

A Town Framework as a Building Opportunity to Optimize Every Energy Effective System

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ABSTRACT

Every energy efficient concept, system and material presented at this conference has an opportunity to achieve greater efficiency only if we invent better towns. Typical towns are like parts of a building spread across the land.

An ultimate Energy Efficient Economy will remain out of reach as long as we cling to two-dimensional, street-based, separate-building, wasteful short-term town concepts.

The purpose of this paper is to encourage each of you to imagine how a town would need to be different in order to optimize your system.

To encourage your out-of-the-box thinking an alternative new town concept will be the basis for comparisons. It will reveal that typical towns limit us in more ways than has been appreciated or published. Its home-site lots are in permanent 3D subdivisions. It is compact, it offers minimum weather exposure, and surrounding open space is an integral part of its recycling eco-systems. Technologies as efficient as those found in nature will someday be developed; this town offers an efficient framework for their application.

Continual-Use is a new aspiration added to recycling and reuse. Long-term continual-use will greatly enhance your opportunities to develop ultimate energy efficient solutions. It makes higher quality research, design and material investments easier to justify.

Introduction

Imagine playing in the symphony orchestra at the Boston Pops; but in your case, every part has a solo. Towns depend on the success of every system. Towns have all the functions of a building. The new town concept proposed for comparison is compact, more like a building. This alone gives every system new opportunities to reach higher economic efficiencies. That applies to how efficiently each can fit into the town and how effectively they connect with people.

The first image is an aerial view (Fig. 1) showing how different a town can be with the same density as suburbia. What appear to be trees covering a hillside actually are trees in the backyard of each home. This is not a hill; the inside is hollow. The top is open below the X-structures along the ridge. Running continuously inside is Main Street. The front porch of each home overlooks the vitality of the street. This paper explores opportunities for greater efficiency and livability possible in the Framework and each individual Home-Site. There continue to be new refinements and opportunities since the original idea. Examples of technical systems described are only ideas; experts' proposals for every functional system are needed.

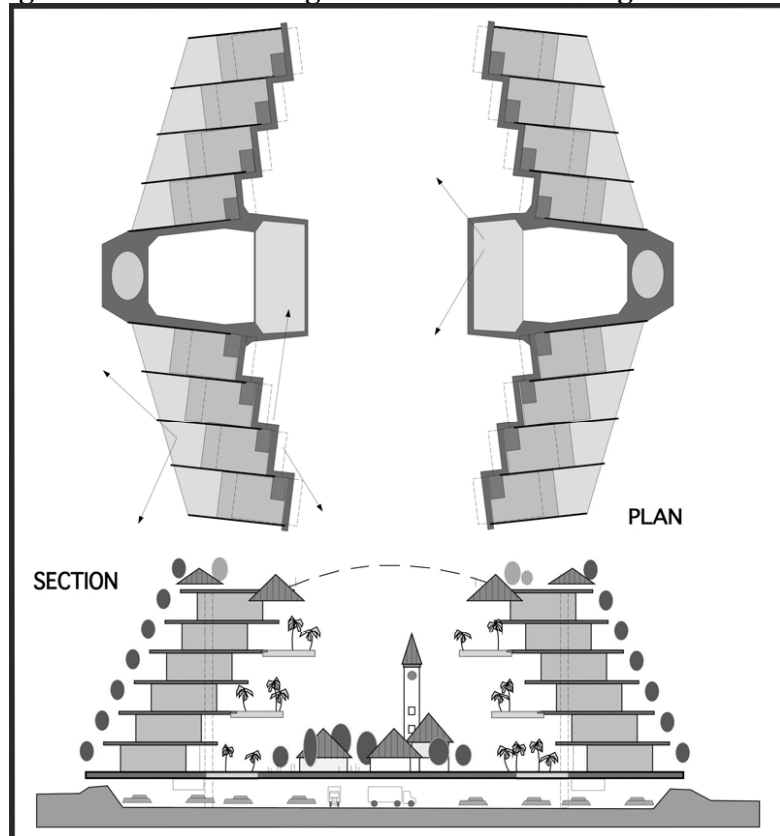
Problem: En Route to a Zero Energy Town (Building) -Abstractly Stated

Design a town-size device for the very long-term that comprehensively solves all the interface problems with maximum energy efficiency between places humans live and the natural world, and between that device and the humans living in it.

Figure 1. Like a Tree Covered Hill with Main Street Inside



Figure 2. Extended Neighborhood Overlooking Main Street



The Solution: En Route to a Zero Energy Town (Building) -Abstractly Stated

This town-size device shall be built as compact as possible to make all connections as short and as efficient as possible. Provide raceways to accommodate function and change for every imaginable service delivery system to every required location. Provide an appropriately sized area of surrounding open space and farmland to optimize interaction with all natural processes necessary for a comprehensive interface. Design the device and interface to function

for 1000+ years with no residual or unused by-products; that interface shall use and enhance the function, longevity and health of all systems.

Since, of all systems involved, the human life function is the most variable, that interface shall have complete flexibility within desired size and function parameters. The smallest module, a home-site (lot), shall accommodate one to four living units. The home site shall have a height for two levels, width and length to be standardized. Home-sites are to be double stacked in clusters of 12 to 20 arranged along one side of a play area with connecting walks. Another cluster with flipped plan (Fig. 2) is placed opposite with walkway and play areas facing. Facing clusters create a larger shared space for Main Street. Narrow ends are open.

That two-cluster grouping has 2 similar groupings stacked above it. The distance between facing clusters in the upper groups is reduced slightly to shelter the lower levels and the partially enclosed Main Street. This is the extended neighborhood module, in a 3D subdivision. The street can be covered. Shops with apartments can be 3 stories. Many modules are connected to become the town. Occupants of each home site are free to build whatever whenever they desire. A 1000+ year plan gives the basis to meet future needs. Extended neighborhood modules can be gradually phased over many decades into brownfields, urban centers, deteriorating suburbs, or new town.

A Long-Term Sustainable Energy Efficient Economy Needs You

Building a never-before-possible ultimate zero energy town depends on everyone's expert (technical, financial, industrial, etc.) contribution to its evolution. A book is needed with chapters written by contributors for each integrated system. Please indicate interest and expertise through <http://www.sprawlsolutions.com>. The next objective is finding the right group to build it.

Advantages of a Three-Dimensional Framework

A town designed primarily for people is not restricted to grid streets or two-dimensional circulation patterns. Towns with grid streets are based on old outdated transportation systems. Streets and buried utilities are wasteful and expensive long-term. They require continual maintenance and replacement. Comprehensive energy saving will be done in many subtle ways.

Overcoming our 2-D planning and thinking is a necessary first step. After centuries we should know it still amounts to sprawl. Structures on lots are seen from all sides; zoning controls, CC&R's and policies protect property values, but limit freedom and flexibility. Spreading out structures and streets across the land unnecessarily wastes space and energy.

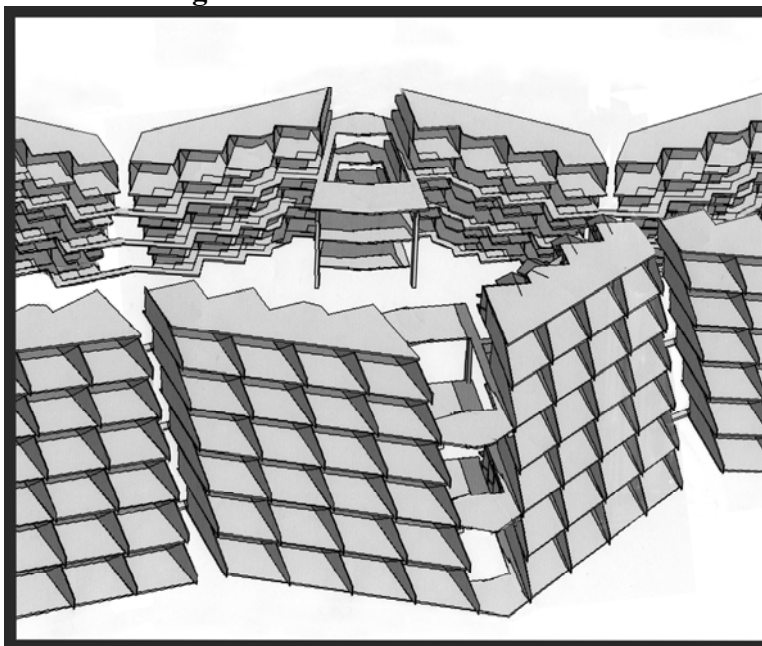
Simply building four to six story housing to get more density is only a partial solution; it still becomes sprawl. Many of you have been on top of the Eiffel Tower in Paris. Remember the mass of housing with several floors extending as far as you can see? As cities grow larger, they still become one continuous mass of structures. Scattered parks offer some relief, but they are an expense. They are usually too small to be designed as an integral part of an energy, recycling or farmland system. Buildings are too far apart for efficiently adding advanced distribution or collection systems.

Multistory or high-rise housing seems a logical answer for conserving land and being compact enough for efficient utility systems. Still, streets usually separate high-rises. It is usually very difficult to make changes in individual condos to meet changing needs. Plus, many people in high-rise buildings live in isolation in their own unit. A complete sense of neighborhood and community is hard to achieve. Possibilities for interaction in hallways or elevators is small

compared to walkways and porches overlooking the neighborhood and Main Street. The lack of opportunity for human connections, respect, and cultural appreciation to grow has already caused many housing high-rises to be torn down. An entirely new format is needed.

This new framework (Fig. 3) for 3-D subdivisions offers a better choice than either high and low rise condominiums or suburbia spreading across the land. It combines the best of each and adds opportunities not possible in either.

Figure 3. Permanent Framework



A three-dimensional framework is a multistoried structure. Cars and service are on lowest level. It has large vehicle size horizontal raceways for utilities connecting below every part of the town. Vertical branch raceways and elevators connect to each home site level. Every other floor (or between Home-Site levels) is a continuous utility space within the structural frame that can service the floor above and below. This allows all systems to be easily updated with the latest energy efficient technologies. It encourages developing better long-term solutions.

The compact town structure allows spaces for every imaginable new technology. It's all connected; it functions as a large building. Here are two ideas as examples. Computer-directed pneumatic tubes deliver goods purchased in a local shop or ordered from a large warehouse to be delivered to a home's hot, cold or normal cabinet. Processing facilities, energy generation and systems to automatically maintain farmland quality for 1000+ years are all connected. The pneumatic system can deliver to or from anyone; it's possible to collect and recycle everything at a fraction of the cost of using trucks. The open clear space over Main Street shops can be used for projecting high intensity parallel light, from the sun or a very large low-cost light source. This light can be reflected into each home by computerized mirrors. It can be for light or heat. The town arrangement itself offers many unique possibilities like this.

The two-story home site living space between structural floors is open and completely flexible. Permanent wall spacing is based on the use of the space and the home sizes in the local culture. For young and old the front porch, home cluster and play area offers an intimate human scale, while visually and functionally part of the extended neighborhood.

The final structure may look similar to a honeycomb, but square-cornered (Fig. 3), rather than hexagonal spaces. Stair-stepped home sites provide a yard space on the roof of each home site below. Flat patio surfaces have solar collecting floor tiles. These same tiles are 50% translucent for getting light to the interior of the unit below. Along the edge of this backyard area deciduous trees provide summer shade and allow the winter sun, reducing energy demand. They hide the structure, it looks like a tree-covered hillside (Fig. 1).

Connecting many extended neighborhood modules (Fig. 4) makes a town. Each half module can be arranged and built independently. Angles can vary, allowing curved shapes to follow site contours. Ramps between modules go to all levels. The street can be wider for small and (Fig. 5) large plazas. Modules can have horizontal connections as needed. The long-term (1000+years) master plan justifies investment in higher quality design and materials. Flexibility assures long-term use.

Figure 4. Connected Neighborhoods Make a Town

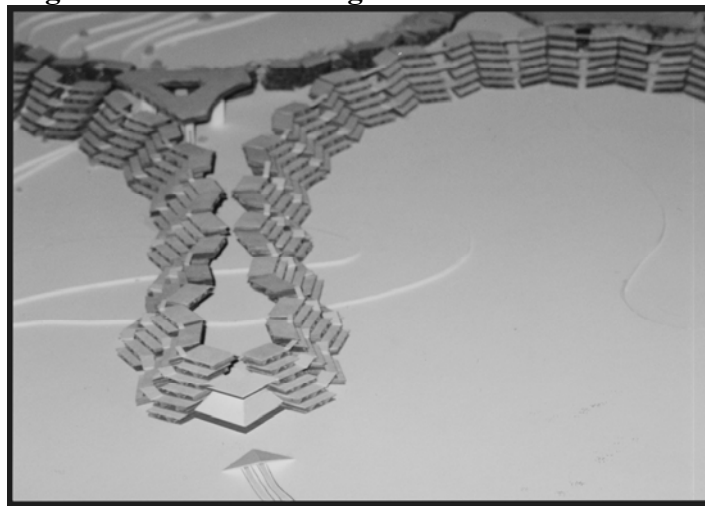
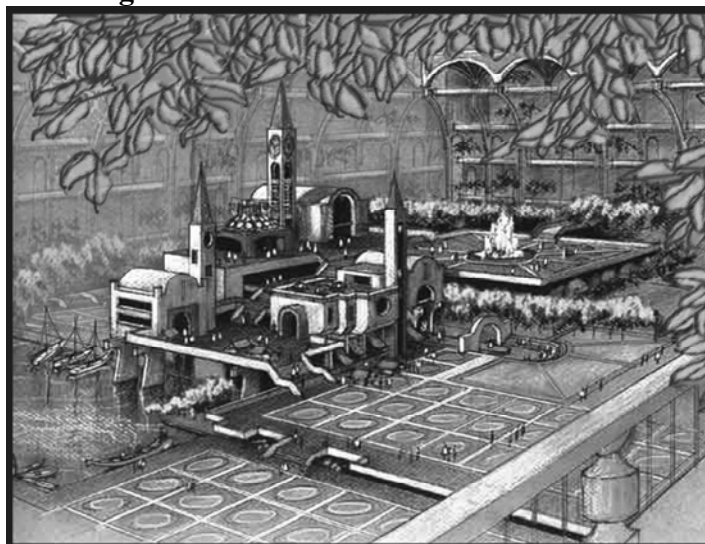
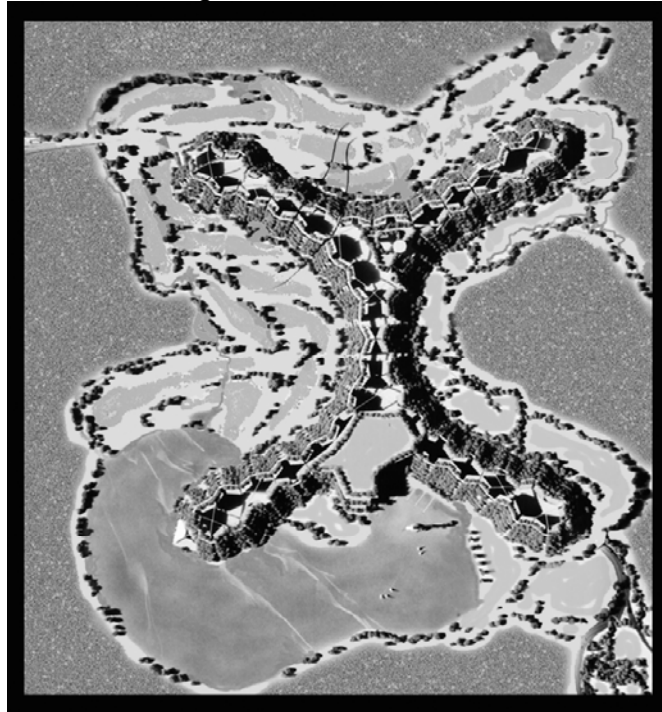


Figure 5. Homes Overlook Grand Plaza



The first prototype concept (Fig. 6), for comparison purposes, was designed for a one-mile square site. It has the same number of homes, a school and related community uses as typical in suburbia. But it leaves 80% of the land as open space for recreation and people-friendly farming methods. New plant and insect science is eliminating conflicts between housing and recreation next to most types of farming. The open space functions as part of a complete loop from food and water management to energy production; all combined operations have the potential to generate income rather than expenses.

Figure 6. Town with Square Mile of Farms, Lakes and Recreation



This concept has Main Street, the best part of New Urbansim. But all its homes view Main Street's vitality without mixing cars in people spaces or any long walks to the transit stop.

Continual Use of a Permanent Framework Revolutionizes Cost

The 3-D framework that subdivides the spaces into home-sites is designed to last for 1000+ years. That frame amounts to 70% of what is typically included in the cost of each home.

That adds a new kind of sustainability, CONTINUAL USE. Continual use is more efficient than re-use, loops or recycling. Just imagine: Once built, 70% of a house never has to be built again. All the normally expected removal, waste, recycling or reuse cost and environmental impacts are avoided for 1000+ years or more. It's as if 7 out of 10 steps were skipped each time a new house would normally be built.

The only elements needed to complete a house are whatever rooms and floors you want inside. Those usually amount to less than 30% of a home's cost. Those are an optional expense based on need and budget. Being self-built adds to affordability and a families success.

Long-term financing also offers new possibilities for making housing affordable.

The convenience and livability of these new Home-Sites will make them sought after in the housing market and as a tourist attraction. Their prices (value) could go up dramatically. For those who retain ownership, once various components are paid for, their housing cost could approach the lowest imaginable cost for future generations.

The housing industry has tried for over fifty years to make effective manufactured houses and components. A long-term standardized framework with flexibility makes developing higher quality wall and floor systems practical. Neighbors can only see the front wall; flexibility and privacy allow imaginative options. Even sweat equity is possible, which alone can enhance the entire financial future for a family. For an extreme example, with a very tight budget, favorite rooms from a home being replaced in a deteriorated area can be simply inserted in a home site and combined with new a kitchen module, other housing modules or conventional construction.

Is It Possible?

How can the initial cost be similar to that of a comparable house? The cost of labor and materials in typical suburban subdivisions for streets, curbs, gutters, sewer, water, utilities, sidewalks, driveways, foundations, slabs, sidewalls, fences, floors and roofs will basically pay for building the permanent framework. That's the 70% not having to be maintained or replaced over 1000+ years. Long-term costs are 70% less.

In towns now being built some building elements may last 75 to 100 years, many less than 25 years. It is hard to justify higher quality materials. We are too shortsighted! What we build today will directly or indirectly affect the surrounding land for hundreds of years, even after it is torn down. Our current 25- to 50-year planning and what we build still fits more with a Kleenex mentality than with any long-term thinking.

Some may doubt that a structure could be built to last 1000+ years. There are buildings all over the world that old still in use. I have a friend whose family has owned and lived in the same structure in Spain for 500 years. Long-lasting structures can have many uses over time. Many of you have walked through the Coliseum in Rome. It's been there over 1500 years. Remember those tall arches under the seating? There are notches for floor beams up about every 8' for as many as five levels of housing. After its original use a thousand people lived within those arches, protected by that structure for hundreds of years. Another example, the Pantheon in Rome is almost 2000 years old.

We may not use those same materials, but constructing permanent buildings is not a revolutionary idea. The first secret for enduring or sustainable structures is protection from the elements. This town's basic framework will be almost totally protected by the housing. The backyard dividers are wrapped. Second, new material combinations available today can be unprotected. Tests on the Sheerfil II (woven fiberglass impregnate with Teflon) fabric I have used on several of the world's first applications show no evidence of deterioration. Some materials also have increased strength with less weight and size. The more efficient curved shapes possible with the fabric forming systems I have developed can reduce structural concrete needed by 25%. We are such a young country; these comments probably seem like foreign ideas. We need to wake up: we cannot keep designing for and building what amount to temporary structures. At some point in the future we may not be able to afford to replace them.

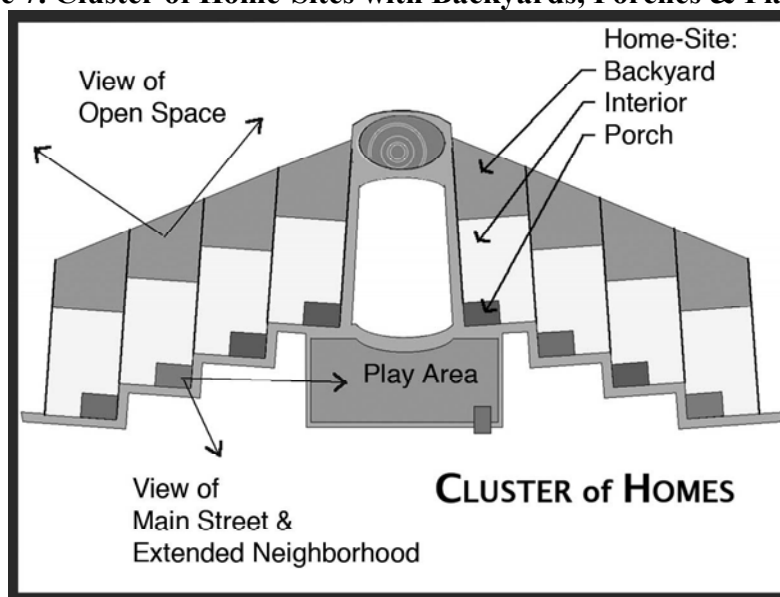
This New Kind of Density Will Be More Desirable

The need for naturally occurring human interactions in our daily lives is starting to be appreciated. Growing up and old in the same neighborhood can enhance every stage of life. Our current urban and suburban arrangements aren't designed to maximize this.

The privacy and flexibility of the individual Home-Site is basic to this concept. The surrounding town does not interfere with activities within each Home-Site, and vice versa. Being in the backyard is private; it's like being on your own hillside in the country. It has a great view and no other neighbors in sight. What could be better? If you want community activity, just step onto your front porch, wave to your friends to join you. Homes are arranged to maximize the opportunities of interactions during daily life.

Each Home-Site is stepped back in plan (Fig. 7) to give maximum views from the front porch and backyard. This is the basic architectural arrangement of spaces that forms a Cluster. Each porch has a view of the Cluster's play area. They are in voice distance. The play area is the cluster's activity center; everyone passes through it on the way to everything. Walkways extend past porches to connect each home (Fig. 8) to it. Every porch overlooks Main Street (Fig. 9) and other porches in the extended neighborhood. All are in waving distance. Dimensions may vary while the general spatial arrangements still achieve desired objectives.

Figure 7. Cluster of Home-Sites with Backyards, Porches & Play Area



The extended neighborhood contains several clusters arranged as shown in Figure 2. These facing clusters are stair-stacked: six are shown stacked in the drawing, overlooking main Street. This forms the extended neighborhood, Main Street is its living room. All of it together becomes a visual and functional unit.

Being on an elevated level offers the best opportunity for watching community activities. Eighteen-foot tall trees and flowering plants can personalize your porch and walkway. What is directly below or above you is out of your sightline. Your cluster of homes and play area are your immediate world overlooking your extended neighborhood.

Figure 8. Homes, Front Porches & Walkway



Figure 9. Porches Overlooking Main Street Plaza, In Waving Distance



There is great value for children growing up watching and being part of a neighborhood and the life in a town. Becoming a senior, being able to afford it, helping care for great-grand kids, having health-care in your home, and growing old with childhood friends next door: this concept makes such things possible.

These Home-Sites offer many more economic and energy efficiencies. But real property is about location, location and location. Every Home-Site has location, the best of both worlds, in town and in the country at the same time. It offers a better choice than a condo or a tract house. All features combined, this kind of town makes density desirable.

It has the potential for the ultimate in sustainability because it is affordable to enjoy living in it. It will be natural for the residents to enjoy taking care of it and investing in it.

The Home-Site, New Opportunities

This town's arrangement has the opportunity to combine the best features of urban and suburban life. People move to the suburbs to be close to nature and open spaces. Those dreams can be satisfied and even enhanced beyond normal expectations simply by these new architectural arrangements.

Rather than a typical suburban backyard with neighbors overlooking your back fence, we will make a completely private backyard that you can build with any design (Fig. 10), plus it has a view over hundreds of acres of open space (Fig.11).

Figure 10. Private Backyard, Build Any Design

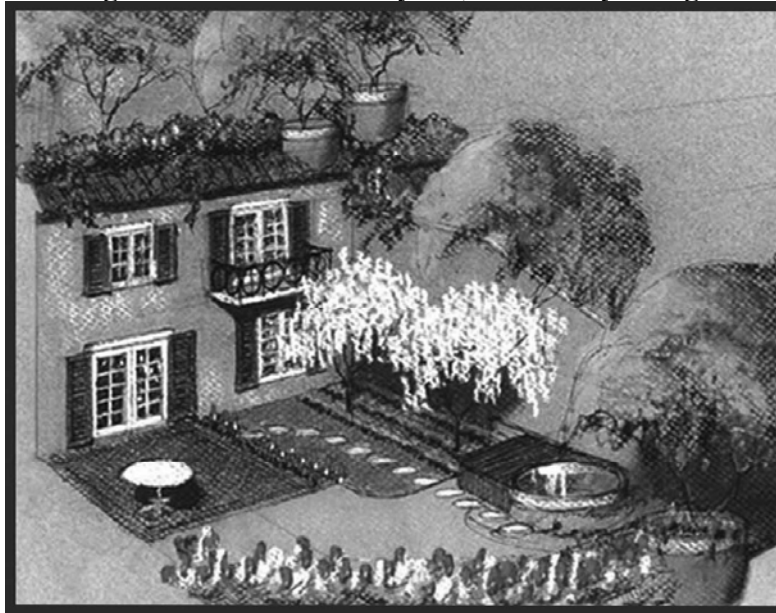


Figure 11. Backyards View of Open Space



Rather than windows opening onto narrow side-yards, we will provide additional privacy with a solid soundproof wall on both sides.

Rather than a seldom-used front yard on a typical boring street, we can provide a front porch that overlooks your cluster of homes, your cluster's play area and your extended neighborhood.

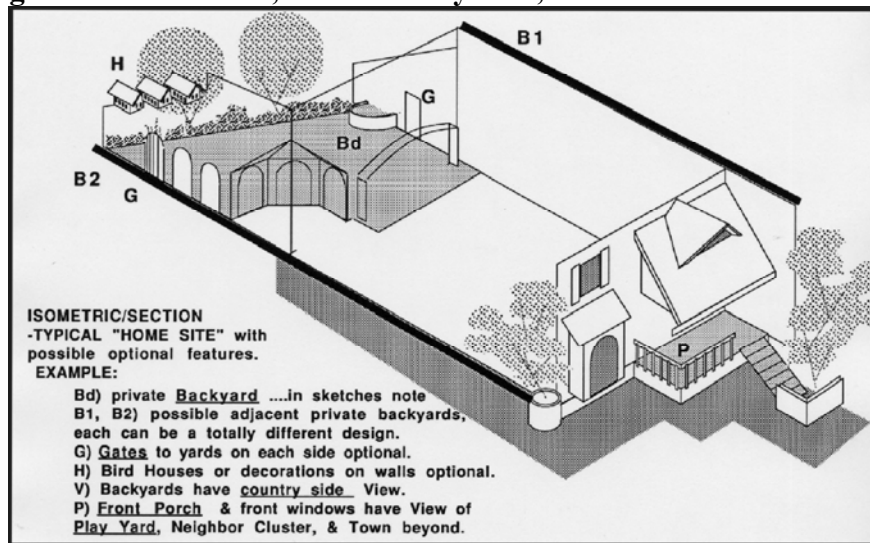
Rather than a pre-built home, we will provide a Home-Site where you can build whatever you want. You can build a house with one room or ten; it can be a duplex or a four-plex. Cars are on a lower level. Therefore, within certain limits, the number of people living in your Home-Site will not have any negative effect on your neighbors.

Rather than a long walk or driving, everything is within a short walk: shopping, schools and services. In fact every front porch overlooks the section of Main Street that passes through your extended neighborhood. It continues through every neighborhood of the town.

Rather than mixed with people areas, cars are in the basement, can be directly accessed from each home by a shared elevator and foyer to private garages for 2 cars or storage.

Rather than subdividing new land, we can even bring open space and farming to existing deteriorated in-town areas and preserve historic buildings as focal points.

Figure 12. Home-Site, A Two Story Loft, One House or a Four-Plex



How is all this possible? The diagram (Fig. 12) and descriptions show the architectural arrangements that give this Home-Site its advantages. It is a two-story loft, wide and deep enough for a large typical house and a yard. Dimensions can vary based on local desires. This diagram shows a front porch, the sidewalls and the backyard. Only the front can be seen, so only it needs design guidelines. Typical health, safety and welfare requirements will apply. Otherwise, the space inside the walls is completely private; you can build and change whatever and whenever you want. Affordability is made practical for any budget.

Yes, it is a box. But compare a typical suburban lot. It is also a box. Height limits and setbacks define it. Suburban lots can be seen, so zoning laws are required to control what is built to protect neighbors' values. That imposes sameness on buildings and occupants. Freedoms are very limited on typical suburban lots. There is no flexibility; if a house is too big or too small, moving often is the only option. This new Home-Site could have room systems almost as easy as to change as furniture or erector-set type components.

In Conclusion

Contributors of every energy efficient concept, system and material presented at this conference have seen alternative concepts. Comprehensively meeting future challenges is simply not possible in town concepts being built today. A quantum change like the new concept presented is necessary to achieve a practical long-term "Energy Efficient Economy." We are at a unique time in history, renewed design awareness and new technologies offer possibilities never possible before. The dream and purpose of this paper is creative minds, imagining past the words and pictures, already spawning new ideas.

This is a new beginning extending into the future. Since the draft edition of A Town Primarily For People was printed the idea has continued to evolve. It would take a conference to present all the research and models. It is more than just an idea; it offers a real-world solution that can be built today with initial house cost similar to comparable typical houses in suburbia. It can satisfy the objectives of the sincerely concerned environmentalist and real estate developer. Its 3-D subdivisions in a permanent framework allow new relationships along with new technology to comprehensively address the challenges. Once initially built, 70% of what we currently expect as recurring and replacement housing costs disappear for 1000+ years or more, including the related energy cost and environmental impacts. That introduces a new sustainability feature, continual use.

Your critique is welcomed. With your input this idea will be refined and continue to evolve. This is an original copyrighted 3-D arrangement of architectural spaces potentially able to comprehensively meet all our challenges. It will require an equally new and comprehensively concerned entity to build the first prototype.

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