Advanced Building News

International Initiative for a Sustainable Built Environment

ABN 06, June 2005

Global

Costa Rica

See Residential Street Pattern Design on Page 4, a China report on Page 11, and a major report from Spain on Page 13.

Proposals Received for SB08S

Six proposals were received on June 1 for the right to hold the SB08 global sustainable building conference. The proposals were made in response to an RFP issued last Fall by the main sponsors, CIB and iiSBE, with the support of the Tokyo SB05 organization and DTIE/UNEP. The proposals included the following:

1 Melbourne, Australia, proposed by Sustainable Energy Authority (Victoria), CSIRO and others;

2 Sydney, Australia, proposed by University of NSW, the City of Sydney, the NSW government and others

3 Toronto, Canada , proposed by Canadian Urban Institute and others

4 Berlin, Germany, proposed by Federal Ministry of Transport, Building and Housing, the Mayor of Berlin, University of Karlsruhe and Solidar Ltd.

5 Rome, Italy, proposed by iiSBE Italia, the Italian National Research Council and Environment Park

6 Washington, DC, USA, proposed by RCG Productions LLC and the Sustainable Buildings Industry Council

A meeting will be held by the Selection Committee in Paris on August 10, and a decision will be announced shortly after the meeting. Voting members include representatives of iiSBE, CIB, Tokyo SB05 and DTIE/UNEP. The SB08 event will be held sometime during the last half of 2008.

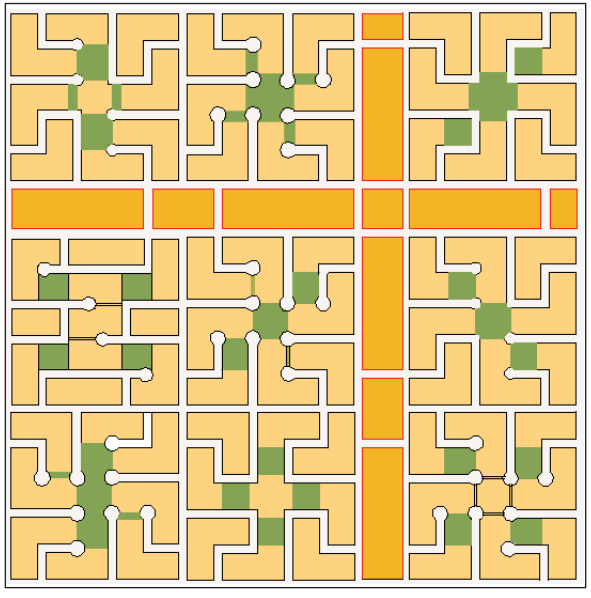
As many readers are aware, a series of seven regional SB conferences have taken place in Sao Paolo, Stellenbosch, Shanghai, Warsaw, Cairo, Kuala Lumpur and Athens during the lastyear, and all the regional coordinators will be presenting regional reports at Tokyo SB05. The peer-reviewed journal Building Research & Information (BRI) also plans to devote a special issue to the regional papers.

The regional events have generally been very successful, and CIB, iiSBE and UNEP plan on repeating this process in 2007, but the process of selecting sites has not yet been worked out.

Conference on LCA in Costa Rica

During the last week of April, an impressive array of LCA experts from all over the world gathered in San Jose, Costa Rica for the first International Conference on Life Cycle Assessment (ICLCA) to be held in Latin America under the auspices of the UNEP/SETAC life cycle initiative. The main objectives were to promote the use of Life Cycle Assessment (LCA) in Latin America, build capacity, and exchange experiences in the use of LCA in the region.

Presentations in three languages (Spanish, English and Portuguese) with simultaneous translation, covered key themes: Education and Capacity Building; Product Policy Making; Life Cycle



What's this? See article on Page 4 to find out.

Management; Green Building; Social Aspects and Sustainable Development; Cleaner Production Less Waste Management; Agroindustry Production Consumption Chains; Plastics as a Sustainable Building Element for Today's Construction Industry; Energy, Mining and New Sustainable Business; and International Organizations. Training workshops were also provided for the most commonly used LCA practitioner tools — Gabi, SimaPro and Umberto.

Costa Rica was chosen to host the 2005 Conference at the last face-to-face meeting in "Seattle in 2003. Previous meetings of this type have always been held every other year in Europe and the United States, so this was a major and very important change in venue for the ICLCA. More than one hundred professionals from all over Latin America, members of the Latin American Life Cycle Network, put in a concentrated effort for about 18 months to make this conference the success that it was.

Of particular interest to ABN readers is the attention that is now being given in LCA circles to the application of the method to buildings. One of the key themes of the conference was green building, a theme echoed in the session on plastics and their application in buildings. The green building track, chaired by Jame Fava, César Trevino and Johannes Kreissig, focused on the following topics:

- Experience with LCA and the environmental sustainability of buildings in Argentina (Alejandro Pablo Arena);
- The life cycle analysis of cement in Mexico (César Espinoza and Francisco Chavez del Valle);
- Sustainable building and life cycle analysis in Mexico (Nydia Suppen Reynaga and César Ulises Treviño);
- Analysis of the growing green building programs and the application of life cycle Approaches (James Fava); and
- Green building: the use of LCA tools and databases (Wayne Trusty).

A related theme throughout the conference was the importance of organizations, databases and tools to support both LCA and sustainable building, with iiSBE and the Sustainable Building Information System highlighted as valuable support systems. Especially noteworthy was the identification of opportunities for mutual support between those in the LCA community and those pursuing green or sustainable building objectives. There is a clear and growing recognition that buildings are a significant contributor to environmental problems, and that LCA is an essential tool for improvement in this critical sector.

Wayne Trusty

SB-Med Conference in Athens

During June 9-11, a regional conference on sustainable building was held in Glyfida, just south of Athens. The event is one of a series of SB04 conferences that are all building up to the global Tokyo SB05 conference in September (see last page).

Most of the 150 or so attendees were of course from Greece, but the audience included a large contingent from France (mainly South), Spain and Italy; and a few from places like Serbia-Montenegro and even Palestine.

The main sponsor was SD-Med (yes, a bit confusing, having SD-Med sponsoring the SB-Med conference...), which is a pan-Mediterranean non-government organization that will try to develop a common environmental action plan for the countries that line the Mediterranean basin. There is lots to do, but the approach appears sensible and quite necessary, and has a lot of energy behind it. Contact Stella Kyvelou for further information at <skyvelu@tee.gr>.

iiSBE supports international standardisation activities

Current standardisation activities at ISO are concerned with questions related to the implementation of principles of sustainable development within the property and construction sector. For example,

within the scope of ISO TC 59 SC 17 „sustainability in building construction“ efforts are made to develop the methodological basics for both, an assessment of the environmental performance of construction works as well as for the description of environmental and health-related characteristics and attributes of construction products in the form of a so-called ‘environmental product declaration (EPD)’. These activities are supported by the International Initiative for a Sustainable Built Environment (iiSBE) on the basis of a liaison. This agreement enables the representatives of iiSBE to participate in the meetings of respective ISO-working groups and to actively provide its own contributions.

A number of working group meetings took place in mid April this year in Lyon, France. In the following the current working status of Working Group (WG) 4 is briefly commented on. At the moment, the efforts of WG4 are mainly focused on developing the methodological basics for an assessment of the environmental performance of buildings (work step 1). The particularities of construction works will be addressed later within a second work step.

Within the scope of assessing the environmental performance different points of view or perceptions of the building have been identified. These are

a) a building as an end use product and as an integrated assembly of products

b) a building as a device to support active processes

c) a building as a place of activity / a place to live and work

Starting from these different points of view respective criteria and indicators can be deduced which shall be applied within the assessment.

Requirements concerning the environmental quality of the building (product quality) are resulting from viewpoint a). Relevant areas of investigation are resource depletion and the impacts on the local and global environment. It has, however, also been pointed out that information regarding the technical description of the building (e.g. accessibility, adaptability, durability) can indirectly indicate good environmental building quality.

One of the main challenges lies in maintaining and improving the environmental quality of buildings during the life-cycle phases of occupation and use. In connection with viewpoint b) several requirements regarding the assessment of the quality of management processes during the phases of occupation and use occur (e.g. pollution control, water management, energy management, maintenance management). However, WG4 needs to discuss the actual way of assessing the quality of these processes in more detail.

Requirements concerning the quality of the indoor environment are resulting from viewpoint c). For example, relevant aspects that need to be assessed are indoor air quality, quality of lighting and quality of water.

As a result of the efforts of WG4 it is planned to develop and formulate a ‘technical specification (TS)’. Subsequently, this technical specification shall be further developed and transformed into an international standard. iiSBE will proactively accompany this process.

Thomas Luetzkendorf

GBC Teams and iiSBE meet in Paris

During March, the countries participating in the Green Building Challenge (GBC) process met in Paris to review progress and to make final plans for Tokyo SB05. Participants included reprresentatives from Brazil, Canada, Chile, Italy, Korea, Poland Spain, Sweden and USA.

Each representative discussed on-going work with domestic systems and organization related to the implementation of rating systems.

France has a certification system operated by HQE (Haute Qualité Environmental) since February 1 that covers office and school buildings; they are also working on hospitals and sports buildings as well as residential. Certification is done before occupancy and includes design process; they would like to develop a system for the building in use as well. The cost is about 15,000 Euro. The previously developed systems ESCALE and EQUER are now just for research.

Italy has established an iiSBE Italia organization and is taking a version of GBTool to the commercial market. the first project is a large multi-function project north of Torino, and a chain of shopping centres is next on the list. The organization is led by Environment Park, a non-profit environmental incubator in Torino, the national research organization CNR, and the University of Milan.

Korea has implemented a system based on GBTool and has carried out a good number of assessments on office and residential buildings.

Continued on Page 18

Residential Street-Pattern Design

Streets connect the private with the public domain as well as link different parts of a neighborhood. These linkages support social interaction and exchange—both vital functions. Street design contributes significantly to the quality and character of a community since appropriately designed street create safe, quiet and healthy environments, particularly for children.

Current thinking on street pattern design appears to be divided between concern for the efficiencies of infrastructure and traffic, and a consideration of aesthetics. This generally translates into a battle between conventional suburban loops and cul-de-sacs, and “traditional” grid models. The latter approach typifies smart growth, New Urbanism, and Traditional Neighborhood Development. The goal of this study is to suggest street patterns that balance efficiency and quality, and reconcile functionality and aesthetics. This requires identification of the positive attributes of conventional suburban development while utilizing current technology and satisfying consumer preferences.

Historic Models

Conventional suburban street layout evolved from plans of early cities and suburbs. These plans were shaped by: the mode of transportation of the day; the current models of city planning; and, the recent explosion of city growth. The first type of suburb to emerge at the urban fringe were streetcar suburbs. Since streetcar suburbs relied chiefly on pedestrian traffic, they borrowed their street patterns--grids--from traditional pedestrian cities. The use of grids, sometimes with diagonal avenues, was convenient for streetcar stops which were directly accessible from all parts of the suburb. The areas around the stops soon emerged as hubs of commercial and social activity. The layout of streetcar suburbs reflected a strong transportation logic: efficient long-distance commuting and convenient short-distance pedestrian access.

The move away from the cluttered and often unsanitary city, intensified the suburban dweller's desire for rural, natural settings. This desire, in some cases, found an expression in street layouts that resembled stylized village plans in a modified grid with winding, picturesque streets and dense vegetation. Access on foot and a rural imagery were the driving forces; the model was the tried-and-true grid.

The emergence and rapid popularization of the automobile as personal transportation made virtually all the urban periphery equally accessible, dissolving the traditional planning constraint of walking distance. At the same time, the automobile introduced new constraints: noise, fumes, and pedestrian safety. In addition, automobiles required streets designed for speed and driving safety, attributes that were lacking in the traditional pedestrian street. These new requirements found their clearest expression in the Radburn model, named after the pioneering suburb of Radburn, N.J., begun in 1928. Radburn replaced the grid with “superblocks” that excluded through car traffic by grouping houses around cul-de-sacs, served by collector streets, and separated by common parkland. Traffic was directed to wide collectors or divided arterials on the perimeter and incorporates a “spine” of open space in the middle of the superblock. This new model of circulation retained the key ideas of rural setting and foot accessibility, but people walked on landscaped footpaths, while streets were given over to the automobile. Most later suburban subdivisions followed the Radburn model, although over the years pragmatic adaptations such as the introduction of looped streets, the elimination of the footpaths and the parkland, increased development efficiencies while reducing the overall attractiveness of the original model.

Efficiency and Quality

Efficiency is chiefly the result of combining two standard street types—loops and cul-de-sacs--with long blocks. Contrary to popular opinion, the curvilinear streets that are typical of conventional suburban subdivisions are not inefficient; they reflect an aesthetic preference and have little impact on land consumption. While irregular lot shapes do not pack efficiently, this is of relatively little consequence at low densities. In fact, for comparable residential densities, loop and cul-de-sac street patterns are more efficient than traditional gridiron geometry (which is why they are preferred by most developers). According to the technical literature on street planning, conventional suburban street layouts consume 16-25 percent less land than the traditional grids advocated by New Urbanism (see Fig. 1.)

Loop and cul-de-sac street patterns have evolved from 1900 to the present (see Fig.2). Their geometry is adapted to the automobile, excluding traffic at the local street level, and permitting good flow at

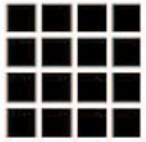
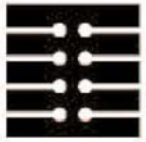
	 Square grid (Miletus, Houston, Portland, etc.)	 Oblong grid (most cities with a grid)	 Oblong grid 2 (some cities or in certain areas)	 Loops (Subdivisions - 1950 to now)	 Culs-de-sac (Radburn - 1932 to now)
Percentage of area for streets	36.0%	35.0%	31.4%	27.4%	23.7%
Percentage of buildable area	64.0%	65.0%	68.6%	72.6%	76.3%

Figure !: Comparison of area used for streets for five typical development patterns.

the collector and arterial levels. By contrast, the traditional grid patterns that predate the automobile have required major adaptations such as one-way streets and traffic lights in order to achieve good automobile traffic flow.

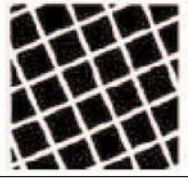
Without such adaptations, congestion is inevitable. The grid, both in theory and in practice, is an inefficient carrier of car traffic. At each grid corner there are 16 possible intersecting paths for which priority has to be deciphered by the driver (or controlled by traffic lights). By comparison, T-intersections, common in conventional subdivision plans, have only 3 intersecting paths, where priority is easily grasped. Grid intersections occurring at every 200 feet, or every 6 to 8 seconds at typical car speeds, undermine the car's main advantage--rapidity of travel. Thus the grid compromises either speed or safety or both and, at high traffic volumes, even with traffic lights and stop signs, the grid begets gridlock.

On the other hand, when congestion occurs on arterial roads in a loop and cul-de-sac system, it is generally caused not by the street network but by the segregation and concentration of homogeneous land uses such as regional shopping malls, or office parks. However, street patterns like the loop and cul-de-sac, which are designed for the automobile are poorly adapted to the pedestrian. Their discontinuity inhibits pedestrian access to facilities and amenities, while their curvilinearity lengthens and confuses walking trips.

A recent study by the IBI Group for the Canada Mortgage and Housing Corporation concluded that the top three determinants of the amount of suburban car use are: the number of people per household; the distance of the subdivision from the Central Business District; and, above all, the number of cars per family. Car ownership is related to: the number of persons per household; household income; and, house size (an indicator of household wealth). Thus, car ownership, family size, and household location have a far greater influence on auto travel than the type of street pattern, which ranked ninth in influence. While street patterns influence car use, they do so only insignificantly.

There is no correlation between street pattern type and residential density, although density has a

Figure 2 Evolution of street patterns sinc 1900, showing gradual adaptation to the car (M. Southworth, 1997)..

	Gridiron (c. 1900)	Fragmented parallel (c. 1950)	Warped parallel (c. 1960)	Loops and lollipops (c. 1970)	Lollipops on a stick (c. 1980)
Street patterns					

strong impact on land usage, and is also related to the presence of amenities within a district. The strongest predictor of residential density is land price, with higher densities occurring where land prices are high. Household affluence is the primary indicator of land consumption, followed by a household's stage in the life cycle. The higher the income of a household, the higher the likelihood that it occupies a single-family detached house. Similarly, the presence of children is closely linked with the consumption of a detached house. Street patterns have never been associated with a specific residential density..

Street Quality

The perceived quality of a street depends on both physical and operational attributes, some of which are incidental, and some of which are designed. Street life, visual complexity, social status and the density of people are incidental attributes dependent on culture and history. On the other hand, safety, security, comfort, and a sense of enclosure, are functions of design. In addition, physical attributes, whether designed or incidental, may be reinforced--or undermined--by operational attributes such as the level of maintenance and cleanliness. Taken as a whole, these attributes produce a memorable image and a pleasurable feeling in the user, expressed as sociability, walkability, and delight to the pedestrian, and driving ease and safety to the driver.

The sociability of a street is critical to its quality. Informal contacts that develop into social networks are at the root of feelings of belonging and security, which are prime factors in resident satisfaction. Street activity cannot be designed but it can be encouraged--or inhibited--by certain street characteristics. The most negative influence on sociability is heavy car traffic, whose negative effect is proportional to its volume. To the extent that a street pattern encourages speed (as in wide through-streets) it will invite more traffic. To enhance sociability, particularly with regard to children's safety and play, most traffic experts recommend discontinuous street patterns of the kind found in conventional loop and cul-de-sac suburbs. Such street patterns consistently show a lower rate of accidents and a higher level of perceived security.

Satisfaction surveys of suburban residents often mention walkability. Walkability implies comfortable access to amenities such as schools, recreation, retail, and workplaces. The presence of these amenities can be affected by a street pattern but clearly not determined by it alone. However, in many conventional suburbs discontinuous, indirect, and confusing street patterns of loops and cul-de-sacs compromise accessibility. In addition, collector and arterial streets are inhospitable and unsafe because of high traffic volume, discouraging pedestrian use. Recent New Urbanism-type subdivisions that have adopted the grid pattern, create clearer and more direct pedestrian routes. Yet the amenities in these communities are generally beyond the five-minute walking distance desired by today's consumers. Walkability demands both a conducive street pattern and, equally important, a proximate arrangement of land uses.

Viewing nature, whether it is in the form of parks, boulevards, or treed avenues in an urban environment is a source of delight. Green space has been found to have social and psychological benefits that explain the strong consumer preference naturally endowed sites, and for house locations facing parks, open space, golf links, lakes, and so on. Green space provides visual relief and opportunity for relaxation, becomes a place for casual contacts, and forms a haven for kid's play. (However, poorly designed and supervised, it can become a locale for crime and drug use.) Green space also has environmental benefits: it cools the air, recycles carbon dioxide, and retains rainwater. Due to these benefits, it emerges as a key element of quality in a residential development. Quality open space has been shown to make increased residential density more acceptable to residents. Though most subdivisions incorporate open space in their plans, ranging from 2 to 16 percent of the area, only a few stand out for their effective design and use of open space.

One of the most successful examples of open space use in an urban plan remains the eighteenth-century plan of Savannah, Georgia. Savannah’s public open space is distributed, accessible and peaceful. It delivers its benefit to the largest possible number of city dwellers. The city plan is organized in repeatable 675 foot-square “wards,” with a square in the center (Fig. 3). This square is visually accessible by at least half the houses in the ward and in close proximity to all. It is protected from heavy traffic since through-streets are located at the boundaries of the ward, leaving the center relatively calm for casual strollers.

A city dweller behind the wheel expects as much pleasure out of driving as out of walking. Narrow,

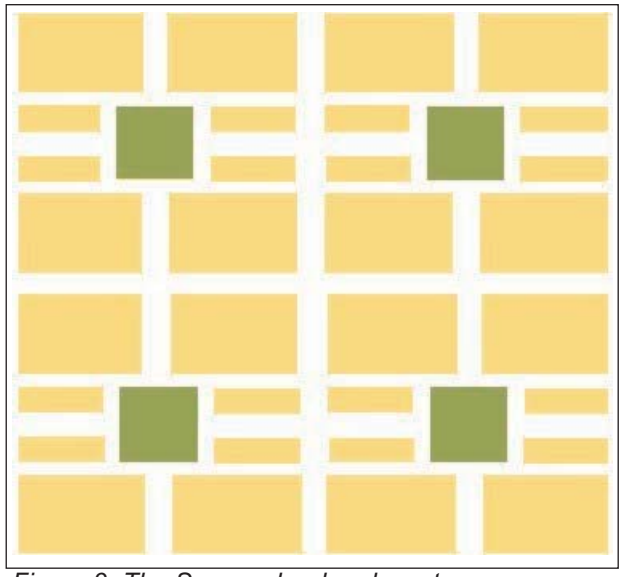


Figure 3 The Savannah urban layout

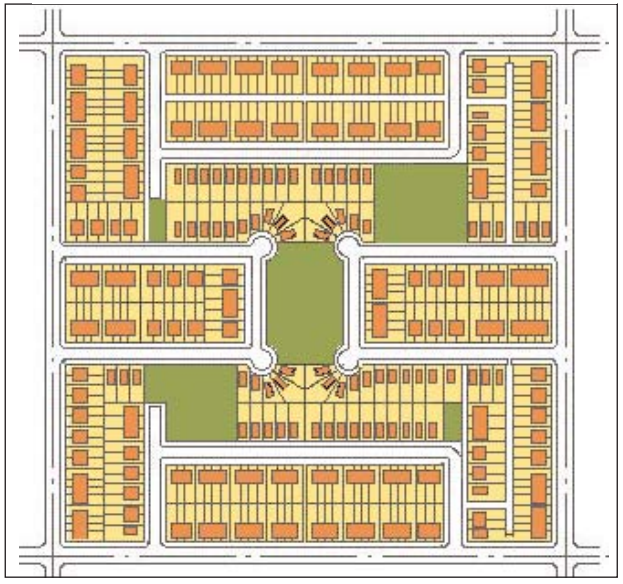
twisted and crowded streets may please pedestrians, but they frustrate drivers. To be enjoyable, driving requires unimpeded flow, perceived safety, and rich visual experiences on a large scale. These qualities are generally achieved by reducing and simplifying intersections, increasing lane widths, lengthening straight stretches, dividing traffic lanes, widening curves, and completely separating opposing streams of traffic by man-made or natural dividers. Treed boulevards acquire some of these qualities but the road that encapsulates all these positive attributes best is the urban parkway.

The Best of Both Worlds

For users, the two predominant suburban street pattern alternatives--loop and cul-de-sac, or grid--have distinct advantages. Discontinuous streets with loops and cul-de-sacs provide safety, sociability and efficiency; continuous grid patterns provide connectivity and easy orientation. To create streets that provide all these attributes, requires combining the two patterns. Such a combination would have the following characteristics: it would return to orthogonal geometry for clarity of organization and directness of pedestrian access; it would provide loops and cul-de-sacs for local streets for safety, tranquillity, sociability and land use efficiency; it would use open space as a structuring element of the layout for connectivity, relief, comfort, water retention, interaction and delight; it would adopt a road hierarchy of local, collector and arterial, for distributing and moving car traffic effectively; and it transforms arterial roads from mere traffic conveyors to activity generators. The aim of this new combined street layout is: to prevent nonresident through traffic; to maximize the number of houses on cul-de-sacs and loops; to situate open space for maximum accessibility; to accommodate a range of housing types.

The fundamental building block of this proposal is the residential quadrant (Fig. 4). It is roughly _ mile square (40 acres) and can be crossed on foot in five minutes. The quadrant is bounded by two collector streets and two arterial streets. Within the quadrant, residential streets are laid out in a modified grid so that cars cannot cross the quadrant, eliminating non-residential traffic. The use of looped, narrow streets reduces the speed of all vehicular traffic. A continuous pedestrian footpath system provides several direct route options to parks, public transit, retail, and services. The

Figure 4 The Quadrant



pedestrian system is generally overlaid on the streets. In one of twelve possible layouts, three parks are laid out diagonally and act as connectors. Eight percent of the area is devoted to open space; 26 percent is devoted to streets. The overall residential density of a quadrant may vary. Highest density would be at the edge of the quadrant adjacent to the arterial streets, intermediate density adjacent to the collector streets, and moderate densities in the center; lots facing the park could be developed at intermediate densities. This configuration is shown in the illustration on our front page.

Comparison

The Residential Quadrant concept was overlaid on an existing 1970s subdivision, Barhaven, in Nepean, Ontario (outside Ottawa), to test its applicability to a large site and compare the results with respect to efficiency and quality. The Quadrant plan was also compared to a Traditional Grid layout on the same site. The three site plans and their essential characteristics are shown below (Fig.5).

Figure 5a: Conventional Loop & Cul-de-Sac

- ❑ Hierarchical, with arterials, collectors and local streets.
- ❑ Curvilinear at every level
- ❑ Discontinuous for pedestrian and vehicles
- ❑ Open space is located beyond walking distance for most residents

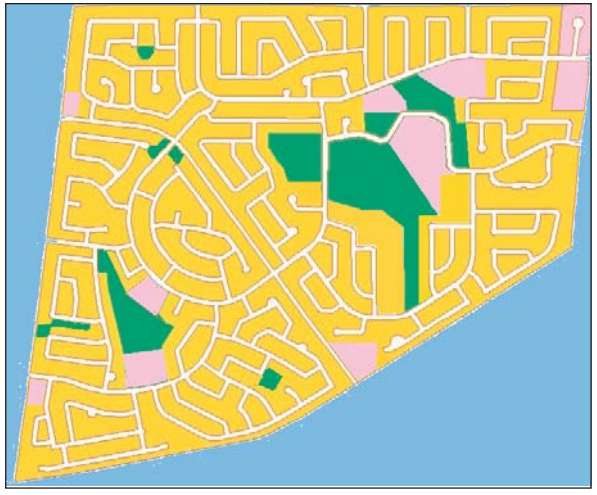


Figure 5b: Traditional Grid

- ❑ A modified grid
- ❑ No loops or cul-de-sacs
- ❑ The grid becomes discontinuous at the edge of each “neighborhood”
- ❑ One collector-type road links site to regional arterials
- ❑ Most open space is located at the perimeter of “neighborhoods”

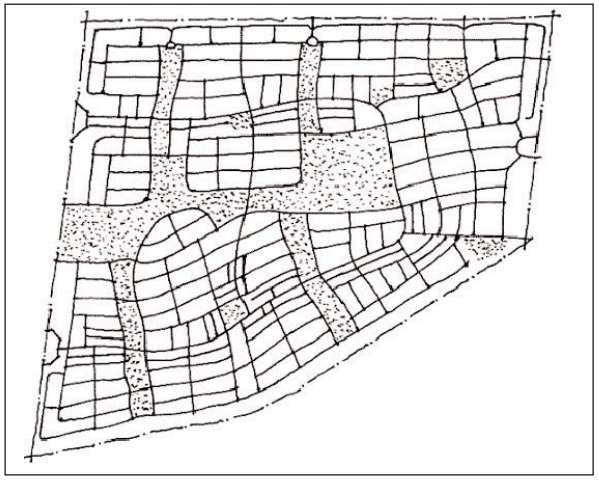


Figure 5c: Residential Quadrant

- ❑ A continuous, open grid of arterials
- ❑ A discontinuous grid of minor collectors and local streets
- ❑ A continuous, open network of pedestrian streets, spaces and paths
- ❑ No through traffic in residential quadrants
- ❑ Corridors of mixed-use zones
- ❑ Open space within each quadrant part of the path system

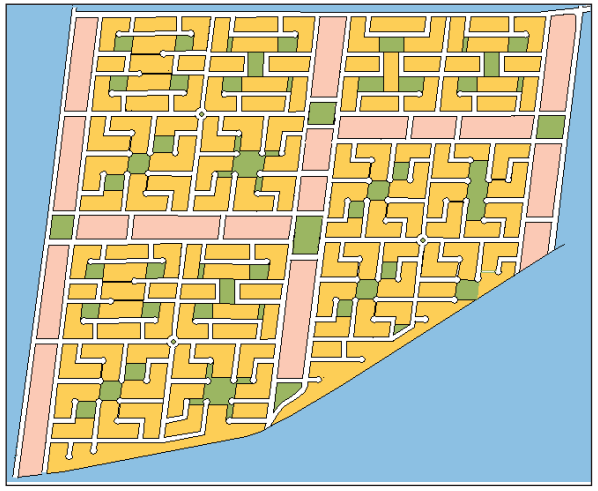


Table 1 provides aomparison of land use distribution among three alternative site plans, and the graphic on Page 1 shows a more generalized implementation of the system.

In terms of efficiency the Quadrant option rates better that the Loop & Cul-de-Sac and the Grid layouts. When the three prime uses--Residential, Commercial, and Institutional--are combined, the Loop & Cul-de-Sac plan develops 58.1 percent of the land, the Grid plan develops 53.4 percent, and the Quadrant plan develops 59.8 percent, that is, the Grid plan decreases the amount of developable land while the Quadrant scheme marginally

increases it. The 2.2 percentage points difference between the Quadrant scheme and the Loop & Cul-de-Sac plan in residential uses can be explained by the 2.8 percent increase in commercial and institutional uses.

The amount of land devoted to streets shows how a plan can optimize land consumption and minimize infrastructure costs. The Grid plan consumes the most land for streets while the Quadrant scheme the least; the Loop & Cul-de-Sac plan represents a median between the two. This difference would be higher if the rights of way for the Grid plan were kept constant. It is also worth noting that streets in a Grid, which are accessible to through traffic, must meet higher design standards than cul-de-sacs and loops, which increases the cost of infrastructure. In the Loop & Cul-de-Sac plan some inefficiency is due to backlotting on collectors, a practice that places two parallel roads on either side of a half-depth block.

The quality of the three alternatives can be compared on the basis of four criteria: tranquility, safety, connectivity, and visual delight. Tranquility is achieved by minimizing potential intrusion at the lot and house level and can be measured by the number of houses located on loops and cul-de-sacs. A measure of safety is the number of T-intersections. Connectivity is the accessibility on foot to various parts of the community, and the links between the neighborhood and adjacent neighborhoods, and can be measured by the frequency of connecting elements. Delight can be calibrated by the frequency and proximity of open green space.

The Grid plan scores low on tranquility due to the absence of cul-de-sacs or loops. The Loop & Cul-de-Sac plan has 30 loops and 16 cul-de-sacs, and the Quadrant plan has 62 loops and 34 cul-de-sacs. With respect to safety, the Grid scores low and the Loop & Cul-de-Sac high. The former has the largest number of intersections (273) and the highest proportion (31 percent) of the four-way type. There are ten times as many four-way intersections, and twice as many intersections of all types, in the Grid as in the Loop & Cul-de-Sac plan. However, scarcity of intersections can also be interpreted as measure of lower connectivity. A balanced resolution of these opposing requirements is offered by the Quadrant plan whose connections are made through parks, rather than on additional streets. The Quadrant has only 20 four-way intersections versus 86 in the Grid plan, but achieves the same degree of connectivity. With respect to delight, though all three plans have an equal amount of open space, the Quadrant plan makes it proximate to the largest number of residents. By comparison, the major green spaces of the Loop & Cul-de-Sac plan are beyond walking distance of most residents. The Grid plan brings open spaces within walking distance but makes them visually inaccessible to most houses. Given that green spaces are mostly also play spaces, proximity is a valuable attribute.

Table1: Comparison of Land Use Distribution	Conventional Loop and Cul-de-Sac		Traditional Grid		Residential Quadrant	
	Hectares	Percent	Hectares	Percent	Hectares	Percent
Residential	183.9	54.5%	157.9	46.8%	176	52.2%
Commercial and Institutional	12.8	3.8%	22.3	6.6%	22.3	6.6%
Recreation and Open Space	34.1	10.1%	40.8	12.1%	40.8	12.1%
Streets	97.2	28.8%	107	31.7%	89.1	26.4%
Vacant land	9.1	2.7%	9.1	2.7%	9.1	2.7%
Total Land Area	337.5	100.0%	337.5	100.0%	337.5	100.0%

Conclusions

This study draws lessons from recent subdivision street pattern designs and from street patterns of

historic cities. It examines how they function, how they fulfill residents' needs and expectations, and how they accommodate environmental concerns. In developing an alternative pattern that integrates the most important and desirable attributes of each approach, the study concludes: first, that it is possible to maintain the efficiency and quality of the conventional suburb while adopting the geometry of the grid; and second, that it is feasible and desirable to combine the tradition of the main street and the convenience of the commercial strip in a zone of mixed land uses that both relies on and supports transportation. By fusing the street patterns of conventional suburbs with those of the traditional gridded city, and by recasting the arterial street in the light of its activity generation potential, it is possible to create communities that are efficient, viable, livable, healthy and highly marketable.

Postscript

This article by Fanis Grammenos (fgrammen@cmhc.ca) is based on research at Canada Mortgage and Housing Corporation. The author acknowledges the comments by the Wharton Real Estate Review editors.

Since the publication of the Fused Grid concept in 2002, one municipality evaluated and approved a secondary plan based on the concept and two other municipalities are considering it for large areas of annexed lands.

Release of the latest HK-BEAM Standards

Over the past 12 months, the Society has continued its research and development of best practice standards for environmental sustainability in building design, construction and management. The latest HK-BEAM standards (Version 4/2004 for new buildings and Version 5/04 for existing buildings) are now both available at no cost from the "download" section of the Society website.

These two standards have been developed with widespread input particularly through the advice of two Technical Review Panels of industry experts and surveys of the HK-BEAM Society and other industry groups. The standards have also been "beta-tested" through pilot assessments of 18 projects, both new and existing, to provide real-life feedback on their practicability and rigour.

Research and development has as in the past been funded by private sponsorship and income from HK-BEAM assessments.

To complement the release of the 2004 standards, and in reply to widespread interest from stakeholders, the Society has embarked on further research and development in two key areas:

- web-based support materials are now being formulated to assist users (clients, designers, contractors, managers and operators) during the of HK-BEAM assessment process; and
- a Task Force has been set up to explore the arrangements and timeframe to establish a wider network of recognised HK-BEAM assessors drawn from professionals within the industry.

The 100 developments that have now been submitted for HK-BEAM certification (listed overleaf) cover more than 60 million square feet of commercial / domestic / mixed use floor space and 52,000 residential units. Approximately 40% of projects are existing buildings and around 30% are from the public sector.

This level of acceptance makes HK-BEAM, on a per capita basis, the most widely used voluntary scheme of its kind in the world.

HK-BEAM members, both individual and corporate, now total over 150 in number being made up of project managers (30%), engineers (28%), architects (23%), academics (16%), environmental consultants (15%), surveyors (11%), property and facility managers (11%), contractors (9%) and other related disciplines.

For more information on HK-BEAM please visit www.hk-beam.org.hk or contact the HK-BEAM Society Secretary Mr. Kevin Edmunds (kpe@bec.org.hk, direct line 2784 3910).

It should be noted that the Government of Hong Kong is also developing a rating system. When it is introduced we will bring you details. (Ed.)

China's Ministry of Construction Launches SB Project

The Ministry of Construction in China has taken the initiative to start developing and implementing guidelines and regulations for Sustainable Building and Construction. Main carrier for the process is a series of demonstration projects throughout China, in Chongqing, Shenzen and Beijing. The overall project is being developed in cooperation with the Netherlands Ministry of Environment housing and Spatial Planning (VROM), which was invited to join under a MOU of co-operation in the field of sustainable building.

Policies will be developed in parallel to the projects, as well as dissemination of knowledge to all stakeholders. During the past months a team of Dutch and Chinese experts, led by Ronald Rovers from Wageningen University, has analysed the main requirements and has developed "the Brief", or terms of reference for the design and construction of the project in Beijing. A framework for the development of policies and regulation has also been prepared.

The project team has chosen to work in a conceptual way, defining targets for different sources and topics, and deciding on the level of performance to be met within these concepts. In a later stage the targets within the concepts can be raised. Guidelines and policies should also be developed accordingly, with defined performance levels as a starting principle, to be assessed and monitored with for instance GOBAS, the Chinese version of the Japanese CASBEE tool.

For the Beijing project an urban area suited for some 700 houses has been chosen, of which a 100 will be treated as demonstration project, partly as detached houses, and partly as a small apartment block, as an example for the high-rise residential construction sector. On the urban level, the whole area will be developed in relation to the demonstration part.

Project sites in the other two cities have not yet been chosen.

So far the workshops concluded that most required knowledge is already available in China, but that this knowledge is relatively unknown to the main stakeholders. The demonstration projects will be a good way to help solve this problem.

The over-riding objectives for the project can be seen in the following exceprts from the Ministry planning document:

Housing construction is today one of largest tasks China faces today, and is the sector consuming the largest part of resources. Its estimated that one billion m2 of housing a year will be constructed the next period. As a comparison: That is twice as much new housing as the total existing stock in The Netherlands, and that is every year.

Its obvious that improvements will have a major effect on the countries resource consumption.

Nevertheless it is also recognised that most knowledge, methodologies, technologies, products, and examples needed to develop sustainable housing are in some way available in China. However, as far as within this (limited) project could be recognised: it is spread with different stakeholders, institutions, geographical areas and so on. Its not widespread and certainly not common knowledge. Building a demonstration project's goal therefore is not primarily showing new technologies and products to the Chinese market, but rather to bring all knowledge, technologies and methodologies together in a conceptual way, to introduce some strategies and approaches that have proven effective in establishing sustainable housing projects, and to use this combined and concentrated experience to develop general guidelines, to prepare

China's Ministry of Construction Launches SB Project

regulation, to build awareness, and spread the combined knowledge to all stakeholders.

The need for practical concepts and strategies has been recognised in the first workshop, in exchanging knowledge and ideas between the two expert delegations.

Regarding the actual construction of houses in China, it has been shown that one of the main problems is speed: The speed of a building process, from first initiative to actual completion is very short, may be too short to ensure a thorough and balanced approach for a sustainable project. However speed will stay a major factor to deal with, and a practical and straight strategy for project development in a sustainable way could help a lot implementing resource reducing and more sustainable principles.

It is recognised that development of a general plan for building site, or a neighbourhood, could help a lot in setting basic conditions for sustainable development. This includes a integrated approach for transport connections (Bicycles, public transport and cars) , energy concepts (in orientation, wind, ventilation) , water concepts (using local conditions) and many other topics. The Chinese traditional culture provides already a lot of clues to use for a urban plan (and mostly combined wit social and cultural preferences) , however not (anymore) always practised. It should be stated here that traditionally it seems that the Chinese culture always had more attention and experience with inclusive design when it comes to social and cultural needs, then the traditional western or Dutch approach. In this way the Western world could learn from traditional Chinese experiences, However, the main task today is to make these principles survive in Chinese housing design.

The design of houses and housing areas can have a great influence regarding resource consumption However it shows in many cases no clear direction in architecture or urban design for effective reducing in the general way houses are designed . A new architectural language should emerge in Chinese architecture that reflects the cultural and social needs, and incorporates the conditions and provisions set by local climates , and availability and renewability of resources. Targets for this are defined in the Brief,

A choice has been made, in how far these targets will be met in this demonstration project. The design approach chosen sets the basis for this process.

An important aspect is quality. Chinese societies demands in quality are rising, and it should be reflected in housing construction. Quality is to be found in many different ways: In flexibility of the house to adapt to new circumstance, but also in low maintenance costs, value of the house after a certain lifetime. But also in the way of construction, which is very important in relation to the resource use: cold bridges can be avoided, Walls can be constructed thinner, but require secure detailing and skilful labour.

Comfort is at the basis of housing people. What levels are accepted, what needs are to be met? It has been pointed that noise nuisance is one of the main comfort parameters to address: Houses are hardly prepared for noise insulation. And there is a growing need for cooling in the Beijing region, partly due to unnecessary overheating via a not optimised south façade.

High comfort levels will raise energy and resource consumption of average housing, but less so than in the not optimised similar new neighbourhoods.

It is in this context that the Chinese and Dutch expert delegations have jointly developed the terms or reference for the project.

Ronald Rovers

Note that a website about the project will soon be available at <www.sustainablebuilding.cn>.

Report from the Spanish Sustainability Monitoring Unit

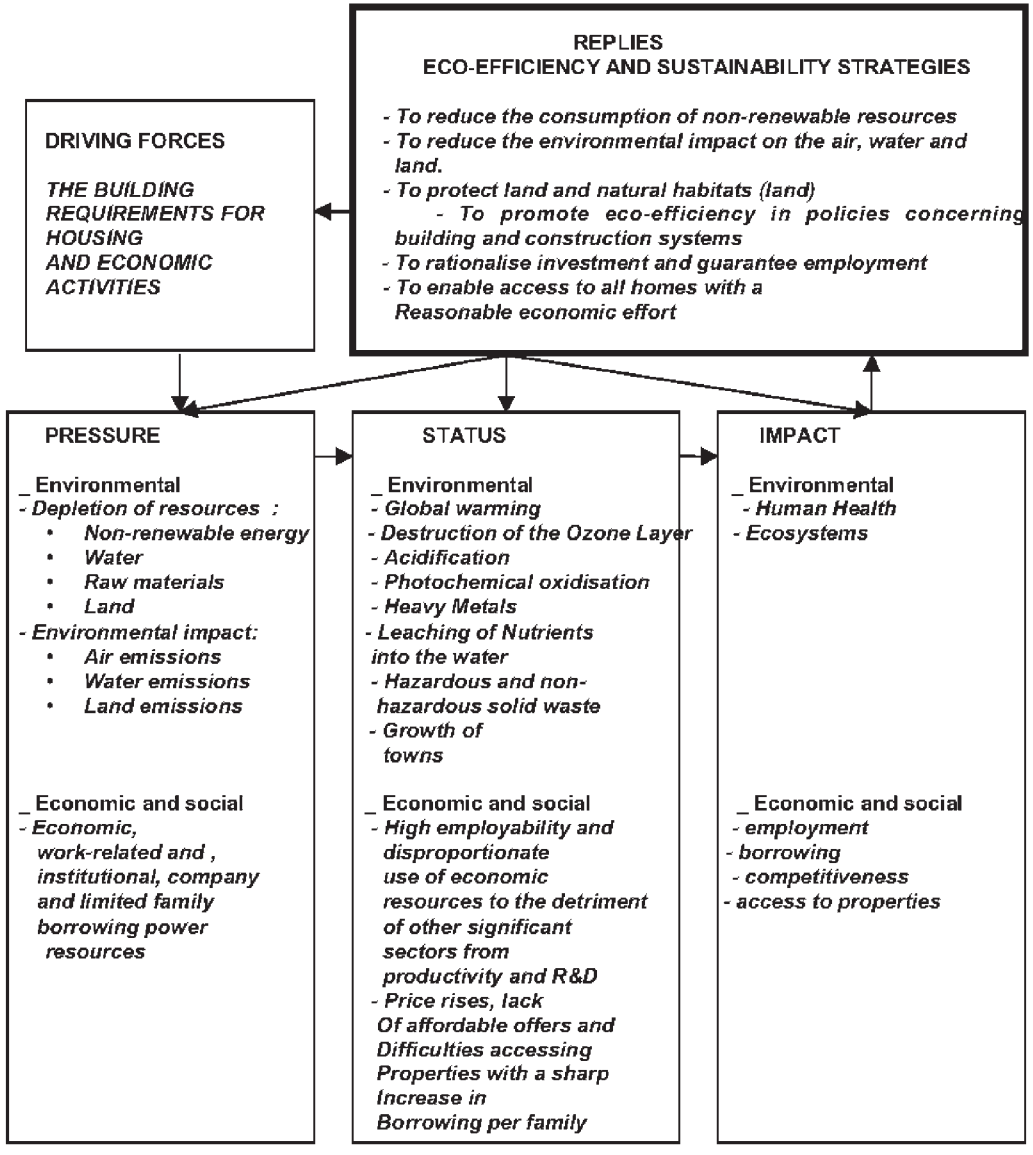
The following analysis forms part of the "Spring Report" produced by the *Spanish Sustainability Monitoring Unit* (OSE). Most of the observations and data refer to the Spanish building sector in relation to its degree of integration, eco-efficiency and dissociation.

The report focuses on the relationship between population, GDP and building (1) and between the latter and sustainability, in its environmental, economic and social aspects. It explores the steps forward as well as backward in relation to the aforementioned aspects. From an environmental point of view, the environmental impact (energy, water and materials) and changes to the land resulting from the urbanisation process are presented. From an economic point of view the GDP, investment and employment are examined. And from a social point of view accessibility of homes (in relation to this aspect, the evolution of prices, the striving for profit, borrowing and the proportion of protected and rented housing in existence for the overall total) is discussed. In addition, the energy intensity in the residential and tertiary sector is analysed compared to Europe and the more important European countries (GBC Spain).

The sector comprises residential and non-residential building (including renovation) and represents, according to SEOPAN, 76% of the construction sector (the remaining 24% is made up of Civil Works).

The Building Sector (76% of Construction) has a great structural importance in the country:

- It must answer the basic social needs (main home) or those derived from economic activity (the Spanish GBC team estimates the built surface in m2 at 105 million (Included renovation) in 2004 for homes and tertiary).
- It generates a very considerable environmental burden in terms of land, consumption of resources and generation of emissions (the I.D.A.E. (Spanish Institute for Energy Diversification and



The Building Sector (76% of Construction) has a structural importance in the country:

Saving) estimates that in 2000 the residential and tertiary sector consumed energy equivalent to some 14.5 Mtep).

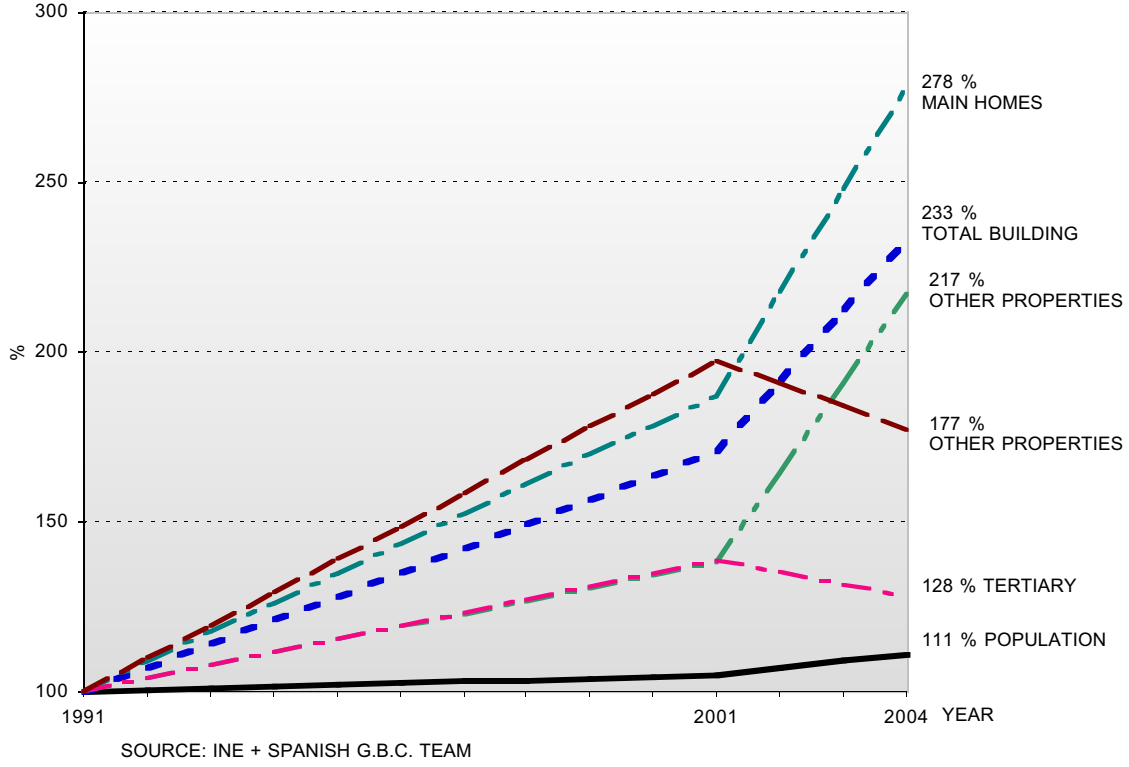
- And it constitutes, in itself, an activity with great economic and work-related impact (construction, including civil works, according to SEOPAN, represents 18.2 % of the GDP and 12 % of the population in employment in 2004).

Since 1991, especially from 1996 to the present, the sector has seen a new property “boom” with a significant impact on production, the environment, the economy and social issues:

- *Production*: Between 1991 and 2004 the building growth ratio (233%) has doubled that of the population (111%), showing improved levels of habitability, a strong tendency towards the creation of second homes for foreigners and nationals on the coast and the sector shelter-component as a financial investment.

  Between 1991 and 2001 residential construction (82% of the total) grew by 503 million m2 and in just three years (2001 - 2004), the aforementioned increase has resulted in some 259 million constructed m2, figures which compared with those for the 1980-1990 period (some 345 million m2c) confirm the construction "boom", mainly of new developments, which has occurred in the country in recent years. (Source Spanish GBC team based on the INE (National Institute of Statistics). See Graph 1.

Graph 1: Building Production

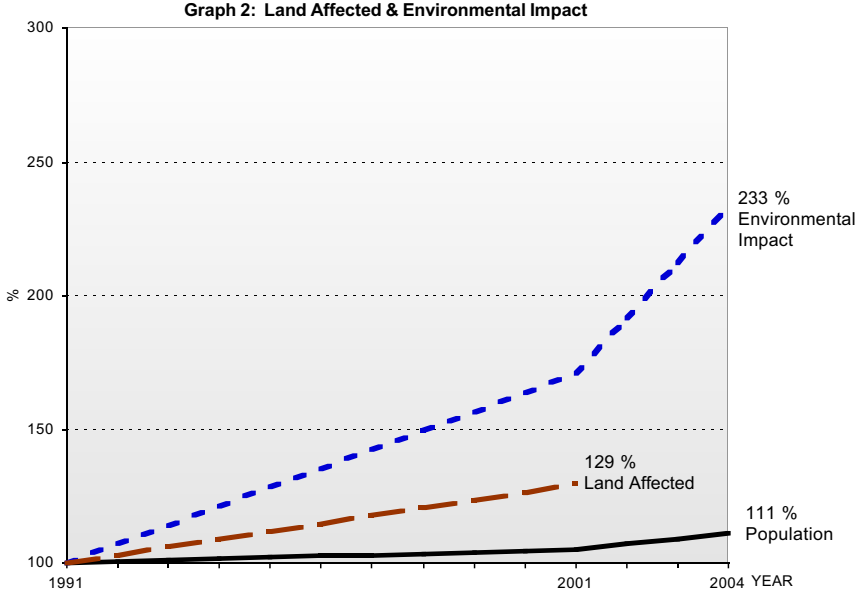


SOURCE: INE + SPANISH G.B.C. TEAM

- *Environmental impact:* As a result, for this same period, the land affected and the environmental impact ratio have also multiplied, in excess of population growth ratios. Corine-Landcover data for 1990-2000 show that the amount of land affected has gone from 8,078 to 10,454 Km2 (29%) with ratios increasing in correlation to m2 affected per inhabitant .

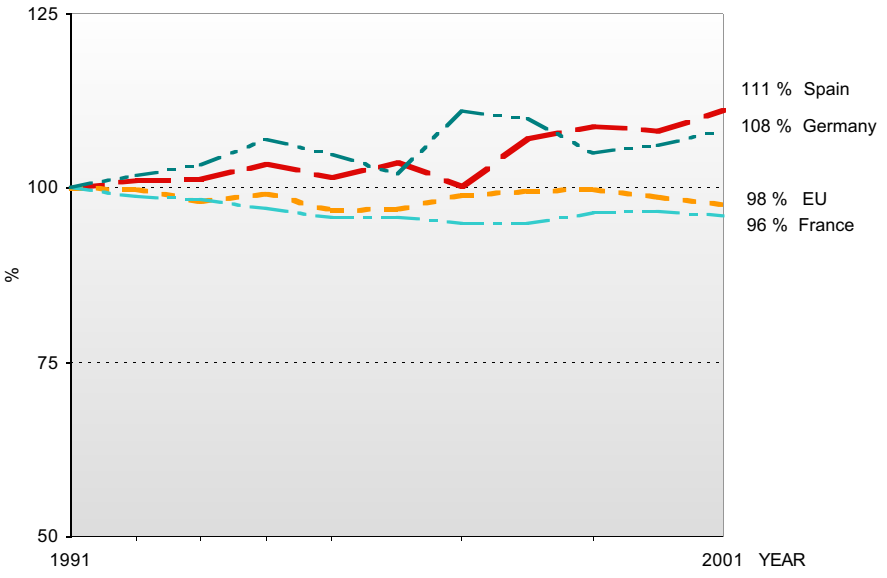
Also the ratio of growth of environmental impact brought about by the increase in building has been very significant and in direct proportion to the increase in building, 233% between 1991 and 2004, since in the Spanish system, unlike other European countries, sufficient eco-efficiency measures have still not been implemented to reduce the impact brought about by every construct-

Graph 2: Land Affected & Environmental Impact



SOURCES: LAND AFFECTED and CORINE-LANDCOVER: NATIONAL GEOGRAPHICAL INSTITUTE
ENVIRONMENTAL IMPACT: SPANISH GBC TEAM

Graph 3: Comparing Energy Intensity in the Residential Sector
Energy consumption per home



SOURCE: EnR (EUROPEAN ENERGY NETWORK) / IDAE

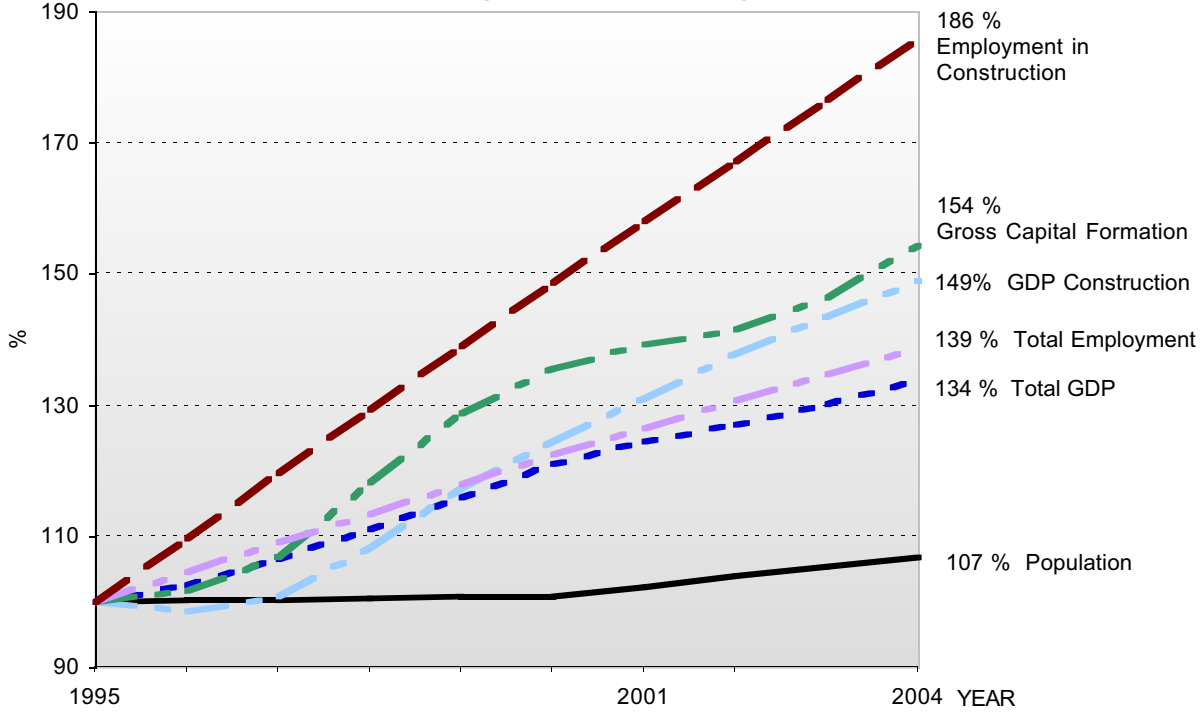
ed m2. (Source: Corine-Landcover and the Spanish GBC team). See Graphs 2 and 3.

- *Economic and social effects*: Logically, economic and work-related growth of the construction sector (including civil works) have been very significant. In the gross formation of fixed capital, the construction sector represents, each year, more than 50% of the total of that generated in the country. For the period 1995-2004, according to SEOPAN, participation in the PIB went from 14.6% to 18.2%; the employed population rose by 75% until it reached 2,094,100 workers in 2004 when 20% of all new jobs were created. See Graph 4.
- *The social plane:* Finally, the evolution of social indicators between 1991 and 2004, around the main product of the sector, the permanent home, offer a contradictory outlook, as is reflected in the various thematic sources (INE, Ministry of Public Works, CSCAE (High Council for Spanish Architects).

  Between 1991 and 2004, the price index for homes grew by 260% and borrowing per family, influenced by property loans in the long term, grew by 464 %, which has only been possible due to the sharp decrease in variable interest on mortgages, which in turn, have enabled another sharp decrease, to 57% of the effort to access property. This is accompanied by a decrease in Protected Housing and property to let (to 53% and 57% respectively for 1991).

  In summary, price increases compensated by cheaper financing (difficult to stabilise with regard to the future) and a sharp growth in borrowing with a critical factor, which is

Graph 4: Economic Aspects



SOURCE: INE, Spanish National Accounting Employment Figures, Ministry for Work and Social Security.

interest on mortgages. In turn, a sharp downturn in the number of protected homes and rental properties, essential for social sectors without the means to access the market conditions. See Graph 5.

Prospects for the future indicate that sooner or later, trend changes in the building sector will have to take place. These changes, if a crisis interrelated with the potential stability of other key sectors in the country (the Bank of Spain is talking about a 20% surcharge) is to be averted, it is better that they are made in an orderly fashion and, most importantly, with an integrated view of their different components: production, the environment, the economy, employment, and social issues:

- In production it appears inevitable that a change in the rate of building will take place. No one believes it possible for the market to allow the building figures of recent years to be maintained and it is a question more of when, how and to what extent this downturn will occur and whether a the risk of a crash can averted, something no one wants to see occur (management at ASPRIMA (Madrid Association of Property Developers)are talking about an immediate decrease of 100,000 flats/year in relation to those built over the past five years. El País, 18/05/2005.)
- In the environmental field, it is not desirable either for these increases in land use or environmental impact to be maintained, in particular in the overcrowded coastal areas and in sectors as critical as energy and water. Put simply, energy prices, a shortage of water and post-Kyoto processes on climate change do not look as if they are going to allow it.

  So then, saving and eco-efficiency have become a critical objective for a sector which has so much impact on these issues.

  Property/land policies need a two-pronged approach (with a sharp trend towards compact towns, the renovation and occupancy of empty homes) and improvement measuring of the environmental efficiency ratios per constructed m2, issues which are going to receive a boost with the approval of the new Technical Code, the tools generated by GBC/Spain and the recommendations established at the time in the White Paper on

Sustainable Building, being drafted.

- From an economic and employment perspective it appears that the change in trend mentioned in point one stipulates and should allow for a better focus of building sector financial resources towards other products, sectors and countries. This process is already underway, and aside from the development of properties at an "affordable price" or an ambitious programme for making buildings environmentally friendly, it should allow for an economic re-investment in strategic sectors for the modernising and improving of the country's competitiveness (knowledge sectors).

  In tandem, full attention is needed for the appropriate re-conversion of excess manpower (employment constitutes the most rigid element in the current situation), normally underestimated, which could be brought about in the sector and which to a large extent could be re-focused, among other aspects, on improving eco-efficiency of the existing newly-built property in the country which is worth many millions.

- On the social plane, a change in tend in terms of residential property also appears inevitable, it being the most important aspect of the building sector. There is still relatively significant demand, since according to INE the population will continue to grow due to immigration (from 43 to 49 million inhabitants in 2001), but a very significant part of that demand which is not met will face prices markedly lower than current market prices, meaning that homes to buy will have to be boosted, as will homes to rent at affordable prices.

Finally, preventive measures should be put in place against the consequences of a possible increase in mortgages, a situation which fortunately does not appear to be looming, and its consequences for homes where it is difficult to assimilate the increase in the corresponding monthly depreciation.

Fernando Prats and Luis Álvarez-Ude
GBC ESPAÑA

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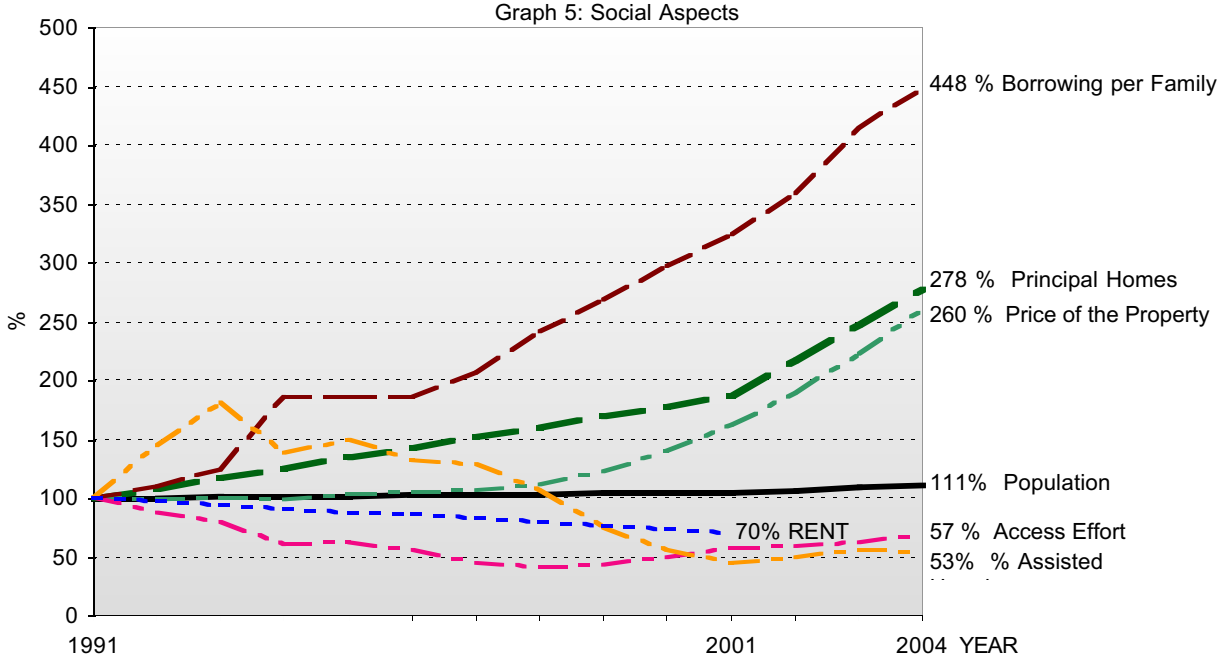
Graph 5: Social Aspects



SOURCES: Borrowing per Family: Julio Rodriguez López, Bank of Spain
Principal Homes: INE + SPANISH G.B.C. TEAM
Price of the Property: Julio Rodriguez López, Ministry of Public Works Property price Statistics.
Access Effort: Julio Rodriguez López, Ministry of Public Works Property price Statistics.
Assisted Housing: Ricardo Verges Escuin, "Cuarenta y cinco años de edificación residencial".
% Rent: INE, Family Budget Survey

Continued from page 3

Poland has decided to establish a joint academic and commercial team to develop a Polish version of GBTool, and they plan to develop the organization along the lines established by Italy.

Spain has a major process under way. They have developed a rating system called VERDE that is loosely based on GBTool, and is soon to be introduced to the Spanish market. They will be preparing assessments for Tokyo using VERDE, GBTool and CASBEE, the Japanese system. The process of implementing rating tools is being taken very seriously in Spain, and the Spanish GBC team (which includes the Ministry of Housing and the Architects Association) is preparing a government White Paper that will establish policy in this area.

Canada is also preparing multiple assessments, funds permitting, using GBTool, LEED Canada and Green Globes on three buildings.

The *USA* team has members with expertise in LEED as well as GBTool. The team is funded by the General Services Administration (GSA), and plans to do an assessment of a new courthouse.

The rest of the GBC meeting was taken up with discussions on how to organize and also how to solve technical assessment issues arising from the use of GBTool.

The Chilean and Brazilian teams are considering how to organize, and found the Italian initiative a very useful precedent. However, the unique conditions in each country means that a common model is unlikely to emerge.

Finally, the representatives of iiSBE held a meeting that focused on practical arrangements for Tokyo SB05. A larger point was how to make sure that useful action flows out of the SB04 and SB05 events.

It was suggested that a method should be worked out to communicate conference information to a wider audience in each region. This partly reflected the experience that, although the SB04 events were designed to gather delegates from all the countries in each region, most delegates were in fact from the host country.

Serina Hijjas, the architect of the SEC building, with Shahram Heidari of Kone Elevators and Faridah Shafii.

Methods suggested for getting results to other countries in each region include (a) presentations at SB05, (b) papers prepared for Building Research and Information, (c) translateing some of the key the papers and placing them on the iisbe Web site, and (d) conducting seminars in each country in the region to present the results (begin by identifying local leaders who could sponsor and send them a cover letter from iisbe, UNEP, and CIB asking them to “help make this happen.”

Nils Larsson and Joel Ann Todd

Recent events in S.E. Asia and China

In Kuala Lumpur (Malaysia), the regional SB04 conference was held in April. The event, organized by Faridah Shafii, was quite well attended by 250+ delegates. They paid close attention over 2 1/2 days of intensive presentations, partly due by the fact that the conference was held at the airport hotel, and so there were few distractions. As with tthe other SB04 events, a regional paper will be prepared and presented at Tokyo in September.

Faridah Shafii also organized a smaller three-day seminar in advance of the conference, on behalf of the Division of Technology, Industry and Economics (DTIE), the Paris-based branch of the United Nations Environment Programme (UNEP). The seminar was supported under a program called Asia Pro-Eco which is funded by the European Community..

Site visits in KL were made to a new headquarters building for the Securities Exchange Commission (SEC) and also the recently completed head office building for the Energy Ministry. Both are sophisticated buildings and rely on air-conditioning, perhaps inevitable for such functions in a climate as hot and humid as Malaysia.

Another field trip was made to Putrajaya, a satellite community near KL. Here the planners had the advantage of dealing with a greenfield site (an old

rubber plantation) and had *carte blanche* to do as they thought best. The resulting city is only partially populated, but does have the formal symmetry that one might expect of planners faced by a site

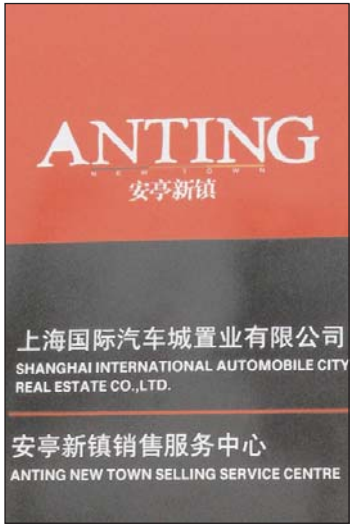
with few topographical features. The community will undoubtedly develop more interesting (and unplanned) features as it matures.

A second seminar of a similar nature was held in Shanghai in May, organized by Xu Qiang of the Shanghai Research Institute for Building Science (SRIBS), again for DTIE and supported by EC..The theme was similar and there were both building and neighbourhood case studies.

In this case, the building was an office / research building designed by SRIBS for its own use. The so-called Eco-Office Building is a very attractive project, with lots of movable external shading, an atrium. SRIBS is hoping that this project will establish a precedent in Shanghai for high performance, and a GBTool assessment is being prepared for Tokyo SB05.

The Shanghai seminar included a field trip to the new community of Anting, which is the first of nine planned satellite communities to be established around Shanghai. As the project sign indicates, Anting is oriented towards a car culture, and a new VW plant is nearby. Plans include a public transport link to the City, but the planning allowance of 1.5 cars per housing unit seems to indicate that public transport will play a minor role.

Also presented at Shanghai was another new community called Berjuntai Bestari, being established in Selangor State of Malaysia. This project is fascinating for the very careful and detailed consideration of physical, environmental, economic and social issues that seems to underlie the planning decisions. We will bring you more detail on this project next issue.



Nils Larsson

Joining iiSBE is cheap at $75 Canadian per year, and only half of that for students of residents of developing countries. For that low cost, you help to support our GBC project and the ABN newsletter, get access to downloads on our database at <www.sbis.info>, and you also will be able to subscribe to the refereed journal *Building Research & Information* (BRI) at a saving which is greater than your membership cost!

There is now a new reason to join iiSBE: our Skills Registry database. You can browse at http://www.iisbe.org/iisbe/gbc2k5/gbc2k5-dwn.htm, but you have to be a member to register. This resource should be a useful way of establishing contacts between project managers and specialists in various aspects of SB.

We apologize for the lateness of this and the previous issue. We hope that the solid content makes up for it.

ABN is a publication of iiSBE, the *International Initiative for a Sustainable Built Environment.* ABN specializes in information related to sustainable building, and is distributed free to members of iiSBE.

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Action for Sustainability
The 2005 World Sustainable Building Conference in Tokyo
SB05Tokyo

27-29 September, 2005

The 2005 World Sustainable Building Conference in Tokyo

iiSBE and CIB are pleased to announce the SB'05 conference, to be held in Tokyo.

The conference is being organized by public and private-sector organizations in Japan, with the support of iiSBE and CIB.

For details, see:

<http://www.sb05.com>