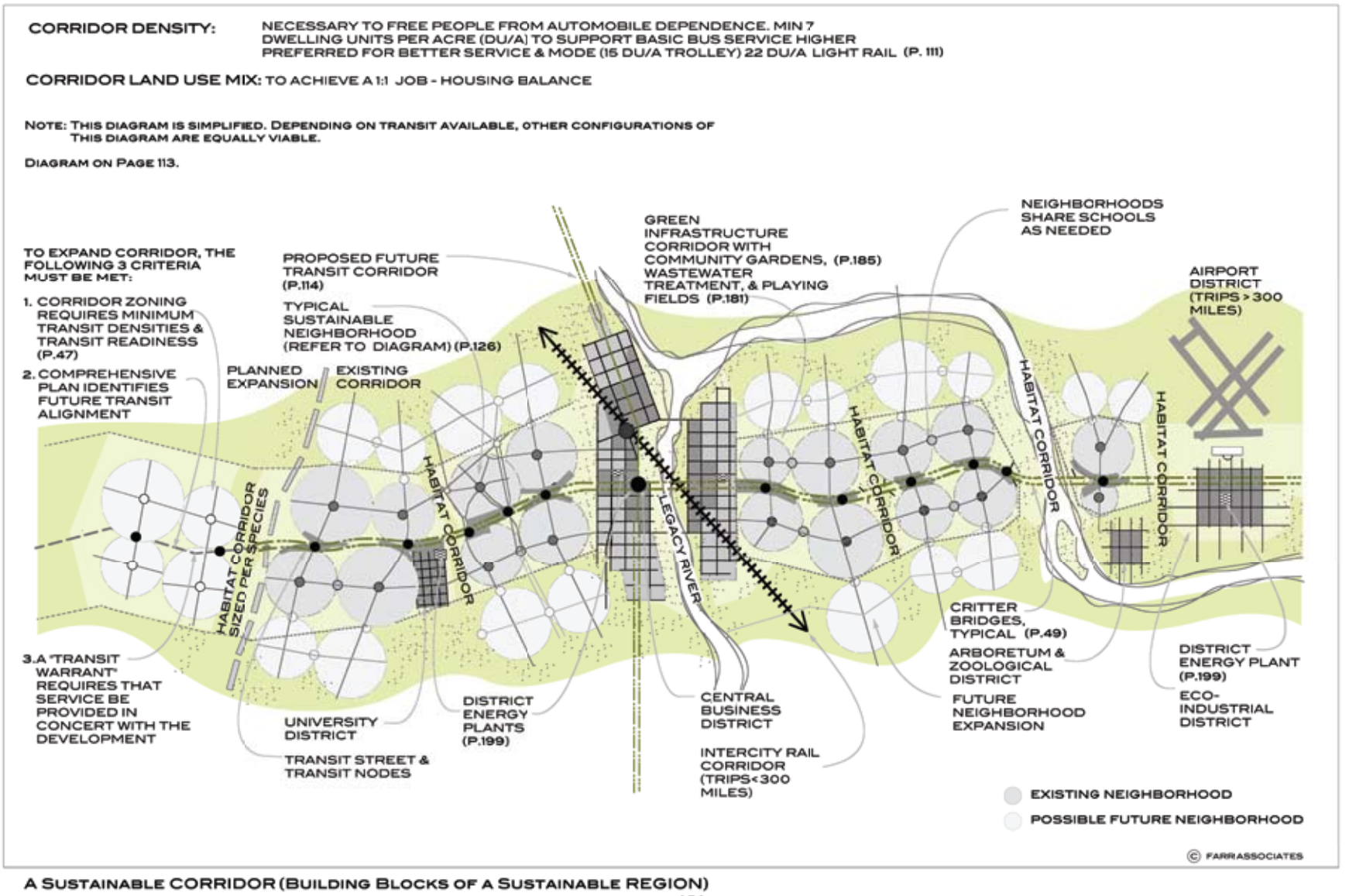
2005: Baseline — 8,000 VMT per capita*
2010: 10 percent decrease — 7,200
2015: 20 percent decrease — 6,400
2020: 30 percent decrease — 5,600
2025: 40 percent decrease — 4,800
2030: 50 percent decrease — 4,000
**2001 U.S. average VMT, to be locally calibrated*

Sustainable Urbanism Development Standard

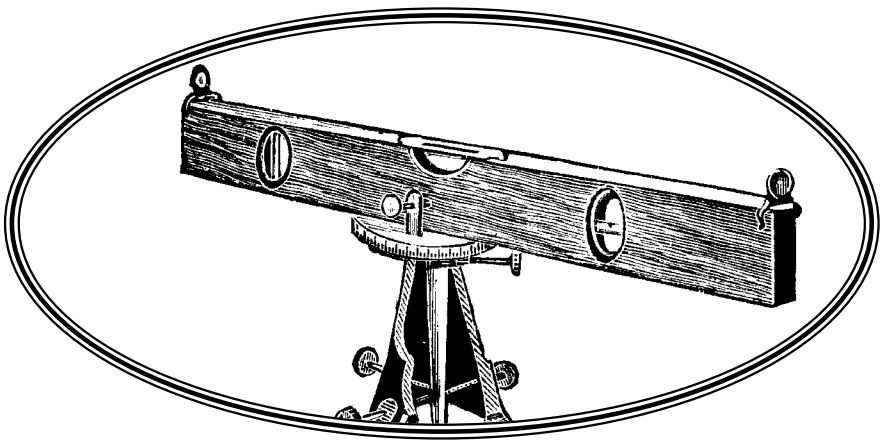
Thresholds in this book have demonstrated that a complete neighborhood can encourage walking, can reduce car trips by up to 10 - 40 percent, and is associated with reduced levels of obesity, land consumption, and per capita pollution. This standard can be used by companies or governmental jurisdictions as minimum criteria for the percentage of development projects required to meet LEED-ND criteria at the Platinum level.

2030 Community Challenge — Goals for LEED-ND Platinum Certification for Land Development in a Given Jurisdiction

2010: 20 percent
2015: 40 percent
2020: 60 percent
2025: 80 percent
2030: 100 percent



A SUSTAINABLE CORRIDOR (BUILDING BLOCKS OF A SUSTAINABLE REGION)
V1.1



LEED for Neighborhood Development

Agreeing to Weights and Measures: Making a Market for Sustainable Urbanism

By Douglas Farr

The following excerpt is from the book Sustainable Urbanism: Urban Design with Nature *by Douglas Farr.*

Economic history shows the important role that agreed-on weights and measures play in making a market for goods and services. Over time the pent-up demand for a good or service can take off with the introduction of recognizable standards with an appropriate seal of approval. In "The Tipping Point," Malcolm Gladwell explains that there is "a maxim in the advertising business that an advertisement has to be seen at least six times before anyone will remember it." In the green building sector, the LEED standard has built up such a recognizable brand identity that it has helped to accelerate interest in the concept of green buildings and the adoption of specific technologies and practices.

There is a pent-up demand for communities and developments that integrate the features and benefits of urbanism with those of environmentalism. The ability to develop consensus standards has been retarded by urbanists who resist environmental performance and by environmentalists who oppose urbanist development. The urgency with which we need to move on needed reforms means we do not have time to indulge this old spat. Weights and measures of sustainable urbanism that strike a proper balance have the potential to produce something extraordinarily positive from the seemingly impossible integration of opposites. The development industry senses the pent-up demand for sustainable communities while society senses it is now time to confront the sustainability challenges created by our lifestyle. Both are hungry for a branded standard of sustainable urbanism.

LEED for Neighborhood Development (LEED-ND) may be just that branded standard. It builds on the recognition of the LEED brand for green buildings, but expands the focus beyond the scale of the individual building to address multiple buildings, infrastructure, and entire neighborhood-scale developments. Closely related to the themes of this book, LEED-ND is a voluntary leadership standard to define what constitutes smart, sustainable land development. LEED-ND was developed through a unique partnership between the Congress for New Urbanism, the Natural Resources Defense Council (representing the smart growth movement), and the United States Green Building Council. Having started in development in the year 2003, the standard likely will be fully piloted and operational sometime in 2009. This three-way partnership accounts both for the richness of the standard as well as for the long development cycle. It will create a brand for sustainable urbanism that will prove central to its widespread adoption.

The standards are organized into three divisions. While there are many overlaps, the three divisions correspond roughly to each constituency's core concerns. The location of a project in a region — *where* it is — is a principal concern of the smart growth movement and is addressed in the Smart Location and Linkage division of LEED-ND. Walkability, land uses, urban design, and architecture of place — *what* goes on there — is a primary focus of the Congress for the New Urbanism and is addressed in the Neighborhood Pattern and Design division. Finally, the greenness of the construction and the operation of a development — *how* it is built and managed — are principal concerns of the U.S. Green Building Council and are addressed in the Green Construction and Technology division.

More than half of the topic areas covered in the LEED-ND pilot draft are new to the LEED family, greatly expanding the agenda of the green building movement. For the first time, social issues such as housing diversity, affordable housing, ungated communities, visitability for all including the handicapped, and community participation are now part of LEED. The LEED-ND standards also pioneer performance thresholds for urban design attributes such as walkability, connectivity and a mix of uses. The standard applies design strategies long associated with green building, such as stormwater filtration, energy efficiency, and local and recycled content, to the design of infrastructure and entire neighborhood-scale developments.

Probably the most demanding aspects of the LEED-ND draft concern two particular prerequisites (requirements for any project seeking LEED-ND certification): Smart Location and Compact Development. The Smart Location requirement demands that projects be located on infill or redevelopment sites or sites adjacent to existing developed areas. While it provides for some flexibility, it generally prevents leapfrog or discontinuous greenfield developments from gaining certification. These same criteria also exclude what new urbanists call "new towns" — master planned developments in nonurban areas — even though many are planned to become full neighborhoods over time complete with jobs, schools and services.

The Compact Development prerequisite requires that projects develop to a minimum residential or commercial density, both to decrease the rate at which development consumes land and to concentrate population to create markets. The LEED-ND Core Committee set the minimum level of compactness at seven dwelling units per acre of buildable land or the equivalent commercial density, which is the minimum development density required to support basic public transit and walk-to retail services. This prerequisite requiring density is a radical departure from contemporary development norms; new greenfield development in the United States averages less than two dwelling units per acre.

The development of LEED-ND is a major achievement in the campaign to make sustainable urbanism the national norm. It is an open-source tool available for free to everyone, and it will have many applications-serving as the duct tape of sustainable urbanism. It also has three national organizations behind it that have all pledged to maintain its integrity and operation for the foreseeable future. This is a precious and irreplaceable investment that will have taken more than six years to complete. While LEED-ND no doubt has room for improvement, it is a new and powerful tool with advantages not easily replicated.

If the development of LEED for buildings is any guide, LEED-ND will generate a market for designers and developers who can deliver projects that will satisfy the required level of certification. Few practitioners currently have a command of the many specialized areas of design addressed by sustainable urbanism. We need a wave of interdisciplinary design and development professionals who can quickly master the intricacies of the LEED-ND system.

By combining three critical areas of concern — traditional urbanism, high-performance building, and high-performance infrastructure — sustainable urbanism and LEED-ND represent a potentially immense market. The goal of this book, and the challenge our country is poised to address, is to make sustainable urbanism the norm across the country in a generation. In order to do this, the entire development industry needs to agree on this one standard of excellence. All people interested in sustainability and especially those affiliated with smart growth, new urbanism, and green building should push this standard as far as possible. The coordinated efforts of large numbers of people striving for the same goal can create immense benefits.

Vibrant, active and pedestrian-friendly sidewalk in Washington, D.C.'s Dupont Circle neighborhood.

Photo credit: DC Office of Planning

Viva Cities!

By Harriet Tregoning and Zach Dobelbower

For cities, this is truly the best of times and the worst of times. We are challenged by decades of under-investment in aging infrastructure, by growing disparities in income, educational achievement, employment and health outcomes among our citizens, and by the continued dispersal of jobs, investment and housing to the far-flung edges of our regions. At the same time, many cites are seeing healthy increases in population for the first time since the 1950s, more travelers are availing themselves of our diverse transportation choices, and property values are generally weathering the current mortgage crisis better in core cities than in most regions' exurban counties. And there are reasons to be optimistic about the role cities can play in addressing the issue of global climate change, perhaps the most defining challenge of our generation. While the conversation about environment and sustainability has been going on for a century, we may be entering a new age of environmentalism that puts cities, quality of life and sustainable lifestyles on the center stage.

For many, this is not just a rash of green buildings, but a sign that our economy is beginning to restructure around green products, services, practices and technologies.

President Teddy Roosevelt arguably gave rise to the first age of environmentalism — *conservation* — at the beginning of the 20th century when he acted to protect the great wilderness areas of the United States and created the National Park system. The second age of environmentalism — *pollution control* — was defined by Rachel Carson's "Silent Spring," the Cuyahoga River catching on fire, and the toxic waste disposal at Love Canal in the 1960s and 1970s. The third age of environmentalism was international — *sustainability* — beginning with the 1987 United Nation's Brundtland Report. The report defined sustainable development as, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The brand of environmentalism that is now dawning — *quality of life* — is focused on where and how we live; the choices we have and how individuals and organizations exercise those choices. From changing light bulbs, energy-efficient appliances, renewable energy sources, and where our food comes from, to buying local goods, walkable neighborhoods, transit choices, and high-performance buildings, this brand of environmentalism harnesses globally-informed consumer choices to create market forces that are redefining the "good life." With roots in the last century, the beginning of the 21st century has witnessed an environmental movement that is increasingly effective at making our own choices and lifestyles a force for positive change.

One example of the rapidly changing expectations for environmental performance is in our built environment. In 1998, the US Green Building Council (USGBC) developed the LEED (Leadership in Energy and Environmental Design) rating system — now the most widely recognized green building rating system in the country. In its first five years the USGBC registered 948 projects.[1] Today, there are more than 7,300 registered projects, close to 1,000 certified buildings, and more than 13,000 member organizations from every sector of the building industry. The annual U.S. market in green building products and services was more than $7 billion in 2005, $12 billion in 2007, and is projected to increase to $60 billion by 2010.[2]

Citizen expectations about their quality of life have prompted local governments and cities to act to demonstrably amplify the reach of the LEED rating system. Various LEED initiatives including legislation, executive orders, resolutions, ordinances, policies and incentives are found in 72 cities, 22 counties, 16 towns, 27 states, 13 federal agencies, 10 public school jurisdictions, and 35 institutions of higher education across the United States.[3] In December 2006, the D.C. Council passed one of nation's most ambitious green building laws. The law requires all public buildings, starting in October 2007 and including schools, to meet a LEED silver rating; and beginning in

2012 will require most private sector commercial buildings to meet basic LEED certification. In the year since the law passed, and well before the private sector requirements are set to begin, the District of Columbia has grown from 19 registered and six certified projects to more than 200 registered and 19 certified buildings. Although the private sector still has four years before it needs to comply, developers in the city say they don't want to be the "guy that builds the last 'brown' building in Washington."

For many, this is not just a rash of green buildings, but a sign that our economy is beginning to restructure around green products, services, practices and technologies. Cities like Oakland, Chicago and recently the District of Columbia have acted to channel this emerging green economy to educate, train and employ a workforce and to encourage enterprise development. District of Columbia Mayor Adrian Fenty created a Green Collar Jobs initiative, including a "Green Collar Jobs Advisory Council" made up of government, industry, education and civic leaders. The Council will analyze the supply and demand for a green labor market in the District and the surrounding jurisdictions where a wide variety of transit, green building, climate change, energy efficiency, bike sharing, and renewable energy projects are getting underway. Energy efficiency financier Hannon Armstrong, along with Virginia Tech University and Pepco Energy Services, have launched a $500 million program to retrofit 100 buildings throughout the Washington, D.C., area, with the goal to reduce energy use and carbon emissions by 20 to 50 percent. With rising energy prices and the growing scientific consensus around human activity and climate change, carbon mitigation and energy efficiency are critical in the fight — and cities are well positioned to lead the charge.

The recent United Nations Climate Change Conference, held December 2007 in Bali, had a resounding message — we must take action, and we must take action now. U.S. carbon dioxide (CO_2) emissions have risen more than 20 percent since 1990,[4] and are projected to rise another 22 percent by 2020.[5] Though below the national average, the District's greenhouse gas emissions are also increasing and expected to rise 15 percent by 2012 over 1990 levels.[6]

In the absence of federal leadership, cities and states are taking action. Mayor Fenty and more than 600 other mayors have signed the U.S. Mayor's Climate Protection Agreement, an effort that requires cities and localities to strive to beat or exceed the Kyoto Protocol's CO_2 reduction target of seven percent below 1990 levels. The District and more than 300 other U.S. cities and localities are also members of the International Council for Local Environmental Initiatives (ICLEI), an organization that helps governments conduct greenhouse gas inventories, develop climate action plans, and assist with the implementation of emission mitigation strategies. The northeast region has the Regional Greenhouse Gas Initiative (RGGI), a cooperative cap and trade system among 13 states and the District, which will work to reduce emissions to 10 percent below 1990 levels by 2018. And the west has a similar effort, the Western Regional Climate Action Initiative, that will develop a market based multi-sector program to achieve GHG reductions by August 26, 2008.

Our development patterns are critical. Since 1980, the number of miles Americans drive has increased three times faster than our population growth and nearly twice as fast as vehicle registrations.[7] For the last half-century we have developed our homes away from our jobs, away from our schools, away from our shops, and away from our everyday needs — many Americans now commute more hours than they vacation.[8] We can no longer afford to primarily invest in auto oriented, sprawling development — we need smarter, more compact, transit- and pedestrian-oriented patterns of growth.

Residents of higher-density, more compact metropolitan areas average energy savings of 20 percent per household. These same residents drive 10 fewer miles per day per person, or roughly 40 percent less, than our more auto-oriented suburban neighbors.[9] Considering that the transportation and residential sectors comprise 54 percent of all U.S. CO_2 emissions, the largest single contributor to climate change,[10] compact cities are looking better than ever. With high population densities, low-impact mass transit systems, a mix of dense, accessible land uses, and large existing building stocks, cities are natural aggregators for energy efficiency and carbon mitigation — an essential part of the solution to climate change.

"Bicing" bike-sharing kiosk in Barcelona, Spain is similar to the bike kiosks that will be used in the District of Columbia.

Photo credit: Marcbel, Wikipedia Commons

Green roof on the headquarters of the American Society of Landscape Architects in downtown D.C.

Photo credit: ASLA

Over the last several years, the District of Columbia has undergone an amazing evolution. Beginning with a DNA that includes a walkable urbanism defined by L'Enfant and refined by the McMillan Commission and others, and with a 106-mile Metrorail system, second in ridership only to New York City, D.C. has made a series of deliberate decisions that redefine us as a sustainable city. We have expanded Metrorail and added premium transit service around the city, including a forthcoming streetcar line. We have added 26 miles of bike lanes and 400 bike racks in the past 6 years with plans for 60 miles by 2015. This spring, we will join cities like Paris and Barcelona by bringing automated bike sharing to the city.

Car sharing has brought the convenience of car access to thousands of D.C. residents without the costs of car-ownership. District residents have access to more than 700 car-sharing vehicles scattered throughout 26 neighborhoods contributing to a household car ownership rate of only 65 percent, significantly less than the 90 percent national average.[11] By making it easier to get around the city without having to always use a car, and making the many choices visible, convenient, even cool, we are also seeing more biking, more transit use, and more walking. Washingtonians now walk to work more than the residents of any other major U.S. city except Boston. When you consider that transportation costs are second only to housing in terms of average household spending, ditching the car is not only good for the environment but easy on the family pocketbook.

We are also implementing an ambitious Anacostia Waterfront Initiative that will transform long-neglected, formerly industrial, underutilized, often-polluted lands that are being transferred from the federal government to the city. These sites are emerging with miles of new waterfront parks and trails, including a planned 20-mile riverwalk, and more than 25 million square feet of vibrant shopping, housing, and office facilities. Also exciting will be the many nature, entertainment, cultural and sports destinations, all served by transit but designed to be utterly walkable and bikeable and directly connected to key corridors and existing centers in the city. On these half-dozen sites and hundreds of acres, we are seeing whole new sustainable neighborhoods crop up that will demonstrate not only the high performance of green buildings but provide workers, residents, visitors and customers with a uniquely green and sustainable set of choices for travel, shopping, dining and living.

Something is happening in the District of Columbia … and in many other cities across the country. Many of our cities have inherent attributes that are gaining currency — walkable and bikeable neighborhoods; a density of housing and jobs that translates directly into convenient access to shopping, culture, learning, services, and other daily needs, as well as good transit service; short city blocks and frequent intersections with fairly direct routes to most destinations; lively and interesting human-scaled streetscapes; and more and more people joining the other walkers, bikers, and transit-users on city streets and sidewalks. Some call it convenience, some call it sustainability, and some are now even calling it "the good life."

Viva Cities. Viva Choice. Viva the Good Life!

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[1] Cassidy, Robert, ed., "White Paper on Sustainability." *Building Design and Construction* (supplement), November 2003. Accessed from <www.usgbc.org/Docs/Resources/BDCWhitePaperR2.pdf>.

[2] United States Green Building Council, February 2008. Web site: <www.usgbc.org>.

[3] Ibid.

[4] U.S. Environmental Protection Agency , "Chapter 2: Trends in Greenhouse Gas Emissions," *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 –2005*. February 2008. Accessed from <www.epa.gov/climatechange/emissions/downloads06/07Trends.pdf>.

[5] U.S. Department of State, "Chapter 5: Projected Greenhouse Gas Emissions," *U.S. Climate Action Report 2006*. February 2008. Accessed from <www.state.gov/documents/organization/89652.pdf>.

[6] District of Columbia Air Quality Division, *District of Columbia Greenhouse Gas Inventories and Preliminary Projection*. October 2005.

[7] Smart Growth America and Urban Land Institute, *Growing Cooler: The Evidence on Urban Development and Climate Change*. 2007.

[8] Ibid.

[9] Ibid.

[10] U.S. EPA, "Trends in Greenhouse Gas Emissions."

[11] U.S. Bureau of the Census, *American Housing Survey*. 2007.

Figure 4: Town and country.

Image courtesy Red Tree LLP

Sherford

By Paul Murrain

The new development of Sherford, adjacent to the city of Plymouth (pop 245,000) on the south coast of Devon, will be home to a population of about 12,000 people when completed. It is therefore unavoidably a small town, even though it is an urban extension to Plymouth. There is no contradiction. In today's sustainable agenda, growth on the edge of cities needs to be allocated in increments of this scale or larger in order to provide the facilities people need without having to leave town too often, and indeed to provide many of those facilities in advance.

Sherford will be built on a beautiful landscape very close to the even more beautiful South Devon "Area of Outstanding Natural Beauty." Traditionally the towns of this region add to the beauty of the landscape. None have done so since the beginning of the 20th century. Sherford must and will.

Once built it will have (Figure 1):

- 5,500 dwellings;
- Up to 700,000 square feet of business and commercial space;
- Up to 180,000 square feet of mixed retail accommodation;
- Community, sports and open space facilities including a community park of 500 acres;
- Three primary schools and one secondary school;
- A health center; and
- Two community wind turbines.

The Sherford plan began as four hamlets strung along a shallow valley floor. However, the absence of any critical mass or centrality was severely criticized when Paul Murrain and the Prince's Foundation were invited to comment. Soon thereafter they led an Enquiry by Design (charrette) to reconsider the proposition with the explicit assumption that a larger and more coherent settlement was necessary if there was to be any chance of achieving the increasingly-demanded sustainable criteria.

THE IMPORTANCE OF "GLOBAL" CONNECTIONS

Successful towns often become so because they are at a place where global movement and local movement come together. The local harnesses the global to give the town its early impetus and a basis for growth — namely, exchange.

Long before Sherford was designed, regional transport plans called for a new connection between a busy regional road immediately to the north of Sherford and an new alternate road with far greater capacity running to the south. The new link road was to be a way of diverting some of the traffic as it approached the town center. This was to be allied with a High Quality Public Transport System (HQPT) that would collect passengers from a 2,000-space park and ride facility immediately to the north-east of Sherford.

This became crucial to the structure of Sherford. Rather than a mere bypass, at the Enquiry by Design it was immediately seen as the lifeblood of the town and the catalyst for bringing local commercial facilities along early with a fighting chance of survival. This was a strategy of allowing mixed-use walkability to be in place early, on the back of city-wide public transit; and more controversially, openly admitting that the car was being used to ultimately get rid of the car. This road had to become the high street (Main Street) in part, as well as pass through the other neighborhood centers (Figure 2). The problem was dovetailing this with the neighborhood structure demanded by the landscape, whilst at the same time making the alignment of the road efficient, minimizing earthworks and creating an appropriate urban fabric gradient to enable fuel-efficient public transport (Figure 3).

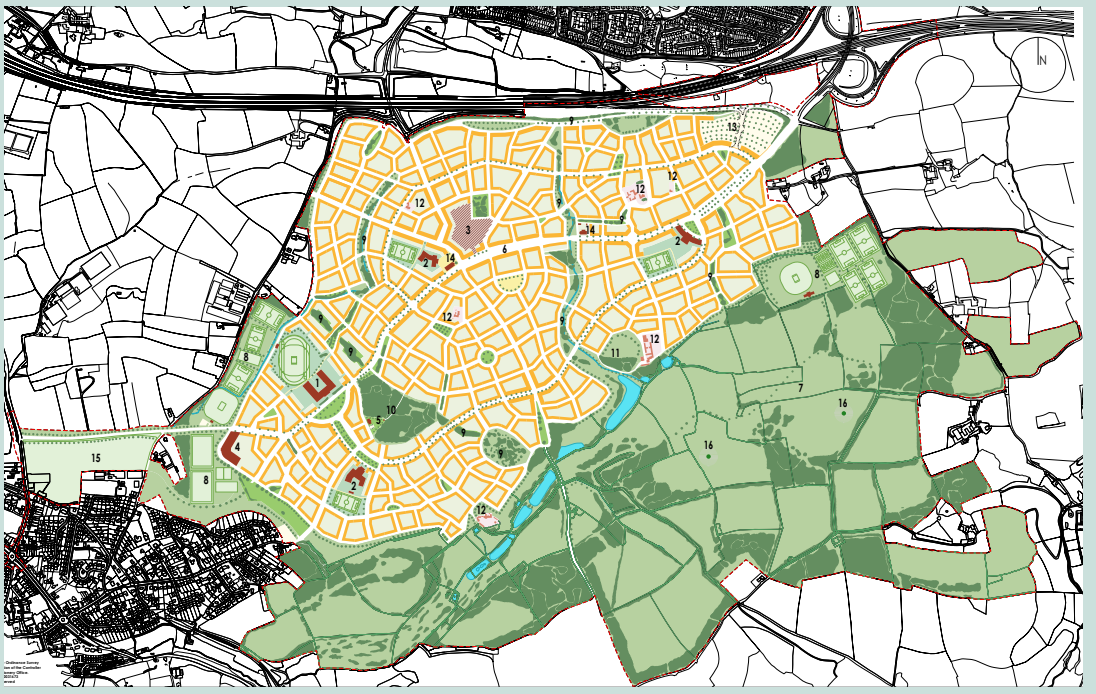
Figure 2: Main streets and center.

Image courtesy Red Tree LLP

FIGURE 1: WHAT SHERFORD DELIVERS

1. Secondary School
2. Primary School
3. Health Center & Children's Center
4. Sport Center
5. Youth Center
6. High Street
7. Community Park
8. Outdoor Sports Facilities
9. Wildlife and Green Corridors
10. Sherford Quarry
11. Existing Woodlands
12. Existing Farm Houses and Buildings
13. Park and Ride Interchange
14. Key Feature Building

Image courtesy Red Tree LLP.



As is often the case with new urbanism, so much centered on getting acceptance for a major road to become a traditional street with on-street parking, building frontages, mixed use and four-way junctions every 180 - 200 feet; a street that was ultimately going to carry up to 12,000 vehicles per day on certain sections. The Devon County Highways Department has been relatively forward-thinking for some years and that undoubtedly helped, but nonetheless a great deal of time and energy was spent in achieving this fundamental shift. Sherford simply would not have been able to achieve many of its sustainable objectives without this traditional street spine being adopted. As is the case in so many traditional places, the meeting of local and global is the trigger for so many other key actions and activities. Sustainable technologies are irrelevant without the fundamentals of urbanism.

TOWN AND COUNTRY

Quite early in the charrette process, a major issue had to be addressed and a quote from the great Thomas Sharp says it all.

> "The way to maintain the invaluable contrast between town and country is to keep these two utilities as pure as possible. We need to get back to the age-old conception of the town as pure town and the country as pure country … along with the preservation of the countryside, the preservation of the town must be attempted. The two are interdependent: one rises to beauty or falls to ruin with the other. It is true to say that only through the rehabilitation of the town can the countryside be saved, that the true way to save the countryside is to build true urban towns." — *Town Planning* (1940), pp. 55 - 56

A very controversial topic in these days of environmental sustainability, but fracturing efficient urbanism with vast swaths of greenery, however "ecological," simply cuts off the nose to spite the face. Sherford tackled this topic head on from an early stage and concluded that sustainability was better served by having compact urbanism on one-half of the land, and to then use the other half (510 acres) as a community park of considerable size. That in turn could achieve its own critical mass to include wind turbines for the town, an organic farm, and 170 acres of woodland planting to contribute to the carbon sink; to say nothing of the simple contrast of town and country, each to refresh the other (Figure 4).

A challenge to the Sherford plan was made at an opportunistic time in the political process. That rival proposition played heavily on the claim that compact urbanism would be made far more sustainable by retaining as much of the landscape as possible, introducing open space systems to an extraordinary degree. The result was reminiscent of Ian McHarg's sieve analysis of the late '60s and early '70s: The built environment was the residual after everything else had been given its "perfect" condition, resulting in failed urbanism with the consequent unsustainable behavior of the chief culprit — humans (Figure 5). Yet this undoubtedly scored higher in the minds of some environmental interests simply because efficiencies of urbanism were not on their radar. Hardly news, but the two contrasting plans illustrate the point. Fortunately, this myth is at last being realized as such by some planning inspectors and the Sherford plan prevailed.

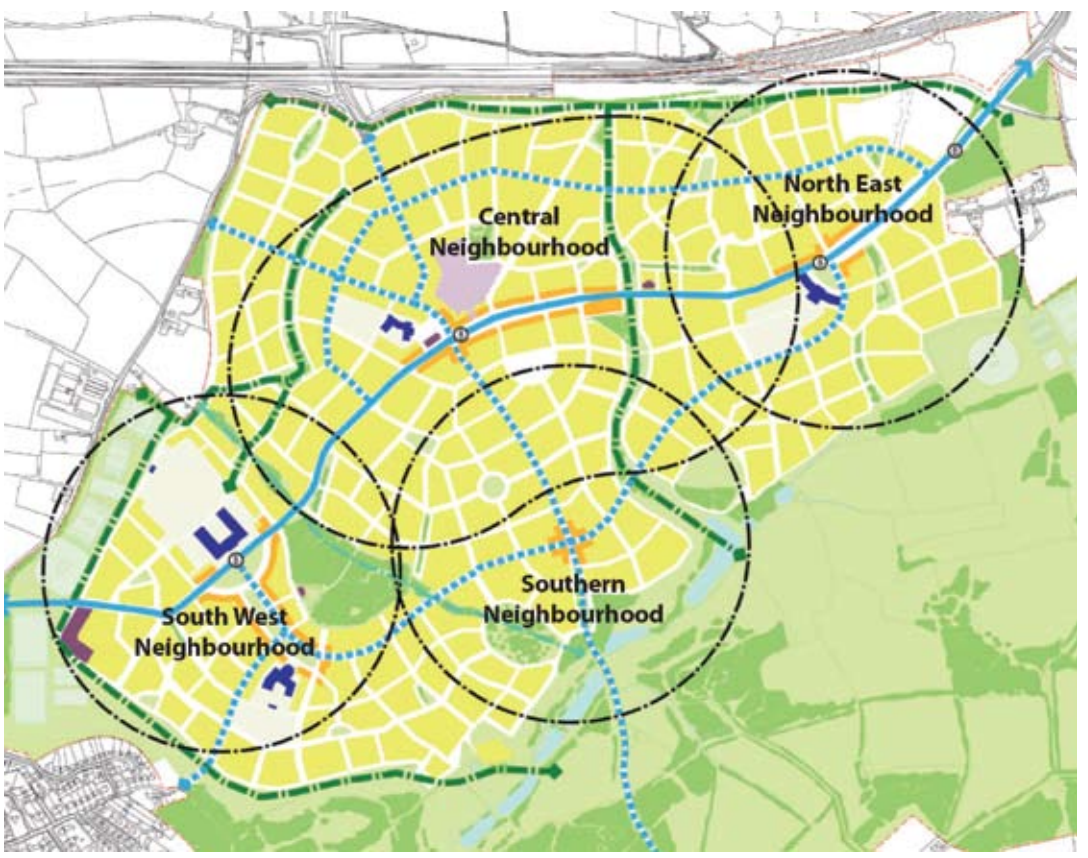


Figure 3: Neighborhood structure.

Image courtesy Red Tree LLP.

A SUSTAINABLE ASSESSMENT

Local and regional authorities are being pushed to undertake rigorous sustainability assessments prior to granting permission, but they struggle with the resources necessary to do it thoroughly. Redtree LLP paid for an independent assessment to be carried out by the Building Research Establishment, formerly a government agency and acknowledged as being at the forefront of sustainable research practices at many scales.

Their assessment system has eight topics:

- **Climate Change** — Ensures developments are appropriately adapted to the impacts of present and future climate change.
- **Resources** — Promotes the sustainable use of resources including water, materials and waste both in construction and operation.
- **Transport** — Ensures transport hierarchy issues are fully addressed and catered for within the development.
- **Ecology** — Ensures the ecological value of the site is conserved and enhanced.
- **Business** — Ensures that the development contributes to the sustainable economic vitality of the local area and region.
- **Community** — Ensures the development supports a vibrant, diverse and inclusive community which integrates with surrounding communities.
- **Placemaking** — Ensures the design process, layout structure and form provide a development that is appropriate to the local context.
- **Buildings** — Ensures that the design of individual buildings does not undermine the sustainability of the overall development.

Within these broad categories there is considerable elaboration.

Clearly there are similarities with LEED-ND criteria and likewise the same queries about how relative weightings and numerical scoring are justified and determined. Sherford achieved exemplary status (i.e. 85 percent or over) but there is no doubt that if certain criteria are less understood by those carrying out the assessment then there is a natural and understandable tendency to reduce the significance of those criteria in the scoring regime. It tends to be the significance of the urbanism that is played down. That raises two important points for new urbanism:

- The constant need to impress upon our "sustainable" colleagues from related disciplines the significance of tradi-

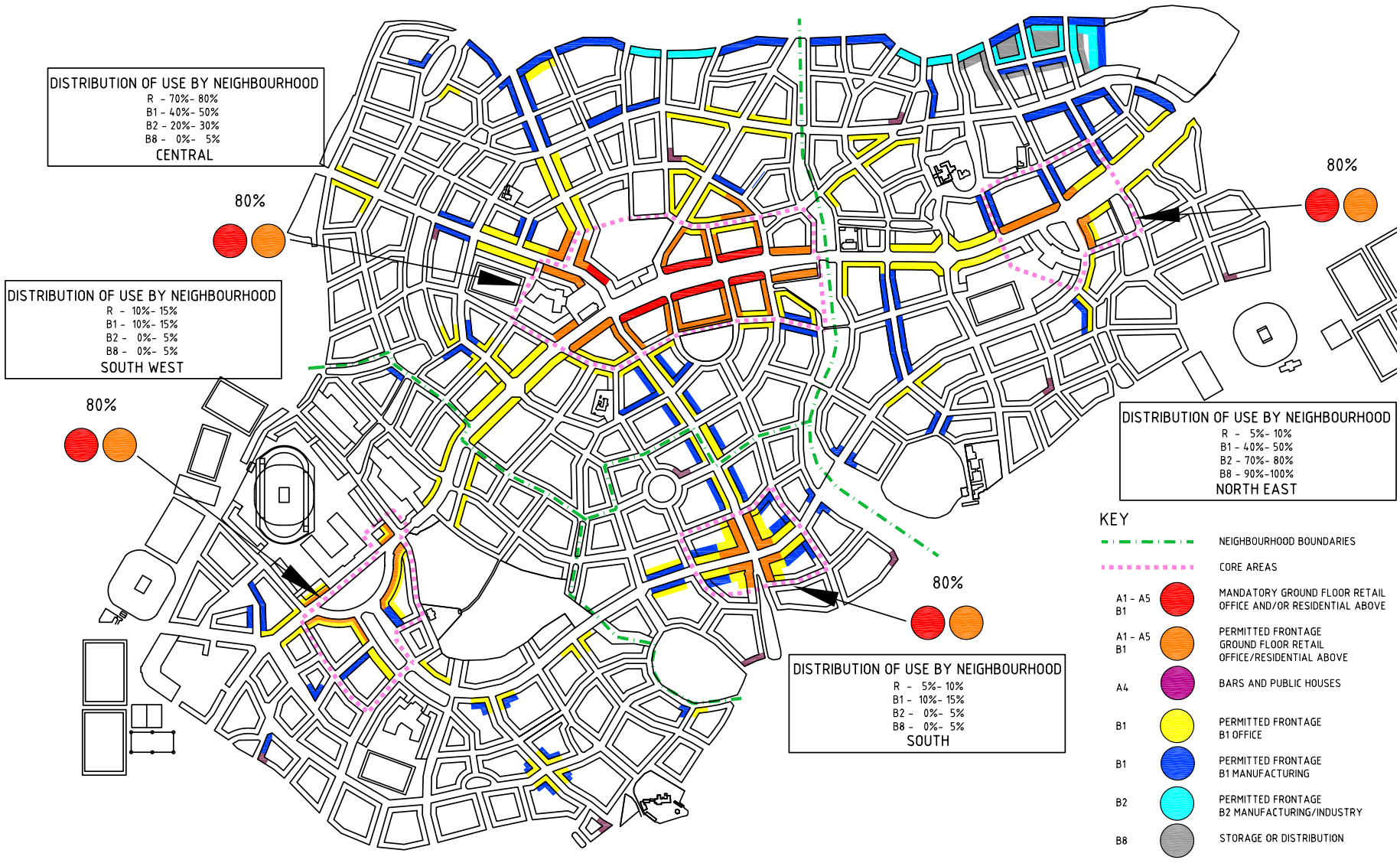


Figure 6: Mixed-use.

Image courtesy Red Tree LLP

tional urban form and layout in contemporary sustainability.

- The reluctance to embrace technocratic assessment. However much we might wish it away, it is becoming increasingly powerful in determining the worth of any proposition.

THINGS THAT HELPED

A score of 85 percent is at present a significant achievement from an independent assessor. This article cannot go into detail and much more can be found on the developer's Web site redtreellp.com. However, it is perhaps of value to highlight briefly a few of Sherford's characteristics, strategies and processes that contributed to its green credentials:

- Balance and distinction between town and country
- Compact walkable neighborhoods
- Early provision of retail and other social facilities including public transport, facilitated by the early creation of the high street spine
- High percentage of ped shed coverage in all neighborhoods
- Continuity of green systems through the town, to and from the community park, with minimal disruption to permeability
- Adaptation of urban blocks for wildlife movement
- The traditional distribution of mixed-use (Figure 6):
  - » Emphasis on the high street
  - » At neighborhood cores
  - » Along the secondary avenues
  - » "One block deep" from the primary and secondary system, including mews streets
  - » At local nodes
- Schools at the core of the neighborhoods, not on the periphery
- A sustainable drainage strategy from roof to river
- A commitment to improve the energy performance of buildings over and above government requirements year on year
- Local sourcing of materials
- High percentage and complex variety of affordable housing mechanisms all designed to be pepper-potted (well distributed) and tenure-blind (no income-based difference in appearance)
- The community trust: a properly localized expression of civic consciousness

Figure 5: Counter-proposal of fragmented urbanism.

Image courtesy Red Tree LLP.

THE CODE

Again this article does not permit detailed examination of the code. Suffice to say that when a project has a lifespan of 15 years under construction, the challenge for the code is to set a firm basis of sustainable urbanism from the outset to give confidence to the regulators, yet be parametric enough to allow for detailed responses and modifications, without being legally challenged as unauthentic after the fact. Perhaps this is a problem particular to the United Kingdom?

The transect is not an explicit urban structuring or operating system in this project and rarely is in the United Kingdom As with all good traditional urbanism it is implicit. But equally, in a culture where the traditional urbanism can be 800 years old or more, the transect is very fine-grained and complex. Again the degree of parametric prescription and regulation is crucial. It is perfectly acceptable and traditional for T3 typologies to exist in very small percentages in T5 zones and indeed be actively prescribed, but on smaller plots with lower parking provision.

Street and spatial composition within the code is of great importance to all concerned, and much effort has been placed on arriving at a series of instructions that, rather than just allocating the building types, uses, frontages and street types per transect zone, brings all these elements together in a spatial composition. Through the use of spatial composition cards that both illustrate and itemize the compositional requirements of each street, guidance is given to the architects chosen to take the work further.

The concept of "patient money" has been emphasized by new urbanist practitioners and developers in the United States for some time. It is crucial to Sherford's very existence. In the United Kingdom we have a volume house-building industry that produces houses in the same way as General Motors produces cars. They are efficient in providing that one commodity, but they are lousy at producing "town." Not only do they not understand it, they are not geared or structured to provide it —— yet they build at the scale of towns. It is a tragedy of immense proportion. Such remarkable achievements as Poundbury, built on land owned by HRH the Prince of Wales, are all the more remarkable in this competitive environment. With Sherford, the developers Redtree LLP have demonstrated that it is indeed possible to do this kind of development by not only taking the risk but also taking the time and taking the trouble.

Section and plan illustrations of a Hawaiian village transect.

Image credit: Duany Plater Zyberk & Company

All Green is Not Good: Sustainability by the Transect

By Sandy Sorlien

New urbanists have long known that compact, walkable neighborhoods are inherently more sustainable than conventional suburban development (CSD) because they reduce vehicle miles traveled and household energy use, and they conserve open space. According to the new book "Growing Cooler," researchers have found that, compared to those living in CSD, Americans living in compact urban neighborhoods with transportation options drive one-third fewer miles.[1]

"The climate crisis demands that we use every good tool available, from green roofs to wind farms to bicycle facilities."

Yet we also know that sustainable development patterns alone are not enough. The climate crisis demands that we use every good tool available, from green roofs to wind farms to bicycle facilities. But the question is where and to what extent we use them, and this is where many "green" initiatives are in conflict with walkable urbanism.

Our understanding of the rural-to-urban Transect, as it reveals a range of distinct local habitats for humans, prompts our distress about some of the sustainability solutions that are inundating the planning field. Unfortunately, these solutions are often discipline-specific, and each discipline tends to apply its ideas universally. The LEED ratings concentrate on the individual building. Environmentalists concentrate on preserving natural lands and protecting watersheds. Alternative energy entrepreneurs focus on fueling our consumption more responsibly. Transit advocates focus on getting funding for rail. Bicycle advocates call for safety on the streets for riders. Visitability advocates call for zero-step-entry housing.

All of those efforts are essential to sustainable planning, but any one of them applied universally could be disastrous to the very urbanism that makes a city walkable. Bioswales, stream buffers and random "green space" can create mini-sprawl, suburban setbacks, and unusable patches in urban areas. A bicycle lane or transit route added to a new thoroughfare design may widen it enough to destroy the spatial containment of the "outdoor room" and make it harder for pedestrians to cross, inhibiting two-sided retail on a mixed-use main street. Worst yet, the latest stormwater regulations are focused on site-level mitigation that attempts to essentially return any site, even in the urban core, to the hydrology of the meadow. This encourages developers to find cheap land and leave much of it open, i.e., spread things out.

In an essay published last year, policy and codes analyst Lisa Nisenson wrote about Maryland, "The signals here are astounding. Sprawling McMansions can easily rate as 'environmentally sensitive' while mixed-use, compact designs, touted by the Department of Planning as best for the environment, don't even make the cut."[2]

The Metropolitan Institute has reported that 2.8 million acres of greyfield will become available in the next 25 years.[3] If all that has to meet the "meadow" standard, we are in deep trouble. Needed reforms cannot take place, Nisenson warns, "unless those of us who understand the complexities of zoning get together with those who understand the complexities of cleaning up the environment." Stormwater regulations, she says, must take into account imperviousness that is avoided on a smaller footprint at the neighborhood and regional scales.

The Transect is essentially the new urbanist "operating system," and as such is our best hope for such coordination.[4] Fortunately, many promising tools are already in place. The transect-based SmartCode, originally released by Duany-Plater Zyberk & Company (DPZ), has been open-source for several years and is available for free to municipalities for local calibration.[5] There are now almost 100 SmartCodes either adopted or in process across the country for towns of all sizes, from Post Falls, Idaho

to Miami, Fla. According to Daniel Parolek, co-author of the new book *Form-Based Codes: A Guide for Planners, Urban Designers, Municipalities, and Developers*, it appears that a large majority of new urbanists are using the Transect as a major part of their methodology, and nine out of 10 of the book's form-based code case studies used the Transect or a modified Transect as the organizing principle.[6] Whatever the scale of our work — the building, block, neighborhood, city, or region — we can all plug in.

The new SmartCode Version 9 model code includes several supplementary modules, written to be integrated into the base SmartCode as well as into other transect-based codes. They are available for free download from the SmartCode Central Web site (www.smartcodecentral.com) and include annotations with advice for incorporating them into a local calibration. In addition to modules for Affordable Housing, Architecture, Thoroughfares and Visitability, there are several related directly to stormwater and other green issues, as follows:

Environmental Standards consists of stream, wetlands and stormwater provisions for New Community Plans. This two-page module was expanded from the Environmental section that appeared in older versions of the SmartCode. Because federal and state legislation often superseded it, calibrators of the code usually removed it. However, it should be used where possible, as it adapts EPA stream buffer standards to the Transect, from T-1 to T-6 zones. An annotation from the *SmartCode Version* 9 and Manual reads, "Municipalities may overcome these limitations by working with state and federal agencies to create regional mitigation banks or by exempting certain urban areas."

Natural Drainage Standards is a basic one-page, text-only module with planting provisions for both the community and lot scale. Contributed by Mary Vogel of PlanGreen, it may institute either standards (mandatory) or guidelines (advisory) as appropriate.

Hazard Mitigation Standards is a series of short sections to be inserted into various articles of the base SmartCode where there are floodplain and post-disaster considerations. These were written by attorney William Wright for the post-Katrina Mississippi charrettes in 2005 and 2006 but can be used anywhere that Base Flood Elevations apply.

Sustainability Tables are graphic pages to supplement the text-based modules listed above, or they may be used alone as part of Article 6 of the base code. Jaime Correa and Associates contributed tables for Wind Powerpower, Solar Energy and Food Production; they have been working on a building orientation table as well. A table on Composting and Recycling was produced by Solid Resources Inc., and the comprehensive Light Imprint Storm Drainage Initiative, described elsewhere in this publication by Tom Low of DPZ, is represented by a one-page summary matrix organizing over 60 tools and techniques by Transect zone.

T3 Sub-Urban Zone, University District, New Orleans. Street trees and natural drainage systems make sense in less urban zones.

Photo ©2007 by Sandy Sorlien

T5 Urban Center Zone, French Quarter, New Orleans. Intimate urban character would be ruined by street trees and bioswales.

Photo ©2007 by Sandy Sorlien

Because transportation options are crucial to sustainable communities, a detailed module on bicycle facilities is also in development.

Even without any modules, the base SmartCode coordinates numerous sustainability elements. It already incorporates transect-based designations for Bicycle Trails, Bicycle Lanes and Bicycle Routes (shared lanes with or without sharrows), as well as provisions for bicycle parking in the more urban T-zones. It requires street trees and private frontage planting to varying degrees along the Transect. And it accounts for intimate urbanism; for example if a right-of-way in T5 or T6 is less than 40 feet, the street tree requirement is waived. This enables some of the most walkable urbanism in the world, including the French Quarter of New Orleans.

As an ethical matter, the Transect underlying new urbanist codes ought to be a welcome entree into coordinated efforts between environmentalists and urbanists. It is, after all, about habitat. Environmentalists know that plant and animal habitats often subsist in a delicate balance, vulnerable to changes to even one of their interdependent elements. The same is true of our habitat.

The future of compact urbanism may depend on transect-based initiatives written by teams.[7] In the spirit of Lisa Nisenson's call to action, I urge new urbanist transect-based coders to join with policymakers and specialists to craft them, and soon.

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[1] Ewing, Reid, et al., *Growing Cooler: The Evidence on Urban Development and Climate Change*. Urban Land Institute, October 2007. Accessed from <http://www.smartgrowthamerica.org/gcindex.html>.

[2] Nisenson, Lisa, "A Browner Shade of Green: The New Water Rules and the Next Chapter of Sprawl." *PLANetizen*, June 11, 2007. Accessed from <http://www.planetizen.com/node/24957>.

[3] Nelson, Arthur C., "Preparing for the Next Building Boom." Presentation to 6th Annual New Partners for Smart Growth conference, February 9, 2007. Accessed from www.smartgrowthonlineaudio.org/np2007/260b.pdf.

[4] Introductions to the Transect concept are available from SmartCode Central, <www.smartcodecentral.com/transect.html> and Duany Plater-Zyberk & Company, <www.dpz.com/transect.aspx>.

[5] *SmartCode Version* 9 and Manual. New Urban Publications, 2008.

[6] Parolek, Daniel G., "Form Based Codes: Significant Work in Progress." Presentation at CNU XV, Philadelphia, Pa., May 2007. Accessed from <http://www.cnu.org/node/1108>.

[7] Contact Robert Alminana at robert@hallalminana.com for SmartCode Module guidelines.

Light Imprint: Integrating Sustainability With New Urbanism

By Thomas E. Low

As the development industry shifts away from the conventional suburban model, the new urban model safeguards the environment while creating compact, connected, mixed-use communities. While sprawl leads to excessive land use and automobile dependency, new urbanist development offers a sustainable alternative.

LIGHT IMPRINT: A NATURAL EVOLUTION OF NEW URBANISM AND THE GREEN MOVEMENT

A natural evolution of new urbanism and the green movement is the Light Imprint (LI) initiative supported by the Congress for the New Urbanism. LI is a culmination of years of on-the-ground experience; it includes over two years of specific research by CNU members.

LI developed out of the need for a new ecological solution. Experiences with the current environmental approaches to new urbanism inadequately address the problem. For example, low impact development is a major enabler of green sprawl; green urbanism compromises community connectivity and quality of life; and conventional gold-plated green engineering tools increase development costs. Shortcomings of these techniques will be further discussed. LI is a planning and development strategy that emphasizes sustainability, pedestrian-oriented design, and increased environmental and infrastructure efficiency. Transect-based environmental metrics established in LI are not found in LEED-ND and form-based codes. LI introduces a framework of tools that addresses stormwater runoff through natural drainage, conventional engineering infrastructure, and innovative infiltration practices. This framework includes a toolbox to be used collectively at the sector, neighborhood, and block scale. A combination of tools can be adjusted according to the appropriateness of their use in each transect zone. This toolbox offers a range of environmental benefits; it can also significantly lower construction and engineering costs.

It can easily be demonstrated that LI differs from conventional approaches when responding to environmental factors. In addition, it is easy to show how LI incorporates the many other quality-of-life benefits of a new urbanist approach to planning and design.

SIGNIFICANT DIFFERENCES FROM OTHER GREEN DEVELOPMENT APPROACHES

The vast majority of current engineering practices continue the conventional "inlet, pipe, and pit" approach to storm water management. The development industry, however, is increasingly considering a range of green approaches. Frequently, green approaches are a requirement. These include green urbanism, low-impact development, best management practices, new urbanist and traditional neighborhood development, and conventional engineering practices. To understand the benefits of LI, it is important to discuss the pros and cons of each of these other approaches.

Green urbanism (GU) is an environmental approach promoted by landscape architects. GU, considered an alternative to new urbanism, emphasizes an increased percentage of open space within a development. Greenway fingers serve as organizing spines for development; stormwater filtration mechanisms are placed outside and around these green spaces. When compared with new urbanist developments, GU developments offer less connectivity. Also, the increased requirement for open space reduces the amount of land available for development. That fact can greatly diminish the economic feasibility of a project.

Low impact development (LID) is another environmental development approach. LID origins are in conventional suburban development adopted by many municipalities. LID manages stormwater quality and quantity with on-site design techniques and best management practices. LID techniques are applied to a wide range of suburban developments. For example, high-density residential development, like suburban apartment complexes, are in the same classification as commercial development, like strip shopping centers. This lack of differentiation between developments of differing characters is a downfall of LID.

When addressing methods for stormwater treatment, best management practices (BMP) focus on engineering rather than planning and design. The EPA proposes using smart growth techniques as a BMP for stormwater although this is not always successful. For example, compact development suffers when the BMPs require stormwater detention areas in front or beside buildings. This approach removes buildings from the public realm of the streetscape, which harms a community's social connectivity. Additionally, detention areas form gaps between buildings that interfere with pedestrian activity, compromising retail merchandizing goals.

Conventional engineering applied to new urbanist and traditional neighborhood development (TND) accommodates the broader range of development standards necessary for community-oriented design. Municipalities reviewing plans for new urbanist and TND communities are often interested in these standards. Their governing bodies, however, may be conservative and opposed to unfamiliar standards. Problems arise when designers overcompensate for differences in standards and design of infrastructure. Called "gold plating," this overcompensation can thwart the successful realization of a new urbanist community. Project delays and additional infrastructure cost can ultimately prevent implementation of a good community development.

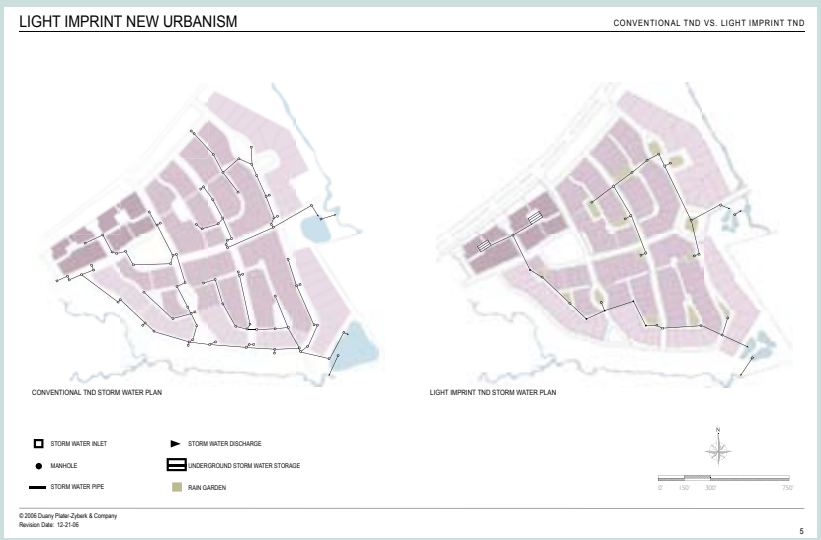
LIGHT IMPRINT NEIGHBORHOOD CASE STUDY: GRIFFIN PARK

Unlike these other development strategies, LI employs different tools in each transect zone (T-zone). It is not limited to one approach for environmentally sensitive development. Rather, LI offers context-sensitive design solutions that work together at the community level.

According to Georgio Tachiev, Ph.D., an environmental engineer at Florida In-

CONVENTIONAL TND MASTER PLAN

LIGHT IMPRINT TND MASTER PLAN

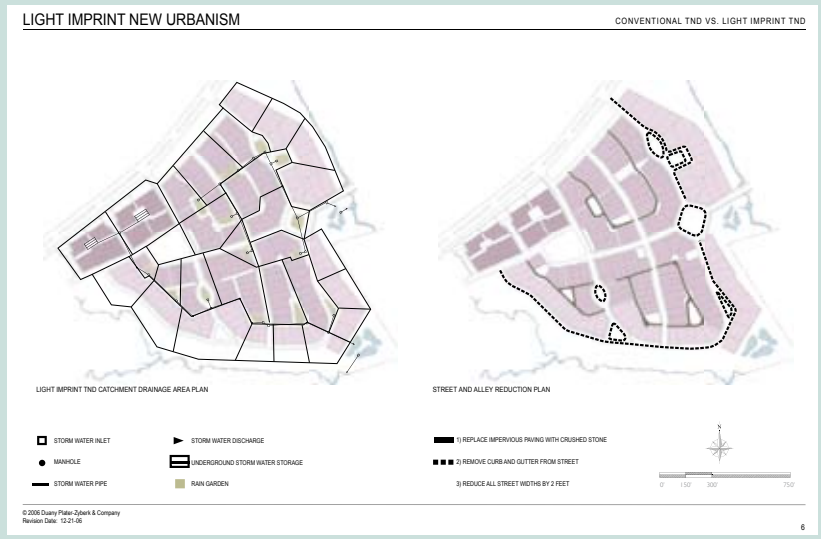


ENGINEERING COMPARISON

Project:	Light Imprint New Urbanism Study								
Date:	6-Dec-06								
Details:	Phase I, 42 Acres, 176 Lots				174 Lots				
Conventional TND Engineering					Light Imprint TND Engineering				
Material	Quantity	Unit	Cost	**Total**	Material	Quantity	Unit	Cost	**Total**
Erosion Control									
Silt Fence	8450	LF	$4.00	$33,800.00	Silt Fence	8450	LF	$4.00	$33,800.00
Rip Rap	200	Tons	$55.00	$11,000.00	Rip Rap	200	Tons	$55.00	$11,000.00
					TPF	4225	LF	$4.00	$16,900.00
Total				**$44,800.00**					**$61,700.00**
Storm Water									
Inlets	101	Ea	$2,500.00	$252,500.00	Inlets	24	Ea	$2,500.00	$60,000.00
Pipes	9434	LF	$30.93	$291,793.62	Pipes	4182	LF	$30.93	$129,349.26
Retention Pond	1	Lump	$48,400.00	$48,400.00	Rain Gardens	20	Ea	$5,120.00	$102,400.00
Total				**$592,693.62**					**$291,749.26**
Pavement									
Curb & Gutter	18910	LF	$7.60	$143,716.00	C & G	13091	LF	$8.00	$104,728.00
Sidewalk	8276	SY	$25.00	$206,900.00	Sidewalk	7000	SY	$25.00	$175,000.00
Paved Road	26705	SY	$18.64	$497,781.20	Paved Road	20515	SY	$18.64	$382,399.60
Paved Alley	6470	SY	$13.36	$86,439.20	Crushed Stone - Alley	5765	SY	$12.00	$69,180.00
Total				**$934,836.40**					**$731,307.60**
Grand Total				**$1,572,330.02**					**$1,084,756.86**
Cost per Lot	176			**$8,933.69**		174			**$6,234.23**

Notes:
TPF - Tree Protection Fence
LF - Linear Feet
SY - Square Yard
Ea - Each

Overall 31% Saving
Per Lot 30% Saving



LIGHT IMPRINT OVERLAY STUDY

Griffin Park, Greenville County, S.C.

The study, prepared by Duany Plater-Zyberk & Company, contains six plates of plan diagrams and one chart. The first two plates compare the master plan before and after the application of LI engineering. The second two plates show the engineering infrastructure for each of these plans. The fifth plate shows the LI TND catchment drainage area plan. The sixth plate shows the master plan with proposed reductions of pavement and curb and gutter.

The table demonstrates the substantial cost savings achieved by applying the LI engineering techniques. It shows the comparison between the two engineering methods for the first phase of the development of 42 acres and 174 lots. The table compares the costs of the two methods based on erosion control measures, stormwater infrastructure, and pavement width and materials. Finally, it summarizes the cost of each showing a 31 percent cost savings of approximately $500,000 for the first phase.

ternational University, LI reduces infrastructure on the neighborhood scale in terms of roads, public works, and facilities. On the block scale, the implementation of LI methods results in reduced building footprint and stormwater runoff. The application of additional LI techniques at the individual lot and building scale add to the increased level of sustainability.

Griffin Park, a DPZ-designed community in Greenville County, S.C., offers one example of LI development. While numerous studies compare conventional suburban developments with TNDs, few compare standard TNDs to Light Imprint TNDs. The DPZ Charlotte office uses Griffin Park as such a case study.

Landscape architect Guy Pearlman and designer Patrick Kelly, both of DPZ, have developed the LI overlay of techniques for Griffin Park. The goal is to create an environmentally sensitive community while lowering construction costs during the first development phase. Pearlman explains, "The conventional TND engineering plan is for both county review and bidding purposes; it reaches an extensive level of detail. The LI engineering plan is based on many variables developed in the conventional plan. Added consideration is given to environmental and preservation factors. Those factors enhance the value of the community and lower the cost of construction."

LI overlay strategies for Griffin Park include the introduction of tools for stormwater storage, channelization, filtration, and paving options. Additional protection for natural areas is provided during the construction phase. Through the use of different tools within different T-zones, the need for infrastructure is reduced while lessening the environmental impact of development.

To achieve LI goals within the TND plan, tree protection fences used in the erosion control phase protect existing natural areas including mature trees. That strategy results in a 27 percent cost increase compared to the conventional method. Yet, using LI, there is a 50 percent cost saving in the stormwater management phase. The introduction of bioretention swales, rain gardens, and vegetative surface filtration areas add aesthetically pleasing natural areas and neighborhood recreation areas. Rain gardens filter runoff to remove pollutants before they reach the adjacent creeks and river.

Two road pavement techniques reduce costs. First, building roads that are 24 feet wide instead of 26 feet wide results in a significant reduction of paving costs. Second, substituting crushed stone for asphalt for rear lane surfacing saves over 20 percent of this development cost.

The following summary outlines the application of various tools by T-zones in Griffin Park:

- T4 Neighborhood Center Zone: 1) Introduction of an underground stormwater storage system; 2) reduction of the amount of pipe required as well as reduction in their lengths; and 3) reduction in the number of stormwater inlets.

- T3 Neighborhood General Zone: 1) Use of pervious pavement in rear lanes;

2) reduction of the street widths; 3) reduction of the amount of pipe required and reduction in their lengths and size; 4) reduction in the number of stormwater inlets; and 5) introduction of small-scale, multiple-lot, communal bioretention swales.

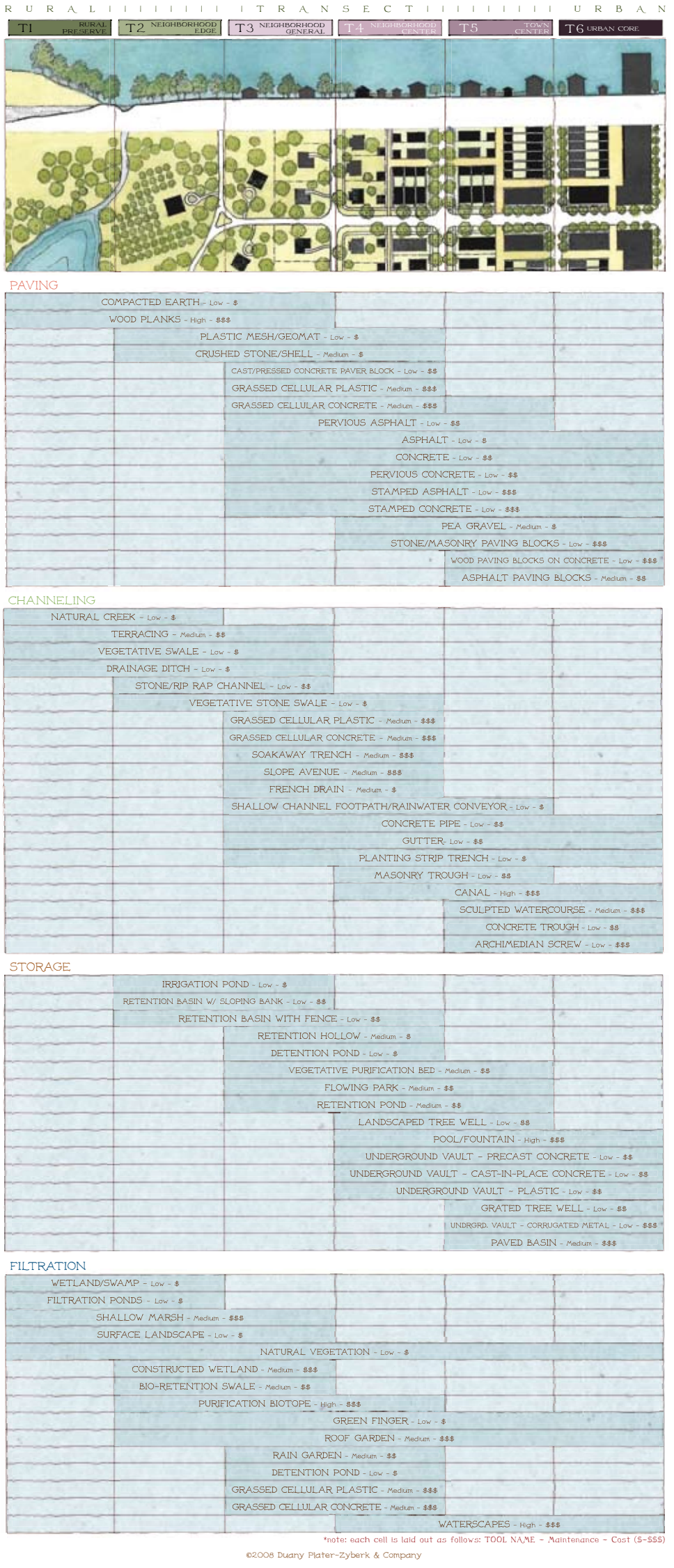
- T2 Neighborhood Edge Zone: 1) Elimination of curb and gutter in strategic edge areas; 2) replacement of the proposed large retention ponds with smaller-scale natural filtration ponds; and 3) introduction of vegetative surface filtration areas along the perimeter; and 4) elimination of stormwater inlets and pipe.

Pearlman summarizes, "Implementing the LI overlay results in over 30 percent engineering cost savings in actual construction dollars for the first phase. That savings is in addition to the added community value of preserved mature trees and communal rain gardens.

LIGHT IMPRINT REQUIRES A COMPREHENSIVE STRATEGY

Stephen L. Davis, P.E., of Davis & Floyd Engineers, is also active in the development of Griffin Park. He supports the LI approach to new urbanism but tempers it with reality from a long-range standpoint. Davis uses the term "ground truthing" to determine how practical it is to get LI communities approved by municipalities and then actually built. Ultimately, success will be measured over the lifetime of the community.

Davis explains, "Standard engineering methods are quicker to complete submittals for permits. For the Light Imprint approach to be embraced by advocates of new urbanism within municipalities and the development and building industry, it is important to have the LI model presented as a comprehensive strategy." He also advises that this strategy should not substantially modify the new urbanist design of street and lot layout, nor should it alter other standard practices for common infrastructure elements. Additionally, when practicing LI, he states, "Engineering hydrology becomes critical." For example, soil analysis must verify rain garden absorption requirements and sufficiency of smaller pipe sizes within the system.



Even though a comprehensive approach works best when applying the LI model, it is critical that technical issues work within the framework of good engineering practices. Davis recognizes that the LI strategy allows stormwater surface sheet-flow across pervious surfaces. That encourages onsite absorption and reduces the typical number of drain inlets. Although this technique works, the rule-of-thumb of the curb and gutter system should still apply — 400 linear feet as the maximum distance between drain inlets. Davis also suggests that LI can reduce infrastructure even further if the lots and streets on the neighborhood's perimeter allow sheet flow of stormwater through landscaping into existing natural drainage systems.

Field supervision and maintenance issues are also factors to consider during design and construction. For example, correct design of a rain garden assures that water does not bypass the drainage area. Perforated drainpipes must be also installed properly. Davis voices concerns that rain gardens could become dysfunctional over time. This issue can be mitigated if the rain garden plant material is indigenous, water tolerant, and properly maintained. If pervious road surfaces are being considered for alleys, lanes, and streets without curbs and gutters, then measures are required to stabilize the road's shoulders to prevent erosion and tire rutting. Developers point out, however, that maintenance requirements for most LI tools do not necessarily exceed those already in practice for well-maintained conventional suburban development. LI offers a tangible green alternative to the superficial perfection of suburbia.

Finally, Davis advises that time is necessary for LI to become the norm. Designers and developers may not be able to employ all LI techniques immediately, but they could be implemented incrementally. The pace of development and the need for a project to succeed may dictate incremental implementation.

BOTTOM LINE VALUE TO DEVELOPERS

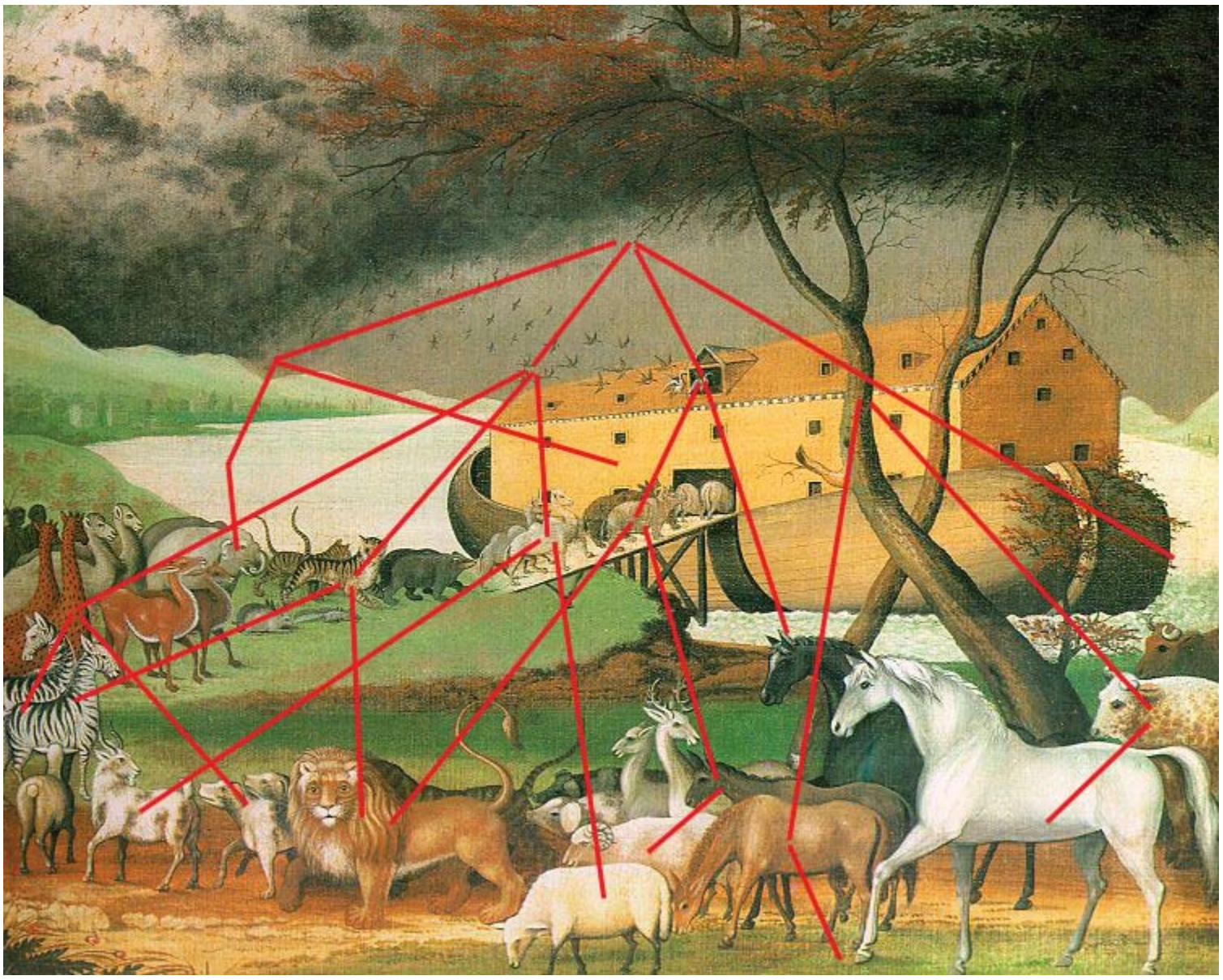
Joe W. Jelks, III, developer and founder of Griffin Park, S.C., sees value in applying LI. He explains, "For Griffin Park, the LI overlay case study for the first phase was compelling enough to lead our development team to apply the LI overlay techniques after construction had started. The case study also convinced us to work with stakeholders and approval agencies to holistically apply LI for the next phases."

THE *LIGHT IMPRINT HANDBOOK*

Elaborating on this approach, the authors are publishing the *Light Imprint Handbook*. The handbook provides an overview of the initiative supported by CNU. In the *Light Imprint Handbook*, the transect-based matrix organizes over sixty tools and resources in a simple, useful form. Readers can easily gain an understanding of the LI overlay strategy and methods to apply the LI approach on their next land development project. It features four LI case studies, including Griffin Park. This handbook, part of a user-friendly website, is available at www.lightimprint.org.

The web version of the *Light Imprint Handbook* includes a user-friendly interactive database that allows individual property owners, environmentalists, development teams, municipal staff, engineers, land planners, and land conservationists to select different variables. These variables may include soil hydrology, slope condition, climate, urban-to-rural T-zones, initial costs, and long-term maintenance factors. Once variables are submitted to the database, a customized palette of tools specific to the project's needs appears instantaneously. This valuable database provides a simple solution to those overwhelmed by the massive surge of green information in professional practice today. LI will benefit from application on real projects. As experts add content, this toolbox will grow and expand. The authors welcome peer review, comments, suggestions, or questions.

Lead author Thomas E. Low, AIA LEED CNU, gratefully acknowledges contributors to this article: Stephen L. Davis, P.E. CNU; Andres Duany, FAIA AICP CNU; Joe W. Jelks, III; Patrick Kelly, LEED CNU; Guy Pearlman, RLA CNU; Georgio Tachiev, Ph. D. CNU; Nora M. Black, Associate AIA CNU; Katharine Burgess, CNU; Monica Carney, CNU; Kathy Crowe; Xavier Iglesias, CNU; Lauren Koutrelakos, CNU and Elizabeth Plater-Zyberk, FAIA CNU.



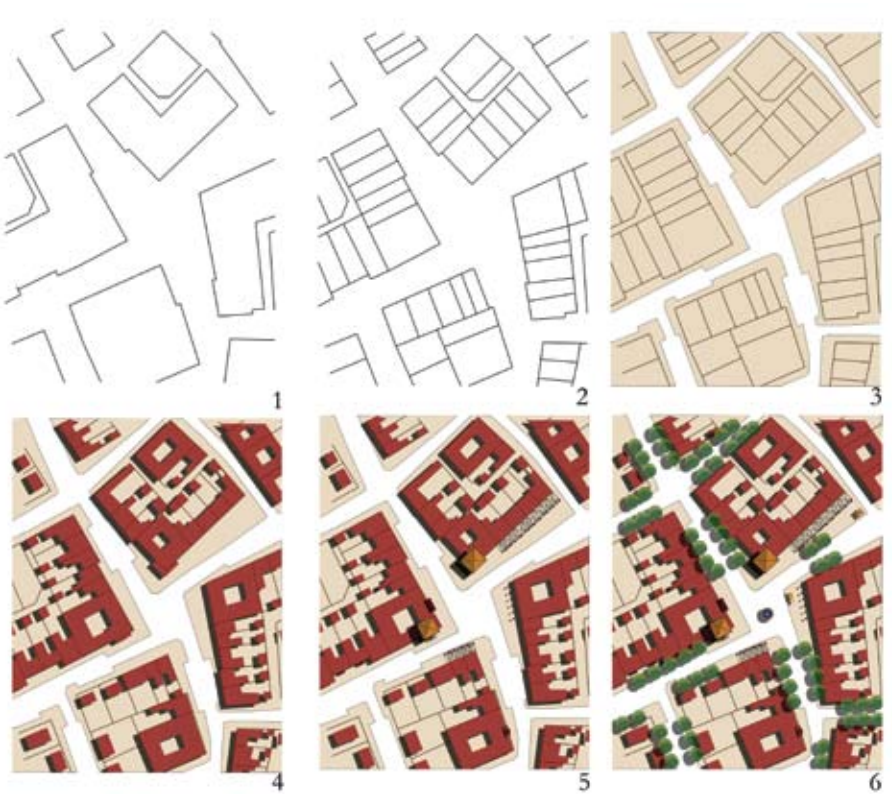
Noah's Ark by early American artist Edward Hicks, with Christopher Alexander's lattice diagram superimposed.

The New Urbanism Ark: A New Environmental Module for the SmartCode

By Jaime Correa

Defining sustainable urbanism without an awareness of the primordial concept of the city is a futile exercise. If our methodology lacks a basic understanding of this conceptual apparatus, then we are granting a license for all kinds of design faults and human whims, as well as a blank slate that disregards a more harmonious schema of the city —— a schema in which fundamental mistakes are avoided and perfect ideas are achieved. In effect, the primordial idea of the city is a conceptual point of departure where the natural wholeness of its composition (*art*) and its pragmatic work (*science*) coexist in absolute harmony. It is a relationship that defines with precision the focus of sustainable urbanism.

The Assyrian-Egyptian image of the city, the primordial graphic of urbanism, distinguishes between the parts that are essential to the composition and those that have been introduced by necessity or caprice. The parts that are essential (the two axial lines meeting at the center of a circular boundary) are the foundation of beauty; the parts that are introduced by necessity (the specialized achievements embedded within its four resulting quarters) bring about every human license; and the parts added by caprice (the overall fashion and decoration) trigger every fault. This is what all masters of urban design have been able to recognize, and this is what rarely has been understood as our most fundamental point of departure.



Algorithmic design may be used to generate complex urban forms.

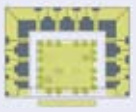
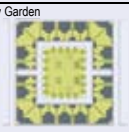
Image: Jaime Correa and Associates.

In a seminal article, Christopher Alexander reminded us that some essential ingredients were missing in the design of the new American cities.[1] He noticed how traditional towns had charm, complexity and elegance, while our newest cities were artificial, rigid and organized in a "tree-like" fashion. He concluded that the city as a receptacle of life should become a container of the primordial ideal, and could not be reduced to a system lacking ambiguity and coincidences. For

SMARTCODE MODULE **SUSTAINABILITY - FOOD PRODUCTION**

Municipality

Sustainability - Food Production. This table shows ways of incorporating types of food production along the Transect.

	T1	T2	T3	T4	T5	T6	SD	Specific
Farm 		·					·	
Agricultural Plots 		·	·				·	
Vegetable Garden 		·	·	·				
Urban Farm 			·	·	·			
Community Garden 			·	·	·	·		
Green Roof - Extensive - Semi Intensive - Intensive 		·	·	· ·	· · ·	· · ·	· · ·	
Vertical Farm 					·	·	·	

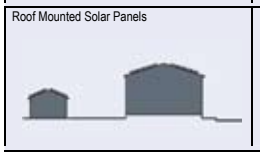
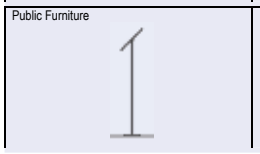
SmartCode food production module shows ways of incorporating food production within the Transect.

Image: Jaime Correa and Associates

SMARTCODE MODULE **SUSTAINABILITY - SOLAR ENERGY**

Municipality

Sustainability - Solar Energy. This table shows opportunities for the placement of types of solar-powered devices within the Transect.

	T1	T2	T3	T4	T5	T6	SD	Specifics
Solar Farm 	·	·					·	
Roof Mounted Solar Panels 		·	·	·	·	·	·	
Public Furniture 			·	·	·	·	·	

SmartCode solar energy module opportunities for the placement of solar panels within the Transect.

Image: Jaime Correa and Associates

SMARTCODE MODULE **SUSTAINABILITY - WIND POWER**

Municipality

Sustainability - Wind Power. This table prescribes opportunities for the placement of types of wind-powered devices within the Transect.

	T1	T2	T3	T4	T5	T6	SD	Specifics
Wind Farm 	·	·					·	
Horizontal Axis 	·	·	·				·	
Vertical Axis 			·	·	·	·	·	
Public Furniture 			·	·	·	·	·	

SmartCode wind power module prescribes opportunities for the placement of wind turbines within the Transect.

Image: Jaime Correa and Associates

Alexander, the primordial ideal of the city was not a tree but a "semi-lattice" where complex relationships would generate the life, overlap and wholeness characterizing the internal structure of living things. This quality was identical to the one he found in "the mind of great paintings and symphonies." However, he also realized that complexity and overlap were not necessarily the only characteristics of great urbanism. Complexity and overlap also produce chaos —— in fact, a garbage can is full of complexity and overlaps. Therefore, the question remains: What would be the system that could allow us to achieve the authentic richness of the living city?

The answer to this conundrum cannot be found in texts of architectural or urban theory, but in some of the most important neuropsychological experiments of the mid-twentieth century.[2] One of these was the Perceptron, a machine consisting of a single neuron performing yes/no algorithmic classifications of data. As various objects were presented to it, it slowly got better and better at classification. However, it was never presented with any novel combination of shapes and colors that would make it have difficulty discriminating correctly.

In other words, and to complete the analogy between machines and town planners, the Perceptron (representing the scientifically-educated professional) was only capable of focusing on the input for which it was programmed. It was not meant to recognize the emergence of new typologies, innovative connections and relationships, or unusual algorithms, combinations or permutations. The Perceptron (the typical design professional) was good at processing scientific data, but failed when confronted with the artistic, the novel or the unprecedented. Science could explain any given object but was unable to recognize how the artistic was fulfilling our deepest human desires.

As a result of these observations, the American new town designer is confronted with the close relationship between art and science. To illustrate the scientific side: A simple algorithm composed of a lot and a building could generate an urban-to-rural gradient simply by changing the front setback. The closer the building is to the lot frontage, the more urban; the further away, the more rural. But in the presence of a third element, say a two-car garage, the same algorithm would generate responses with doubtful aesthetic value and public space consequences. Therefore, not every combination follows the same type of logic. For some of them, we need to be artists; and, for some others, we need to be scientists.

Art, on the other hand, is never the result of a simple algorithm. Art expands our choices and allows us to build them legally. Art coordinates various disciplines and operational methods while producing taxonomical devices that allow us to put elements in order. Art is parametrical and the result of successive acts of progression. For instance, in urbanism, the artistic act would start with the neighborhood and its particular block structure; then it would add lot lines, decide the direction of the roads, determine the width of sidewalks and location of on-street parking, figure out the most appropriate location for civic and private building types, determine a variety of building footprints, produce the character of the urban spaces through the allowance of encroachments, and finally, complete the overall urban landscape with the presence of trees, monuments and urban furniture. This system of complex algorithms has its pragmatic basis; however, it is not part of a precise scientific recipe, but a part of a convoluted assembly of art and artful decisions, a system imitating the presence of wholeness within the traditional city. It is a system in complete alignment with the parametric methods advocated by Duany Plater-Zyberk in the urban-to-rural Transect.[3]

From a metaphysical standpoint, a similar system of complex algorithms shows up in the form of a metaphorical message within one of our most beloved biblical stories: Noah's Ark. The story of Noah and his family, in the book of Genesis, in fact imparts a sustainability agenda that allows us to understand our contemporary predicament and the scope of the project we need to embark upon immediately.

Noah's biblical agenda issues the following nine goals:

1. *Gather data and develop a consciousness of change:* Explained in the biblical text as "people begun to multiply … the Lord observed the extent of the human

The primordial symbol of the city (Egyptian hieroglyph and Assyrian figures).

wickedness … and he was sorry he had ever made them … but, Noah found favor in the Lord." (Gen 6: 1-8).

2. *Build architecture out of sustainable materials and within the context of a compact city form:* "Build a 250 feet long boat from cypress wood and waterproof it with tar, inside and out, then construct stalls through out its interior." (Gen. 6: 14-15).
3. *Be respectful of bio-diversity:* "Enter the boat with your family and bring a pair of every kind of animal." (Gen. 6: 19).
4. *Do not forget the food supply:* " And be sure to bring enough food … take seven pairs of each animal I have approached for food and sacrifice." (Gen. 7:19).
5. *It is not about recycling nor about cradle-to-grave; it is about cradle- to-cradle and innovation:* "The rain fell in mighty torrents from the sky. … God wiped out every kind of living thing." (Gen. 7:11 and Gen. 7:23).
6. *Build an example of a perfect settlement; manifest a testament of these ideas:* "Then Noah built an altar … and there he burnt offerings." (Gen. 8:20).
7. *Mobilize citizens and create powerful policies promoting a consciousness of change:* "Every living creature will look at you with fear and terror. I place them in your power." (Gen. 9: 2).
8. *Produce a sustainability covenant (a new charter of sustainability):* "And when I see a rainbow, I will remember the eternal covenant with God … never again will earth be flooded." (Gen. 7: 19).
9. And finally, the story concludes with the description of the construction of the Tower of Babel which is nothing but *a reminder of our cultural uniqueness and our potential to respond to the genius of place (genius loci).*

Given this ambitious divine agenda and the paradoxical relationship between art and science, how would it be possible to include the practice of sustainable design into the new urbanism? Could we turn the SmartCode into its recipient? After all, we've been told that the SmartCode is "the unique operational system for the implementation of the type of parametric design advocated by the Transect."[4] If that is true, would it then be possible to create a SmartCode Module,[5] and could all the existing gadgets and devices supported by the advocates of sustainable urbanism suit such an operational system?

The answer is basically about design appropriateness and classical correspondence; i.e., the more urban, the more formal; the more rural, the more picturesque; the more urban, the more compact; the more rural, the more spacious. In other words, any gadget or technical device could be fitted in the spectrum of the Transect through mindfulness of the particularities of the spatial urbanity or lack thereof.

1. For instance, to implement the idea of Self-Sustainable Organic Food Production (SOFP):

- *Farms* would be fine when located at the regional scale;
- *Agricultural Plots* should be found at the rural boundaries of the metropolitan areas;
- *Vegetable Gardens* would be appropriate in areas where rural urbanism is predominant;
- *Community Gardens* would occupy the rear of urban blocks;
- *Urban Agricultural Parks* should occupy the center of the city;
- *Vertical Farms* will manifest as hydroponics buildings where each floor would be dedicated to different organic species;
- *Green Roofs* would be used in the most urban centers;
- Finally, agriculture and aquaculture could be used as opportunities to create *Public Art*; a mental organization that would allow the designer to fit all of the possible alternatives for local food production within the T-1 to T-6 spectrum of the Transect.

2. Solar Energy (SE) devices could be fitting as follows:

- *Solar Farms* shall occupy special districts or T-1 areas;
- *Roof-Mounted Solar Panels* should be placed in any T zone — although their configuration would be quite different in urban areas;
- Finally, a solar panel could also become a piece of *Public Art* if placed in correspondence with an artistic concept.

3. Wind Power (WP) devices could be suitable in the following locations:

- *Wind Farms* should occupy rural areas or special districts (T-1 or SD);
- *Horizontal Axis* wind panels should be used in T-1 to T-4 areas due to size and noise restrictions; and,
- *Vertical Axis* and *Public Furniture* wind devices should be most appropriate in T-3 to T-6 areas or in special districts.

In fact, the same kind of rationality applied to these technical devices could also be applied to the multiplicity of building types within the SmartCode. This new understanding would generate a lighter sustainable imprint at the level of the plot; however, it would also create more difficulty by requiring us to re-think the configuration of the lot dimensions, the design aesthetics of certain building types, and the location of sustainable management systems within the private plot. Building types will not be judged simply by their role in the configuration of positive urban space, but also by their overall contribution to the sustainability of the planet. This contribution would happen through the inclusion of compost bins, geothermal wells, green roofs and walls, hot water panels, solar roofs, vegetable gardens, water harvesters, wind turbines, etc.

The combinations, permutations and cultural responses might be many but the appropriateness of the Transect, as a methodology, is unique and almost unquestionable. As we progress towards a more sustainable planet, we will be able to understand that the mind's first function is to increase ambiguities and overlaps. And that the creation of ambiguities and overlaps cannot be generated through the synthetic reproduction of sterile environments but through the imitation of nature and its lovable results. As Leon Krier, the yardstick against which we measure all our successes, has asked: What is next in our agenda: CHOICE or FATE?

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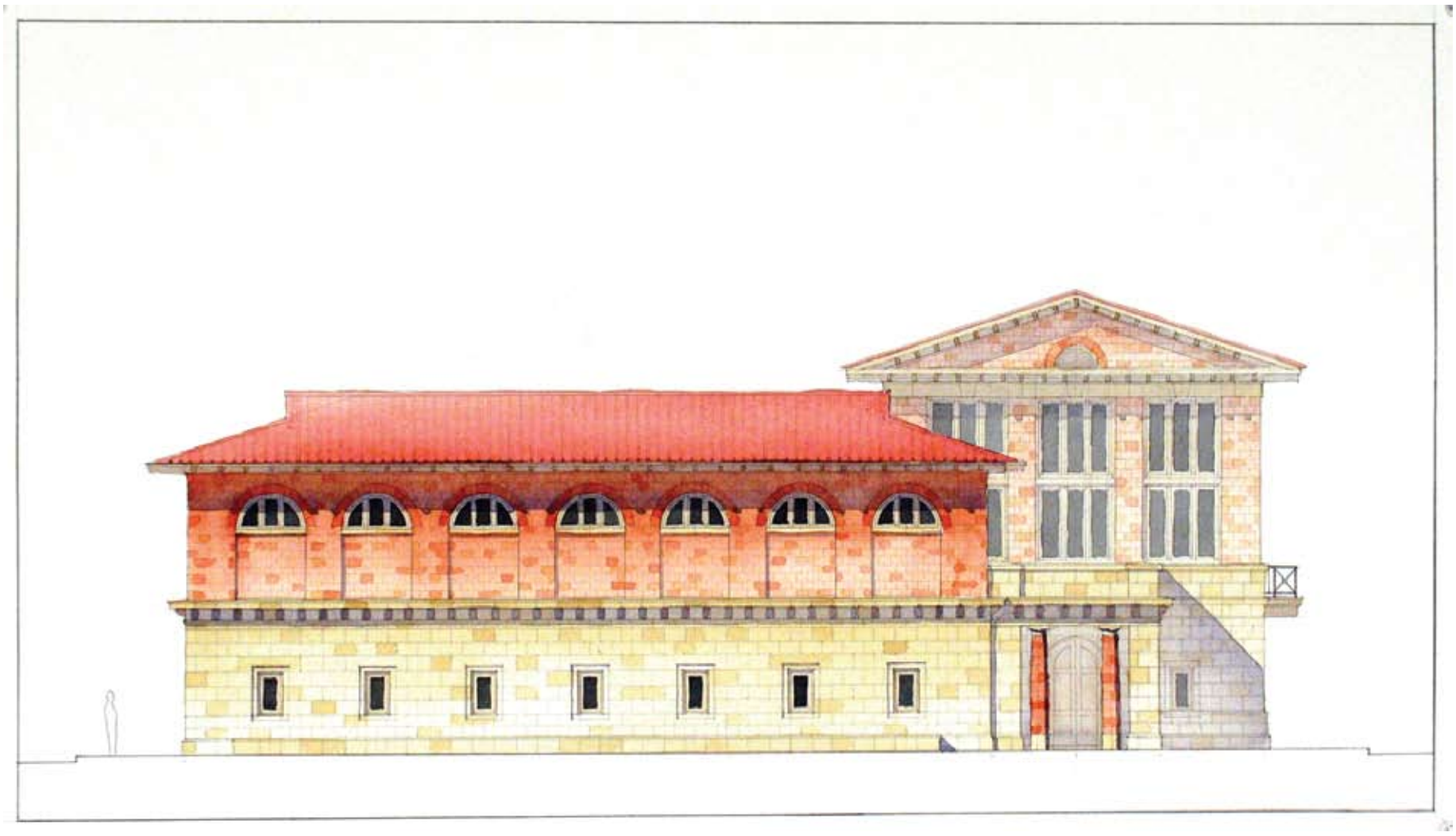
[1] Alexander, Christopher. "A City Is Not A Tree." *Architectural Forum*, Vol. 122, No. 1, April 1965.

[2] Satinover, Jeffrey. *The Quantum Brain: The Search for Freedom and the Next Generation of Man*. John Wiley and Sons, 2001.

[3] Bohl, Charles and Elizabeth Plater-Zyberk. "Building Community Across the Urban-Rural Transect." *Places: Design for the Public Realm*, Vol. 18, No. 1, Spring 2006.

[4] Duany, Andres et al. *SmartCode: Version 9.0*. The Town Paper (publisher), 2007.

[5] SmartCode Modules are additions and/or appendixes resulting from the particular calibration of elements within the SmartCode. Thanks to Maria Bendfeldt, this presentation and its related drawings should be viewed as our proposal for the calibration and inclusion of a sustainable urbanism module within Version 10 of the SmartCode.



Sustainable public realm building.

Image credit: Ricardo Arosemena

Why We Teach Classical and Traditional Architecture and Urbanism

By Michael Lykoudis

With today's headlines and news stories focused on issues of global warming and peak oil production, how architects and urbanists will respond to the challenge might make all the difference as civilization unfolds. The classical curriculum at Notre Dame is based on the idea that traditional architecture and urbanism have been, and still are, innately and inherently environmentally friendly compared to more recent practices that feature sprawl and shoddy buildings with short life spans. Traditional urbanism relies on polycentric cities and towns with pedestrian accessibility, mixed-use neighborhoods and mass transit. Traditional architecture ensures the longevity of the built environment necessary for projecting a community's aspirations into the future. Classical and traditional architecture and urbanism have a significantly smaller carbon footprint than the current models of land use and construction which are based on maintaining high levels of fossil fuel consumption.

On a cultural level, we could think of classicism as the projection of society's highest aspirations into the future, thus ensuring the continuation of the best and perhaps the most sustainable aspects of a culture. Tradition is not duplication but rather a process that is always innovating upon itself. It is the inventive quality of tradition that allows each generation and region to shape the future in its own manner, and it is tradition's projection of the past forward that provides the sense of stewardship that is required for sustainability.

The Congress for New Urbanism (CNU) has been highly effective in bringing traditional urbanism into the mainstream because it made the case for the principles of the traditional city as real and pragmatic solutions to environmental and socio-economic problems. At Notre Dame, architecture and construction are subjected to the same scrutiny. The curriculum is structured to examine the built and natural environments as an interrelated, interconnected and inseparable spectrum of principles. This spectrum, which consists of urbanism, architecture and construction, provides a clear outline for establishing environmentally sustainable criteria at each level:

Urbanism is about how we live together with a shared purpose. In traditional urbanism; streets, squares and blocks make up the infrastructure of the city that makes possible our lives in the public realm. It is at the urban scale that much of the conservation or waste of society's resources is made.

Architecture provides shelter and mediates between our private and public natures and between how we live together and how we build. Traditional building typologies also resolve technical problems that arise at the architectonic scale. Traditional buildings are designed for a purpose that often outlives the specific function a building was originally built to serve. This attribute of traditional buildings facilitates their longevity.

Construction is about how we build. Traditional construction materials can reduce waste and embodied energy with methods of construction that reflect local availability of materials and craft. Walls, openings and roofs make up the focus of this part of the spectrum, and classicism is the idealization and representation of these elements elevating the craft of building into a codified artistic form.

Without attention to these three scales, we will not be able to optimize our efforts towards sustainability. Combined, the building industry, and the built environment and its dependence on mechanical transportation, consume about 70 percent of our energy resources. By changing how we live together and how we build, we could make a radical difference in the accommodation of the crises that lie ahead. While we recognize that other aspects of green and modern architecture are a necessary part of the solutions to these problems, we also emphasize to our students that they could think of traditional architecture and urbanism as the foundation of sustainability. The principles guiding the culture of our studios and classes are designed to reflect this spectrum of sustainability, as follows.

URBANISM

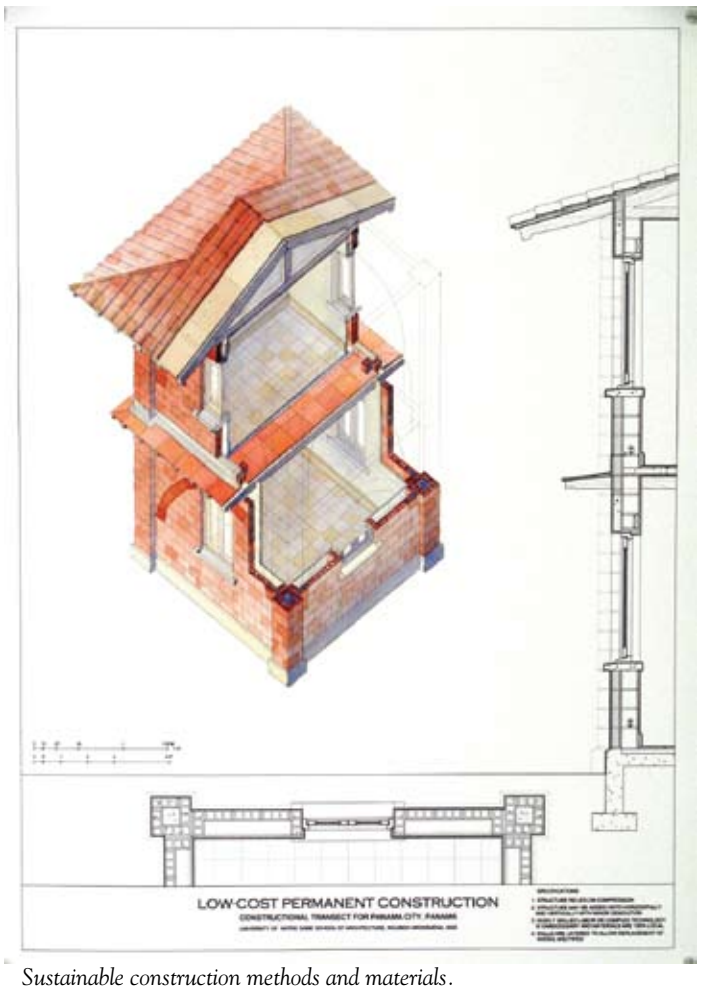
Traditional urbanism is the foundation to being "green." Traditional towns and cities emit a fraction of the greenhouse gases and consume a small part of the energy than that of modern sprawling suburbs. Traditional urbanism is based on a pedestrian scale. It is organized in such a manner so that within a 10-minute walk one can find

all of life's necessities. Its basis is in mixed-use neighborhoods. In traditional towns and cities, all citizens, including the young and old, do not rely on automobiles but can walk from their homes to commercial and civic centers, thus ensuring that all are included in the life of the city. These neighborhoods reinforce the relationship between public and private life. The interconnected networks of streets allow access to all the parts of the city, without labyrinthine or physical barriers common to suburban sprawl that require automobiles and other transportation using large amounts of fossil fuels.

The densities of traditional communities allow commerce and public life to thrive on neighborhood street corners and squares with economies of scale and without reliance on energy-driven transit. The density necessary for a traditional city requires the positioning of buildings to be aligned along streets and squares such that they define the public corridors and spaces of the public and private realms. The resulting urbanism enables people to watch over their children and their neighbors as well as to participate in the affairs of the community. The most sustainable communities are those we care about. We care about those communities where we become, and are a part of, the daily life.

The traditional city grows by multiplicity. New neighborhoods grow adjacent to older ones with their residential areas around commercial and civic centers. Through mass transit these neighborhoods are integrated into larger villages, which become towns and cities, which are transformed into major metropolitan areas based on sustainable urban principles having smaller carbon footprints than today's megacities. This growth model provides for more compact, dense cities and encourages the preservation of farmlands, forests and the countryside.

Because of its dependence on large amounts of energy to support its structure, suburban sprawl wastes energy and contributes significantly to global warming as consumers drive their fossil-fueled cars for miles to buy the smallest item. By contrast, the traditional city, with its dependence on pedestrian proximities and emphasis on mixed-use neighborhoods, conserves energy and emits only a small percentage of the greenhouse gases of the modern suburb. In an age where climate change is an accepted fact and the passing of peak oil production has many concerned about the future, traditional urbanism is a basic common-sense strategy that, overall, costs less to build than its suburban counterparts and requires not much more than good planning.



Sustainable construction methods and materials.

Image credit: Ricardo Arosemena

ARCHITECTURE

Principles of traditional architecture are inherently green and complement traditional urbanism's ability to be sustainable. Traditional buildings are built with durable methods and materials that do not rely on petroleum and other high embodied-energy industrialized products. Traditional buildings typically rely less on mechanical means of air-conditioning and heating than their modernist counterparts.

The massing and organization of traditional buildings is a prerequisite for a durable building. Roofs protect a building from its primary enemies, water and sun. Traditional roof systems require floor plans that have widths with simple geometries and clear hierarchies such that the slopes of the roofs can be reconciled to allow water to drain off effectively. The use of interior courtyards can reduce the effective width of a building so that the floor plans and roof spans are reconcilable and the water can drain outside rather than through interior drains. This approach to roofing not only disciplines the floor plans and massing of buildings, but adds significantly to their life spans.

In contrast to the amorphous ground-scrapers of suburbia, the narrower floor plates and interior courtyards of traditional buildings facilitate effective roof designs that allow light to penetrate the usable areas of the building so less electricity needs to be used for lighting. The use of operable exterior windows and transoms over interior doors permits the natural flow-through ventilation in the building that requires less reliance on mechanical heating and air-conditioning systems, which saves energy. Traditional buildings, with party walls that abut one another, save energy used for heating and cooling as they limit their outside wall perimeter.

The massing and organization of a building determines much of its ability to be adapted to new uses long after its original functions have become obsolete. Designing for the long-range purpose of a building rather than its specific function allows for future recycling of that building through renovation. Embodied and life-cycle energy are conserved as fewer resources are used to rehabilitate a building as opposed to demolition and replacement construction.

CONSTRUCTION

Communities flourish when there is optimism for a bright future. The durability of a city or a neighborhood's buildings make that promise to its citizens. It is one generation's gift to the next. Traditional buildings do not have to be replaced often, and they conserve embodied energy and resources necessary in a sustainable world.

Traditional architecture uses the most resilient materials and methods in the most vulnerable places of a building such as the exterior walls, openings, and roofs, and the weakest materials in areas where they are protected from the elements. In wet climates pitched roofs keep water and snow off. Trabeated and arcuated construction has proven to withstand the test of time for much more than the 30-to-40-year life span of most contemporary buildings.

Masonry construction is the most enduring method of building we know. Potentially it can have the lowest level of embodied energy when its use is extended over long periods of time. Locally available stone or locally made bricks have low embodied energy with respect to being transported, and in the case of bricks that need to be fired, the embodied energy in the brick can last for long periods of time. When joined properly with lime-based mortars, masonry can be separated and be re-used again and again.

Masonry walls have other environmentally friendly properties. They absorb heat in the summer days and radiate it back out at night. The deep-set cornices, windows and doors provide shade and minimize the heat gain in the summer, when the sun is at its highest, and allow the sun in the winter to heat the interior of the buildings.

Wood may be a less permanent material for construction, but we know that woodlands have lasted in place for hundreds of years. Today we avoid first-growth timber, but if we develop and use sustainable harvested, properly raised wood, we also contribute to the absorption of the world's carbon footprint created elsewhere during the lifetime of these trees. Wood's inherent environmental and economic potential and natural insulative properties make it a viable building material in a sustainable built environment. Some of the same elements of classicism that are found in masonry such as cornices also work in wood construction.

SUSTAINABILITY IN THE NOTRE DAME CURRICULUM

The principles outlined in this spectrum are implicit in the school's studios and lecture courses and seminars. Each year stresses a specific theme. In the first year of study, the liberal arts program common to all Notre Dame students examines the continuities found in knowledge and between disciplines. This emphasis on the unity of knowledge becomes the basis on which principles of construction are related to architectural form in the second year, which is focused on how we build. The third year, which the students spend entirely in Rome, explores traditional urbanism and how traditional architecture facilitates an environmentally sustainable and civil way of life. By the fourth year, sustainability is tied to issues of regionalism and cross-cultural values that are examined through the typological understanding of the city and its architecture developed during the previous three years. By the fifth year, the students have forged individual viewpoints about architecture and engage a diversity of issues that culminate in their spring thesis studio. Invariably sustainability and the good city become synonymous in their minds

The fossil fuel era has brought about the most egregious misallocation of resources in human history. Through suburban sprawl and consumerism we have squandered so much, and so little time remains to correct what we have done. The models of architecture and land development taught in architecture and planning schools for the last half-century have been based on the premise of unlimited energy sources and infinite possibilities. As we are now faced with limited options and difficult choices, the cities and buildings of yesterday that faced similar constraints have something to teach us today.

The knowledge of the traditional city and its architecture applied to modern times can facilitate significant conservation of energy and emit into the air a fraction of the greenhouse gases of our modern sprawling suburbs. Traditional urbanism and architecture are and will continue to be the basis for the most effective circulation and transit systems, passive solar heating/cooling and energy saving practices that we have. By studying the lessons they offer and incorporating them into our culture along with all that we have learned about sustainability and green building in modern times, we could have the best of both worlds.

As teachers in the architectural academy it is our role to prepare our students for the challenges and opportunities they will face in their lives. We are not only preparing future architects to enter the profession, but empowering citizens of the world to value their opportunities to contribute to the public realm and give back more than they have received. Our society is better today than those of generations past. The way we build and live together should be a reflection of that. Our cities should be reflections of our highest hopes and aspirations and a gift to the generations that follow us. It is this sense of stewardship we hope we impart to our students.

A Snapshot on the Status of Architectural and Urban Design Education in 2007

By Ellen Dunham-Jones

Detail plan by Cassie Branum from Professor David Green's Fall 2007 urban design studio, looking at the corridor impact of a streetcar system along and extending Peachtree Street in Atlanta.

There is no doubt that curricula in architecture and urban design programs are greener today than they have ever been. This is certainly the case at Georgia Tech, but is also true at most schools across the country, as I will try to show in this snapshot of trends and challenges. I will highlight the many trends and green initiatives I see in abundance within academia today, but also point out the caveats and challenges ahead to further advance green urbanism.

The biggest driver in the schools right now is the fact that student interest in green architecture and in urban design is so high. Using Andrés Duany's terms, this generation is interested in "green" both from an ethicist *and* a trendsetter perspective. It would be tempting to suggest that the ethicist students are that much more likely to be drawn to green at the larger scale and focus on urban design, while the trendsetters are attracted to the aesthetics and lifestyle questions posed at the architectural scale. However, I have not seen that split at Georgia Tech. There were plenty of ethicists amongst the architecture students that devoted enormous energy to our entry into the U.S. Department of Energy's Solar Decathlon competition. They loved having the opportunity to not only design, but actually build the house and work with students in engineering, biology, management and construction. And the cool factor associated with building an entirely solar-powered house didn't hurt.

Students' enthusiasm for urban design is also growing. The urban design concentration of our city and regional planning program has been attracting the largest cohort of students in recent years — a trend that appears to be widespread. The number of dual-degree architecture/city planning students has doubled in the last few years.

However, despite what would appear to be complementary interests, the urban design students/faculty and the green architecture students/faculty remain rather distinct and separate camps. Sadly, the ideological associations of neotraditional design with conservative attitudes versus high tech design's more progressive positioning translates in school into camps that more or less ignore each other. I'm delighted to say that we have some good dialogue between the two at Georgia Tech, but I fear this is the exception more than the rule.

The faculty are responding to this student interest and reschooling themselves and adapting the curricula. However, I have not found sustainable urbanism to be on the radar of many architecture faculty and researchers, even when they are passionate about green buildings from a predominantly performance-based perspective. There have been numerous academic architectural conferences now on green design — but I have seen little or no discussion of the implications it has on urbanism.

A second factor contributing to the greening of the curricula is the waning interest in architectural theory and growing interest in the reality of progressive architectural practice. The critical distance advocated by high theory for much of the past few decades, and relative disdain for practice and everyday life, is largely over. The paramount importance of representation has been superseded by an interest in performance — be it urban, sustainable, material or digital. Students and faculty are very interested in making things/places again, and engaging with communities and practice. All of our urban design studios work on real projects, meet with the stakeholders, and present to the policy makers, much as our digital manufacturing studios experiment with form and structure by building full-scale installations.

But theory's legacy of criticality remains strong. With good reason, faculty remain highly suspicious of metanarratives, overarching teleologies that purport to explain "the whole story" and tell us all "the answer." Both sustainability and new urbanism can raise academic hackles in this regard.. As a rather extreme example, in the November 2007 issue of *Metropolis*, post-structuralist theorist and critic Mark Wigley (and now the dean) had this to say when asked about Columbia University's pursuit of green design:

> "The trouble with virtue is; virtue means you already know the answer. … For a school which is dedicated to finding the next question, the last thing we need is virtue. By not being virtuous, but instead being open to the most important innovators in our field, the school then takes up its responsibility. … We must never assume we know the answer, never assume that we know what's correct."

The rise of interdisciplinarity and collaboration within schools is the third promising trend. At Georgia Tech, interdisciplinary activity is the third item on the official format for faculty curricula vitae. That is a high measure of the importance the university gives to innovation coming from collaboration with other fields. Faculty

members know that leaving that section blank does not reflect well on them. Fortunately, they have an increasing number of opportunities to fill it.

All of the newest research centers at Georgia Tech are interdisciplinary:

- Center for Biologically Inspired Design
- Center for Quality Growth and Regional Development
- Institute for Sustainable Systems
- Institute for Sustainable Technology

In addition, the College of Architecture's new one-year post-professional degrees are highly interdisciplinary:

- MS in Building Ecology and Emerging Technologies
- MS in Classical Design
- MS in Urban Design
- MS in Computation, Composition, and Construction

More and more of the new faculty hires are joint hires, including a joint hire in City and Regional Planning and Architecture to teach urban design.

Efforts at individual schools are also being reinforced by larger, proactive academic initiatives for systemically greening teaching and research. The Associated Collegiate Schools of Architecture (ACSA) is promoting a proposal to create a new National Academy for the Built Environment. Joining the other national academies, its purpose would be to increase sponsored research on sustainability.

ACSA has also made proposals to increase the urban and green requirements within the NAAB accreditation criteria. Also, the ACSA and the American Institute of Architects (AIA) have held several joint conferences and a sustainability summit, proposing the integration of new project delivery models which are far more collaborative (such as BIM) with issues of sustainable design.

Governments and professional associations have also created new opportunities for interdisciplinary learning and real-life experience. New, major student design competitions, such as the Solar Decathlon and the ULI Hines competition, are engaging students in issues of green design at various scales.

Despite all these advances, numerous challenges remain. One that I find particularly disheartening, based on my experience teaching at both MIT and Georgia Tech, is the lack of interest in educating engineers at our top institutions to care about buildings. Perpetuating a vicious cycle, engineering faculty tend to see building engineering as too simple and conventional to merit much attention. Nor are there adequate sponsored research opportunities in issues of green design to attract an engineering faculty member whose tenure will be significantly based on the research resources they attract. One of the great aspects of the Solar Decathlon was that it provided us with the opportunity to work with many of Georgia Tech's top engineers — however, we had to buy their time, and it wasn't cheap! They enjoyed it and were impressed with the end results, despite admitting their initial disinterest. I am very hopeful that we will be able to build on these new relationships — but it will require substantial research funding.

Increased funding for sponsored research in academia on topics of interest to new urbanists is a major need in general. Beyond increasing collaboration with engineers on issues of green design, the schools could and should be playing a much bigger role advancing sustainability through more post occupancy evaluations of CNU and LEED projects, regional particularization of standards, visioning, and other initiatives. We need to further elevate the scholarship of urban design and produce more evidence-based research demonstrating causal relationships, not just associational comparisons, on the influence of physical design on human health, transportation behavior, social capital and more.

Another important challenge is educating architects and architectural educators to expand their interest in high-performance buildings to include greater understanding of sustainable urbanism. And we need to do it in a way that does not presume that we have all of the answers and are presenting people with a limited cookbook of finite recipes. Those of us who have participated in CNU for years know that one of the reasons we keep coming back is because we continue to learn through the ever-advancing ideas. However, new urbanism is not perceived that way within academia. It is perceived as relatively static, formulaic prescriptions that do not allow for the kind of engagement and innovation that excites those interested in high-performance buildings. We need to make it clear that implementing and teaching the principles we know now does not shut the door to further incubation of new ideas and knowledge. And, since this is certainly not a one-way street, we also need to do our part in reaching out, welcoming, and incorporating the principles of high-performance buildings into new urbanism.

What can CNU do to help the schools further advance green urbanism? First, embrace green explicitly and communicate that message effectively. Second, greatly expand the research archive on the CNU Web site. And third, participate in elevating the standards of urban design scholarship — by continuing the call for academic papers at future congresses, by expanding scholarships for both students *and* faculty to attend CNU events, and by supporting more research on the performance of new urbanist communities and buildings through grant-writing opportunities and partnerships. The development of a CNU research institute and its potential usefulness should be studied.

What can CNU members do to assist the schools? CNU members can sponsor classes at local architecture schools to design, if not also build, structures in new urbanist communities. Georgia Tech has held sponsored classes working closely with the developers of Glenwood Park, Serenbe and McDaniel Glenn. Students have been extremely excited to develop designs for "real" individual buildings and have learned a good deal about new urbanism and green design in the process. CNU members can also donate funds to schools to support public lectures, visiting scholars or endowed professorships. Georgia Tech has been lucky to receive the support of Harrison Design Associates to bring a visiting scholar each year to the school to broaden our largely modernist offerings with classes in historic preservation and traditional design.

Finally, CNU members can and should teach! New urbanists have an enormous amount of practical expertise that can be a great asset to the schools. Teaching benefits practitioners and students — and strengthens both the CNU and the universities, and the relationship between them.

Georgia Tech's entry into the DOE's Solar Decathlon competition was led by Professors Choudhary, Jarrett, and Trubiano and involved over eighty students from five colleges.

Green on Green

By Elizabeth Plater-Zyberk

Preparing my remarks for this occasion reminded me how fragmented and contradictory can be one's knowledge of the "green" arena. Hopefully, Doug Farr's book, *Sustainable Urbanism: Urban Design with Nature*, a heroic attempt to organize information for his peers, will ameliorate this condition!

Many of us have been promoting conservation through design for years. The goal of sustainability has been integrated in any number of my own projects: from Seaside's front porches, intended as sea breeze catchers for the houses, to writing design guidelines for the local housing authority to require cross-ventilation for affordable apartments, to serving on a county committee on global warming. So the intensity and speed of the recent awakening across American society to climate change and its environmental consequences, after a three-decade desultory courtship with sustainability, is noteworthy. For the first time in human history, it is possible to combine growing if incomplete knowledge of the natural environment with the ability to measure change over time and, based on analyses of past trends, to make projections about the future.

The growing public reaction should encourage new urbanists to lead the charge with a clear articulation of the problems and their solutions. After all, isn't that how we have managed our mission to change urban form thus far? But articulation of the problems and proposal of solutions for the specifics of conservation and global warming can be frustratingly elusive. It is no longer a matter of simple data like trips or vehicle miles per household per day, measurable and having known effects. The science of global warming is not entirely clear: Depending on who is speaking, the major part of carbon emissions can emanate from buildings, or transportation, or cows!

But even if the problems are still unclear, we can already identify two basic types of actions to consider in seeking solutions. The first is *mitigation*, the actions that reduce emissions and conserve resources; the second is *adaptation*, the actions to be taken as a result of warming, sea level rise, and depleting resources.

Mitigation actions can be considered universally. Worldwide, the imperative for reducing stress on natural resources and reducing emissions demands a unilateral strategy of conservation.

Adaptation on the other hand can only be regional. For example, the impacts of growing water needs vary according to location. In Florida, we are concerned about salt water intrusion through a porous substrata into the aquifer water supply as a result of sea level rise. This is not the same as in Omaha, where on a recent visit, I was informed that Nebraska's underground aquifer may be threatened by isolation from sources for replenishment. These are two contemporary problems, sharing the universal imperative to mitigate impact of water use through conservation, yet requiring vastly different responses.

Clearly, adaptation requires deeply informed and highly specific design, policy and management strategies. But the current narrow and often contradictory vision for sustainability seems to offer little support for a standard for professional training in the academic world. What and how should we be teaching when every proposal raises yet another question?

National forays into curriculum design, including a recent ACSA (Association of Collegiate Schools of Architecture) statement on sustainability, can only agree on the most general goal statements. We are reminded that teaching is an art, not a formula. Andrés and I sound like a broken record talking about the university: he, the elder professional complaining of uninformed grads; I, the elder dean exhorting a faculty of practitioners to be more explicit in addressing evolving concepts and technology of green building.

THE PRESENT

Students and faculty are certainly aware of the new imperative to integrate ever more the concerns of sustainability in learning and teaching. I will describe some specific examples engaged at the University of Miami School of Architecture, and then propose five instructions for developing a pedagogical agenda.

To begin, it should be pointed out that the leading edge for developing proposals for sustainability, more so than universities, are the various not-for-profits and private think tanks devoted to this topic. In terms of the built environment, the Congress for the New Urbanism, Smart Growth America and the United States Green Building Council are much more powerful as advocates than any university. This is, of course, due to their national purview, but also because in academia, advocacy is frowned upon; criticism is a more acceptable posture than hypothesizing solutions.

Thus, at the University of Miami, architecture students and faculty have engaged a number of initiatives in a somewhat diffused approach:

- The Center for Environmental Science and Policy was established five years ago to address deriving environmental from scientific data. Under Professor Joanna Lombard's leadership, the School of Architecture was the first department to provide a course for the Center, taught jointly with faculty from the Rosensteil School of Marine and Atmospheric Science.

- The Center for Urban and Community Design, the school's outreach component, sponsored its first symposium on green building in January 2006. "Under the Sun: Sustainable Innovations & Traditions" presented traditional and contemporary case studies, including climate-sensitive, early modern Miami work, to an audience of students, faculty, professionals and activists from the region. Intended to be a biannual event, the symposium is augmented by an ongoing lecture series co-sponsored by the School and the local chapter of the USGBC.

- The Emerging Green Builders (EGB) and Students for the New Urbanism are student associations begun recently by architecture students. This year's EGB, under the leadership of Mark Schreiber (BArch'09) is participating in the renovation of a Miami house for Korean War veterans, incorporating the students' research on green building applications.

- Architecture faculty provide key partnering in two other university initiatives: the College of Engineering application to the National Science Foundation for an Engineering Research Center grant to study sustainable residential construction in southern coastal states, and the newly established Center for Public Health, emerging from research being carried on by the School's Professor Joanna Lombard with Dr. Jose Szapocznik of the School of Medicine.

- One of the most effective academic endeavors I have recently participated in, in a supporting role with my students, is the MyRegion.org sponsored study of statewide growth proposing a transit-oriented compact pattern. Led by University of Pennsylvania Professor Jonathan Barnett, working with his class of planning students, "An Alternative Future: Florida in the 21st Century"[1] presents a clear vision that has great promise for positive influence statewide.

By now, most professional schools have some involvement with issues of sustainability, even if they refuse to acknowledge the existence or value of the new urbanism. Participation in programs such as the Solar Decathlon, a building design and construction competition, entered by schools such as Georgia Tech and Florida International University, exemplifies the great effort and expense that faculties engage to give their students state of the art experience in green building.

THE FUTURE

Beyond these still ad hoc and fragmented initiatives, what else should schools be doing? How do we best address problems and solutions of sustainability systematically through the pedagogy of a professional architecture program? The five points that follow have developed from a framework for architectural education from a global perspective I proposed in a conference in Viseu, Portugal in 2004. They are here revisited under the specific lens of sustainability; so you might say they are recycled!

I. Teach and learn from experience. Study history.

Architecture has an illustrious history which should not be considered out of date. Much can be learned from building and urban design predating the discovery of oil and the invention of electricity. We still inhabit historic buildings, and they continue to inform contemporary building in image and method; yet many schools shortchange the teaching of architectural history. Traditional vernacular methods of design and construction are a valid approach to independence of nonrenewable resources, an approach currently neglected in professional schools. Those of us who believe this, however, must promote the knowledge base history provides by making design performance explicit vis-à-vis current concerns.

Design should use history as source material and should be conceptualized as its continuation. The architect's university years should establish the profession's history as the practitioner's power base. This opens the door to point two.

II. Build and share professional knowledge — accumulate and record experience systematically — do not fear data!

The 21st century is the age of science. While our infatuation with its predecessor, technology, continues, it is clear that the new frontier of experimentation and invention relates to advances in the sciences. The lineage of scientific knowledge is made of incremental steps of evolution, building on predecessors' production. Architects, in contrast, strive to avoid influence in order to show originality.

The success of the new urbanism owes much to its embodiment of principles founded in knowledge of successful precedent, empirics of dimensions and replicable techniques of design.

Professional exploration should follow the learning of what is already known — evidence-based design. This of course raises the specter of that long-missing part of architectural education — the gathering and analysis of precedent and data. Taking knowledge out of the realm of the personal and making it widely available for comparative measure, for peer review, and for everyone's use would increase the profession's credibility markedly.

Here it should be noted: There has been little funding to support the gathering of data on design. Thus, in the United States, architectural research has focused on theory, an endeavor which does not require large amounts of funding or collaboration. And research methods are sadly lacking among designers. Remember post-occupancy surveys?

The situation is quite the opposite in the sciences. Indeed, funding drives scientific research. At the University of Miami, with colleagues in the School of Medicine, we have circumvented architecture's conventional research marginalization in a partnership exploring the effects of the design of the built environment on juvenile behavior and elderly well-being. The University of Miami initiative replicates the research approach earlier taken by scientists who linked smoking and health risks — besides seeking new knowledge, the goal is to have a potential impact on public policy related to urban and building design, by bringing irrefutable data to the political table.

Here we might hope for a renewed interest on the part of the U.S. Department of Energy; research funding at even a fraction of that of the National Institute of Health and the National Science Foundation would quickly rectify the lack of data.

This brings me to point three.

III. Engage the larger context of the profession — engage all the urban disciplines.

Historically, the profession engaged the entire context for building: not only the design of the building itself, but also its relation to landscape, the urban context, as well as to social, political, environmental and economic issues.

The ultimate context and raison d'être for architecture is the city. City-making relies on three arenas of activity: design, policy and management. Management refers to maintaining a city as clean, safe and well-functioning. Design provides the vision for its physical character, and policy the legal tools to implement. A full panoply of disciplines is needed to empower design. Building form is influenced by attorneys, regulators, planners, engineers, landscape architects, developers, marketing analysts, the insurance industry, and public administrators — in addition to the architect. In fact, some in that long list think our role is primarily cosmetic. A strategic engagement with the other disciplines, landscape architecture, planning, engineering, the sciences, in teaching and research will translate effectively in the everyday world of practice and ultimately empower the designer beyond the cosmetic. The new urbanism is proof of this.

While it is often difficult for students to engage other disciplines while their grasp of their own is still tenuous, faculty interaction across disciplines is stimulating, and bringing several fields of knowledge to bear on a complex issue can be empowering.

This last statement about empowering design introduces point four.

IV. Learn to wield the method of production.

This refers to understanding who builds, why and how.

One of the most powerful inventions of our time, the automobile, has a history of design inextricably linked with its method of production. So it is with the built environment, where production refers to the repetitive building of contemporary commercial development rather than the construction of one building at a time. The understanding of who builds the metropolis and how is largely absent from the architectural curriculum. As in many other aspects of commercial life, the consumer drives consumption less than the process that brings the goods to market. Means of production and scale of operation often determine distribution more than need. How are we to impart these nuances when they are often not evident to practicing professionals?

Andrés Duany refers to the contemporary power of large numbers in relation to architecture, reminding us that Gideon first alerted us to "the challenge of large numbers" as a hallmark of modernity. He points to the influence of designers who deal with customers as greater than the effect of those who restrict themselves to clients and patrons. Italian architect Aldo Rossi said: "In America, quantity is quality." Academia should ask how the excellence that results from the research-informed design process, and attention to detail and supervision of construction of individually commissioned buildings, can be extended to the larger development industry.

Innovation in individual research or projects has to translate to iterative production. The production builders can point to many examples of recent inventions that are clearly unsustainable: Elastomeric paints and particle board are building components that, aging badly or exuding toxins, have resulted in lawsuits and large-scale replacement costs.

So how do we address production building? Are there other examples of successful evolution from tailored design to mass market sales? The work of Michael Graves is an example. His design office continues a couture design practice simultaneously with an inexpensive products line for the mass retailer, Target. Those who have come to know the Graves lamps, ice cream scoop, and chess sets, among other products, admire the logic, cleverness and beauty that these simple objects share with his complex and unique buildings. Graves's experience in the arena of building production is the foundation for his success in product design, first courageously engaged in his work for Disney.

The father of mass production was Henry Ford. He understood the benefits of repeated assembly in a controlled environment. The automobile industry continues developing the process to increase efficiency while responding to ever-higher expectations. Ford and Graves teach us the importance of the designer's engagement and understanding of the production method.

This brings us to point five.

V. Remember that we are form-givers!

In the last several decades, architectural education has sought inspiration in a variety of extra-disciplinary interests. In my time this list has included sociology, ecology, linguistics, various strains of philosophy, and computing, among others. While we have been enriched by this trajectory, we have also learned which aspects of these diversions are valuable and sustainable components of the architect's territory, and which are not. (One Miami faculty is certain green building is yet another misserving diversionary fad!) The fundamentals of architecture — firmitas (firmness), utilitas (commodity), and venustas (delight) — are yet to be set aside by any of their complements. Among all our collaborators, architects and landscape architects are the only ones trained to produce intentional form.

We have three tools of communication: words, numbers and images. The public process shows time and again the power of the image. Design can be powerful and should drive policy. This places the architect in the position of initiator, not merely reactor. The 20th century phenomenon of zoning attorneys and engineers writing the rules for building design may be a factor in architects' despairing retreat into ideology and theory. The same may be said for industrial processes overtaking craftsmanship. This loss of power parallels the neglect of drawing and design skills in the academy. Some maintain that drawing is a technical skill acquired through training and thus should not be a component of education. But the power of architecture is vested in visual communication; it deserves academic attention as transmittable knowledge beyond personal exploration.

History teaches us, for instance, that one of the most powerful and long-lasting design acts is that of drawing the lines between public and private prosperity — the layout of streets and squares. The Via Appia still exists north of Rome. Buildings may come and go but streets tend to stay. And the buildings that stay are those beloved for their contribution to the quality of our environment. This year we celebrate Andrea Palladio's 500th birthday. His buildings in the Veneto continue to be maintained and to delight.

FINIS

In summary, the proposal for academia focuses on five general strategies:

1. Study and repeat history.
2. Organize and share knowledge.
3. Engage all related disciplines.
4. Incorporate methods of production.
5. Remember our unique power as form-givers.

As climate change becomes an integral part of our teaching, we must satisfy the contemporary need for data by making explicit the strategies embodied in traditional architecture and urbanism. Let us use our teaching and research to contribute to the knowledge base of timeless strategies.

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[1] To order copies, contact the Metropolitan Center for Regional Studies at the University of Central Florida at: 407.882.1185.

The allotments at Poundbury are extremely popular and allow many local residents the opportunity to grow their own vegetables. Because of the compact urban layout of Poundbury, the allotments are within a short walk of most homes. The design was laid out by Leon Krier.

Photo: Ben Pentreath, Working Group Design

Green Shouldn't Mean Science Fiction — A View from Great Britain

By Ben Pentreath

For too long, the imperative for a new, sustainable way of building lingered at the sidelines of the architectural debate in the United Kingdom. In a profession obsessed by hi-tech, by Zaha, and the next new thing, building in an environmentally conscious way was at best marginalized, at worst used an excuse for modernist stylistic contortions, and most often entirely ignored.

Within the last three years, the balance has changed. Increasing public awareness of climate change on the one hand, and energy supply issues on the other, has moved sharply up the British political agenda in the last 18 months and society as a whole is expected to take notice. Some of the steps are small — at the end of January 2008, for instance, energy-inefficient tungsten light bulbs will be removed for sale on a rolling basis. Some are much larger. Two years ago, in its "Code for Sustainable Homes" legislation, the UK government committed itself to a radical series of targets to achieve zero-carbon housing in Britain — all new homes to be zero carbon by 2016. Given that at the time of writing about 0.01 percent of new houses in the United Kingdom could be described as zero-carbon, the challenge seems beyond daunting, but the direction of future travel could not be clearer. The Code sets increasingly stringent standards — from Code 1 (which is little higher than current building regulations approval), via several timed stages, to Code 6 (zero carbon) in 2016.

It is estimated that by 2050 this rule will achieve zero-carbon status for one-third to half of the housing stock in Britain. As a key part of achieving zero-carbon status is on-site generation of electricity consumed in the home, it could be argued that the Code for Sustainable Homes is merely a means for the government to quietly admit (without causing widespread panic) that the national electricity supply grid has reached its limits — that there is only so much that ailing coal and nuclear power stations can do — and that it is time to generate locally or watch the lights go out. Whatever the imperative, the fact remains that we are in for big changes, and the housing industry is only just beginning to grapple with this reality.

In the last three years, since founding my London-based company Working Group Design, I have become increasingly involved in these debates. In 2004 the firm won a design competition to build Phase B of Upton, Northamptonshire, which is a government-sponsored sustainable housing development on the edge of the county town of Northampton. Partnering with eco-developer Kim Slowe of Cornhill Estates (based in Poundbury, Dorset), we designed some 200-plus houses and apartments in a mixed use scheme design-coded and masterplanned by The Prince's Foundation for the Built Environment with EDAW. Phase B is part of a wider project that will deliver approximately 1,200 homes within the next five years, all built to increasingly stringent environmental standards. Last year, our site won the Building Research Establishment's prestigious BREEAM award as the most sustainable housing development, scoring the highest BRE "EcoHomes" assessment of any project in the United Kingdom.

In 2005 Slowe and I designed a further scheme of five townhouses and six apartments built to "EcoHomes Excellent" standard at Poundbury. All houses had super-insulated walls and roofs, solar photovoltaic and solar thermal panels, combined heat and power boilers, heat recovery ventilation, low water use appliances, rainwater harvesting, and natural sheep's wool insulation as standard. In the next year we will be working on a project of some 300-plus houses on a beautiful, wooded site in the market town of Towcester in Northamptonshire. These homes will be built to Code

for Sustainable Homes Level 4, incorporating many of the features outlined above.

With the Duchy of Cornwall (the substantial estate owned by HRH the Prince of Wales), Working Group is working on two other projects that will equally be at the cutting edge of sustainable development. Both have been masterplanned by Léon Krier and Colum Mulhern. Working with Robert Adam Architects, Hackett Holland Ltd and Craig Hamilton Architects, we have recently obtained planning approval for the Poundbury South West Quadrant, with approximately 250 houses, flats, shops and offices, which completes Phase 2 of the Dorchester urban extension. Similarly, we are currently working on the first phase of the Newquay development in Cornwall, comprising 360 homes all built to very high environmental standards. The Duchy has committed that all of these new dwellings will be built to Code Level 4, with particular attention given to on-site energy production from renewable resource. At Newquay, as well as the usual measures to save energy and reduce water consumption, the Duchy will also set strict guidelines for use of locally sourced stone, slate and other building materials — including the possibility of reopening long-dormant slate quarries close to the site.

The traditional and contemporary houses sit next door to each other, on a quiet residential street facing open parkland.

Photo: Ben Pentreath, Working Group Design

In these projects and others being brought forward by my many colleagues in the United Kingdom — especially the Prince's Foundation and Paul Murrain — we have continued to work in a highly traditional architectural language, which we believe makes a more timeless, humane and successful contribution to the English countryside than an often alien modernist aesthetic — particularly at the larger scale of the developments in question.

The environmental credentials of traditional architecture and urbanism have been well rehearsed over the years. Quinlan Terry has written in some detail about the intrinsic qualities of traditional materials, longevity and embodied energy that suggest their deep and intuitive environmental qualities. Steven Mouzon has eloquently expounded these themes in his discussion of "The Original Green." Robert Adam Architects has commissioned and produced a detailed study of energy efficiency inherent in traditional design. This comes as no surprise — after all, in searching for a low-carbon architecture for the post peak-oil age, where better to look than the millennia of intelligent building before universal availability of plentiful and cheap energy?

Architecture needs to embrace new technologies, particularly in the fields of renewable energy resource. These technologies will doubtless bring change to the way we build and design. But it is our belief that they must work within the mainstream or not at all. For too long, "green" architecture in the United Kingdom has involved a bizarre conflict between a high-tech aesthetic that looks like a bit part from a sci-fi movie, and low-tech solutions that virtually would have us living as nomadic travelers — not a feasible solution in a world approaching nine billion souls.

In all our work, in Upton, Poundbury, Newquay and other sites, we have consistently and successfully demonstrated that it is perfectly possible to incorporate the most up-to-date technological advances within a calm, traditional exterior. Few compromises have to be made: Daylight ratios are excellent, traditional forms work naturally with local climate, and the long lasting benefits of traditional materials have been discussed previously. The incorporation of renewable energy technologies, water saving and harvesting devices, and super-insulated walls and roofs can be made relatively easily without radically altering the traditional appearance, proportion and materials of the buildings. The only substantial impact on construction methodology may be the result of new standards for building fabric airtightness; the debate between structural insulated lightweight panel systems and solid masonry breathable structures does not yet appear resolved.

The new technologies and additional specifications do carry cost, and this may have implications in a UK housing market that is already severely overpriced with many younger and first-time buyers unable to enter it. The experience of our projects at Upton and Poundbury demonstrates that the "green upcharge" can be met in larger houses for older couples, who have substantial amounts to spend on a home and who are very often concerned about energy efficiency and running cost. Younger families would prefer to spend their premium on extra space rather than long-term efficiency. Time will tell whether the "green consumer" will really welcome the substantial upcharges that renewable energy technologies, in particular, currently carry. However, the message from government is that developments will increasingly simply not obtain planning approval without a full environmental specification. The market will ultimately decide whether the consumer or the landowner bears the cost of going green.

These concerns aside — and they are very real — the message is clear. If we are genuinely to succeed in achieving the "green revolution" on the widest scale, it is inevitable that green building must address the mainstream. And it is here that architecture has a significant role to play. Some people will want to live in space rockets; others will be happy with mud walls and grass roofs. But most will want a normal life, in normal houses, beautifully designed, that make the green life inevitable without wearing it on the sleeve. The lesson of Upton, Poundbury and Newquay is that this is an entirely achievable ambition; and moreover, that simple traditional houses are more effective in the marketplace and can cost substantially less to build than highly contemporary alternatives. Only when the green movement enters the realm of the normal will it have the power to achieve the extraordinary.

Artist's rendering showing the latest phase of Poundbury, some 250 homes in a high density, mixed-use scheme that will be built to code for Sustainable Homes Level 4 with a local energy center to produce electricity, heat and hot water. Masterplanner Léon Krier. Architectural coordination Ben Pentreath, Working Group.

Watercolor by Ed Venn

Lovability

Photo: Stephen A. Mouzon

Original Green

By Steve Mouzon

TODAY MOST PEOPLE ASK, "CAN TRADITIONAL ARCHITECTURE BE GREEN?" This perspective has arisen from what would appear to be a great weakness of modernism: The movement was born at the beginning of the Thermostat Age and is based on a love affair with all things mechanical. Modernist architecture, therefore, usually consumed more energy per square foot of building than any other architecture conceived throughout all of human history. Copious consumption actually lay at the foundations of the movement, because it represented liberation, wrought by the machine, from the natural limitations of the old orders. Staying warm in winter, holding up the roof, and getting to work had become much easier, and the architects intended to celebrate that fact. Le Corbusier famously said "I shall live 30 miles from my office in one direction, under a pine tree; my secretary will live 30 miles away from it too, in the other direction, under another pine tree. We shall both have our own car. We shall use up tires, wear out road surfaces and gears, and consume oil and gasoline."

Today's technogreen architects have arisen from this seemingly bleak background. Technogreens base their work on the principles of Gizmo Green, which is the proposition that sustainability may be achieved using nothing more than better materials and mechanical gizmos. The technogreens often produce buildings that are actually efficient. And because it is so completely against the nature of modernist architecture to be green, whenever they succeed, there is an intriguing story to tell. Trade publications, of course, have happily complied, telling the story of Gizmo Green as if it were the only green. After all, it sells magazines.

But the story is much bigger than Gizmo Green. If we insist on the plain-spoken definitions of words, then "sustainable" must mean "the ability to keep things going for a very long time." This immediately excludes buildings that will be demolished in a generation or two because they simply cannot be loved. *Lovability* too is only part of the story, because it is not possible to discuss sustainable buildings without discussing sustainable places. For example, because no matter how efficient the building is, it is inefficient on a net basis if you have to drive everywhere for the daily necessities of life.

Places can be sustainable if they are *feedable*, *serviceable*, *accessible* and *defensible*. *Feedable* places grow a significant portion of their food within a few miles. Today the ingredients of an average American meal travel over 1,300 miles to get to the table. Currently very few places in the United States are *feedable*, but as the industrialization of China and India continues (resulting in a billion new cars competing for gas over the next several years), the cost of food transportation will become much more significant.

Serviceable places are those that provide the basic services of life within walking distance, so that driving is a choice and not a necessary fact of survival. *Serviceable*

Durability

Photo: Stephen A. Mouzon

places also have places for the people who serve you, like firefighters, police, and teachers. They live either somewhere in the neighborhood or in nearby neighborhoods, so that their daily commute can be a walk or a bike ride if they choose, rather than the 50-mile drive it currently is in many increasingly unaffordable places across the country. This next-generation housing and these next-generation neighborhoods answer the question of "where will your kids be able to afford a home when they get out of college?"

Accessible places are those where you have a choice of how to get around. If you can chose to drive, walk, bike or take the train, then you can do what makes the most sense. If you can only drive, then you have no choice; nor do any of the other people clogging the highway ahead of you.

Defensible places once had to be protected with walls against armed attackers. Today, neighboring towns no longer take up arms against each other, but people still fear for their lives and wellness to varying degrees. This fear has spawned gated "communities," but these destroy all notion of community in the way that they shut themselves off from the rest of the world. Solutions for modern defensibility that preserve the commons of the community are yet to be built well. When they are, they will also be places that are identifiable against the rolling sameness of sprawl that renders much of the fabric of cities, from Denver to Des Moines to Dallas to Durham, indistinguishable.

Within sustainable places, buildings may be sustainable if they are first of all *lovable*, then *durable*, *flexible* and *frugal*. Buildings continue to be demolished for no other reason except that they cannot be loved. Even an architectural landmark as celebrated as the Boston City Hall is in danger of this fate because only an architect could love it. It is not possible for a building to be considered sustainable when its parts reach a landfill in a generation or two.

Our ancestors once built for the ages. Their buildings were durable enough to last for centuries, and because they were *lovable*, they often did. Can we conceive of building to last for a millennium again? Durability is essential to sustainability.

Within a durable shell, however, a building must be extremely *flexible*. We cannot even conceive of how many uses a building might be put to in 30 or 40 generations, which is how long buildings may last if they are *lovable* and *durable*. So the interiors must be able to be recycled again and again for future uses that may not even exist today.

If buildings last for a very long time, then their *frugality* is meaningful. *Frugality* occurs both as a result of the mechanical devices we use and also the passive design techniques that require no machines at all. Gizmo Green, therefore, is a part of *frugality*, but not the whole story. Clearly, it is a small part of true sustainability. The combination of sustainable buildings built in sustainable places constitutes the Original Green. After a place achieves Original Green status, it can then go on to be Deep Green by generating power (especially electricity) on-site to operate the recent inventions such as computers and refrigerators that can be a part of a sustainable future.

Accessibility

Photo: Stephen A. Mouzon

Frugality

Photo: Stephen A. Mouzon

Because the fundamental definition of sustainability is the ability to keep things going for a very long time, it should be clear that living traditions, which are able to span generations, centuries and even millennia, are far superior delivery devices of sustainability than those that have shorter life spans. This is illustrated today, as almost the entire industrialized world is working furiously to figure out how to build and live sustainably before we face greater consequences than we have seen to date. It is evidently a difficult task, because while great effort of the best minds in the world is being expended, we are nowhere near success yet. We have not yet even managed to live with the carbon footprint of our parents, much less with that of our ancestors of the 18th century.

There are two fundamental roadblocks. Timeless living traditions are a shortcut for passing down the wisdom that is implicitly embedded in beauty; their absence means that we must actively relearn each detail of sustainability. This is an enormous effort. And then we must teach that wisdom to millions. Because the effort is so huge, there is not an encouraging likelihood of success before the onset of more onerous damage to our planet.

This Sisyphean task is made all the more impossible by the attitudes that currently populate most of the architecture profession. Advocating the architectural prerequisite of uniqueness makes true sustainability essentially impossible. By insisting that all significant architects must be unique, the profession is disallowing the possibility that clever details devised today will be of use in the future. If one must invent one's own architecture, the details designed by others are of little use. One must begin all over again with the basic principles of sustainability and figure out how to incorporate them into one's own architecture. Simply put, if millions of the best minds around the world haven't yet figured out how to build sustainably given the requirements of modern life, how likely is it that each great architect will figure it out, completely for himself, within the self-defined world of his own work? We must be allowed to share wisdom, and to share it widely.

So the real question should be, "Can anything except traditional architecture and urbanism be green?" The answer, clearly, is "no," because if it is not worthy of enough love to become a living tradition, it cannot be sustained for a very long time.

The Original Green is antithetical to architectural fashion because there is no way to guess what fashions might be like several centuries into the future. Living traditions live because they resonate with regular people, and they replicate naturally, like other living things. These living ideas conserve resources because they do not rebuild just for the sake of novelty. And resources are not all that is conserved. When a tradition lives across several generations, it engages many minds for a long time rather than just one mind for a moment in time, and so it develops a level of sophistication that is impossible with new inventions. This sophistication allows the embedding of subconscious wisdom mentioned earlier.

Supporting a living tradition is an act of fostering life. It is far more efficient to plant an idea that can spread on its own rather than to have to sell that idea again and again. That which can reproduce and live sustainably is green; that which is incapable of doing so is not. This is the standard of life: that process which creates all things green.

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