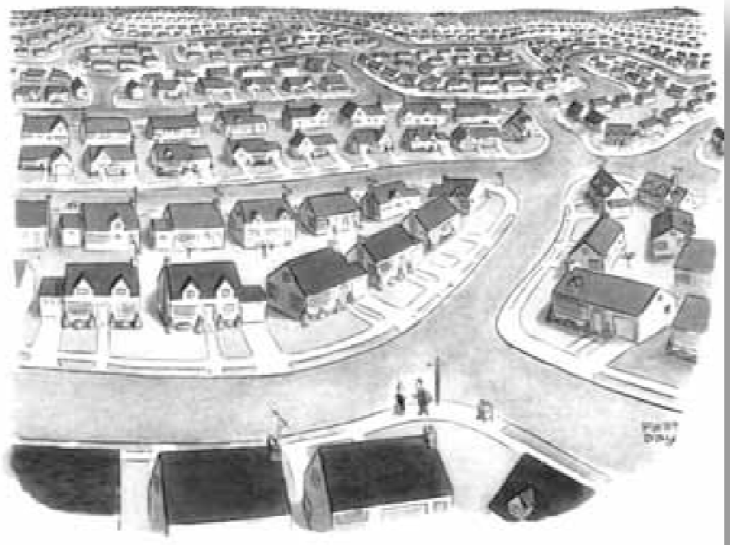
Prefurbia: Reinventing the suburbs from disdainable to sustainable

For as long as cities have been around their relationship of buildings to streets have not changed – it is as if there was some rule that the structure of a home be parallel to the edge of the pavement.

It's been less than a century since the automobile has defined the way we travel, yet the actual relationship of streets and structures have not significantly changed over time. The hub and spoke pattern of old cities when a mule was considered fast transport makes similar sense for today's car or truck traveling a mile in less than a minute. The rigid planning of building structures and streets remained relatively unchanged over time and here is where the real advancements can be made to create more efficient and attractive design standards.

From a design perspective, the North American cookie-cutter patterns have not changed for over 50 years. To prove this point this cartoon from *The New Yorker* appears as contemporary as any development built in today's suburbs. This cartoon was published in 1954.



"I'm Mrs. Edward M. Barnes. Where do I live?"

In 1954, there was no awareness of our polluting the planet, no technology to help those designing our cities, nor any standards to reduce energy consumption.

By the time this cartoon was published, Urban Land Institute had already introduced PUD and Cluster Planning principals… since then no new innovations were invented – until recently.

People today are much more aware of the importance of being good stewards of the environment and entire industries have been required to change to more stringent standards of design either through regulations or market demand to be competitive. For the most part, other than perhaps some environmental restrictions, the designs of our suburban developments have escaped major changes.

Today terms like "green" or "sustainability" describe the latest trends in home building and development. The methods developed in Prefurbia adhere to these movements.

Why Technology did not improve neighborhood design:

Civil Engineering, Land Surveying, Landscape Architecture, and Architecture require those professionals to be licensed – anyone (in the USA) can be a Land Planner. There is no requirement to be licensed or even experienced to become one!

Until the advent of today's computer and software systems, it would take weeks or months to manually calculate, check, and draft a small subdivision. Introducing more curvilinear design significantly delayed production, not to mention the complexity of staking curved streets or property lines.

All of the tediousness evaporated during the explosive software growth during the 1980's.

For the past decade, in a single day, a savvy civil engineering technician can compute and plot complete subdivisions – large ones. Yet, with all this power they still create the same cookie-cutter designs as if we were using a quill pen on parchment.

Instead of using all of the new tools to produce better plans, we have been using them to get the subdivisions out – faster!

The land planning industry in general has become complacent allowing an automated software function to control their designs. As an example a pre-programmed cul-de-sac configuration guarantees monotony.

Instead of being a designer, we can press a pre-programmed button.

Critical issues such as, quality of life, environmental impact, safety, energy efficiency, and affordability through more efficient design, ***the elements critical for sustainability*** – there is no software function for that.

Another roadblock to sustainability has been the very regulations developers must adhere to for approvals.

Regulatory roadblocks to sustainability

Most of today's development problems are due to "minimums" based regulations.

Developers contract consultants to plan and engineer a neighborhood.

The first thing a designer will do is review the current minimum standards to maximize the use of the land. The engineer will concentrate on grade restrictions, sanitary sewer runs, and retention requirements.

The goal of every designer involved is to maximize yield with a minimal development costs.

The minimums based regulations we use to guide the professionals to create today's cities guarantee only minimal development practices.

What of other planning methods such as PUD's, Clustering, and Smart Growth? Each introduce a new series of "minimums", while generally better than the average conventional ordinances, designers still concentrate more on managing the "numbers" through the design process.

Educational roadblocks to sustainability

For the most part in the past half century, those designing our land developments have not had to re-learn an industry. Certainly technology has played a role and the tools have changed but the basic planning and engineering principals have remained a slow evolution process. A civil engineer from the 1950's, if he could time travel to today, would be comfortable with the design and grading of most subdivisions. That engineer would need to learn new drainage restrictions, but then, today it's a matter of learning which buttons to press on a keyboard directing some drainage software package – designed to adhere to the minimum regulations.

If there were to be a major shift – the entire consulting industry must be retrained, and this takes time, money and effort.

It is difficult to get a man to understand something when his salary depends upon his not understanding it.

Al Gore - "The Inconvenient Truth"

Achieving both Sustainability and Green Goals

The term “sustainable” relates to a concept called the "Triple Bottom Line” (**TBL**): **P**eople, **P**lanet, and **P**rofit (the three P’s), endorsed by the United Nations in 2007 for urban and community accounting.

Green is commonly associated with many products, however, is most often used in Home Building. The goals for green include reduction of resources (water, and electricity for example), clean air, less maintenance, and less environmental impact.

For the purposes of relating these ideals in Prefurbia, the goals are:

1) People who live in the neighborhood the are first priority.
2) Develop land with reduced infrastructure length.
3) Respect the natural form of the site as much as possible.
4) Create pedestrian systems that are convenient, safe, efficient and direct.
5) Maintain “flow” through a neighborhood to reduce both time and energy in transit.
6) Enhance the sense of space through efficiency, new architecture, and harnessing scale.
7) Create a sense of “neighborhood” and build character while reducing monotony.
8) Embrace low impact design and engineering methods that are proven or appear promising with little or no negative side effects.
9) Design as if all residents, regardless of income or social status, are important.
10) Create commercial environments that blend with residential uses while enhancing the visibility to all business owners and creating convenient access to customers.
11) Provide for transportation without purposely restricting automobile based systems.
12) Never intentionally introduce any design element that reduces any of the above.
13) If a regulation is counter to the above principals then challenge the municipality or governing agency – never blindly follow any regulation counter to the above goals.
14) Respect not only the developers desire to be profitable but also create value through design to set the foundation for economic stability for future generations.

Prefurbia – People first:

Environmental concerns are important as well as adhering to the requests of the municipality. Developers often plan their neighborhoods to address complaints of neighbors who assumed that large field would somehow forever remain their private open space by placing open space for the yes vote instead of where it might benefit the population of the neighborhood. In Prefurbia creating the most livability takes priority. Serving each individual family unit above all serves the developer and municipality best. In Prefurbia, neighborhoods are built with reduced infrastructure, which creates more organic (typically landscaped) space. By default, Prefurbia is more environmentally responsible.

Prefurbia – Reducing Infrastructure

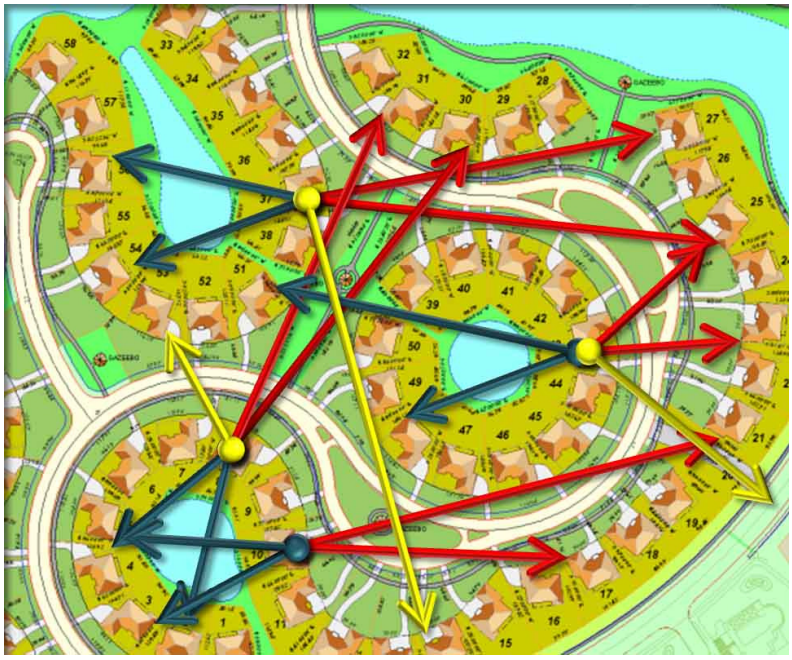
Figure 1 Paseo de Estrella – Albuquerque New Mexico Winner of The Project of the Year Award, built by D.R. Horton Homes. Note the low impact desertscape and the beautiful meandering walks

Coving was the first of many new design discoveries in this new age of Prefurbia.

Coving provided a foundation to gain efficiency reducing construction materials (infrastructure) used to develop land without losing density. Coving is fluid in shape – meaning it can easily conform to the existing surface of the land unlike any prior form of site design.

For the first time in the land planning there is an organized method where the streets, homes and walks can form independent patterns to gain significant efficiencies.

At first the coved design may appear wasteful but when properly implemented, it reduces the infrastructure length needed to develop suburban land typically between 15% and 30% compared to conventional methods and upwards of 50% compared to "Smart Growth" principals. Imagine reducing streets that much while maintaining density!



Increased useable land along with independent relationships of the homes (each home is a part of an overall flowing organic shape) provides architectural opportunities to create vast viewsheds from within living areas of the homes.

This opens up a new era for the architect and home designer to create a house that opens up to the exterior space creating an illusion that the home is bigger than it appears.

Prefurbia: Honoring your Mother (Nature)

Trying to force a square peg in a round hole:

A conventionally designed subdivision or a "Smart Growth" grid (as seen in this picture) is unnatural because contour lines don't naturally form a grid. This produces an excess of earth moving – and when that happens developers alter the flow that nature provides. Moving dirt (earth) is also expensive adding to the cost of housing.

What makes subdivisions so rigid?

Typical subdivision designers use the CAD software "offset" command which automatically generates parallel lines to quickly create rows of rectangular design lots that likely conflicts with the natural surface. The result disturbs the flow that nature has taken a millennium to create but a few minutes with a CAD program function to destroy.

Prefurbia – An organic design solution.

Prefurbia prescribes non-rigid planning methods (street and house patterns course independently). One method, coving, reduces the street length required for development. A coved design can become more efficient as shapes become more 'fluid', emulating nature.

Prefurbia: Pedestrian Oriented Design

In Prefurbia, the Neighborhood Planner designs the pedestrian system first. Destinations for the walks are targeted as a basis for the open space "system," assuring convenient pedestrian connectivity through the developers land. Conventional and "Smart Growth" planning creates walking patterns that follow the street pattern – typically with walks too narrow to be useable (American standards suburban and urban walks are only 4' wide).

For walks to be useable and encourage their use, they must be wide enough (5' or 1.5 m at a minimum) and be inviting. A walk parallel to the curb does not foster excitement nor is it particularly safe as it places pedestrians in close proximity to the vehicular traffic. The more open streetscape in Prefurbia allows for the space for walks to meander thus creating a vibrant and exciting streetscape that is void of monotony.

While many suburban cities in the USA prescribe (rightfully so) walks on only one side of the street, most require walks on both sides. This produces two sets of walks too narrow to be useful adding 8 additional (width) feet of paving for every foot of street – and the results? Many residents will walk along the wider, more useable street! Walks both sides of the street do make sense when traffic is heavy but most internal residential streets have very low traffic. Residents will naturally cross the streets to visit their neighbors… having a walk on both sides will not reduce street crossings.

Prefurbia, thus, will produce a pedestrian system that will be more direct, more connective, far more attractive and inviting (setting meandering walks in public access easements when the walk leaves the right-of-way) and will do so with up to 50% less impervious surface area!

Prefurbia: Go with the Flow

The Prefurbia concept in design of "flow" was first published in the American Planning Association Winter 2007 National newsletter. This method in design was created to reduce the time it took to travel through a development from its entrance point to the destination (home or business). Time can easily be translated into energy reduction and today, energy reduction is becoming even more important than the time savings. We use the term "energy" instead of fuel because the method we use today to power our vehicles is mostly gas – tomorrows vehicles are likely to use a different means of energy. The energy, no matter what form, somehow will require a source. So even decades or centuries from now any form of reduced energy consumption can only have positive impacts. One sure way to increase consumption is to accelerate a vehicle from a stop or crawl to a cruise speed then slow down and stop at an intersection. Getting that mass of vehicle in motion again requires an enormous amount of energy. Once in motion the energy used to keep it at a constant speed is much less. The more cycles it takes to disturb flow translates into wasted energy. It also wastes time.

Flow can be looked at from two different aspects – first is that of regulatory restrictions, which can often hamper flow. The other being new design methods introduced in Prefurbia to increase flow.

Over the past few decades, we have seen more restrictions on arterial streets concerning the distances that regulators will allow street connections. It seems just the last decade in Minnesota, County Engineers increased required distances from 330 feet to 660 feet then to 1,320 feet between access points to a county road. For the most part, over the past few decades, speed limits and average daily traffic flow remained the same. Vehicle performance - in particular braking distance has improved greatly in this same time frame. The advantages of flow can easily be demonstrated on any car or truck with a fuel computer. Simply choose a subdivision to drive through with a lot of short blocks and intersections and make your way 1 mile along a course. Also set the time it took. Zero the computer when you begin then drive through at normal speeds. Then find a street that allows you to accelerate and then maintain a constant speed (the same speed that you drove through the maze-like development). At the beginning clear, the computer and reset your timer then at the end read how much fuel and time was saved. You will be amazed on how much time and energy our development patterns waste!

Prefurbia: Embracing the desire for space

The basic premise of the new design era is to create developments with less paving while maintaining density. This results in more organic space within the neighborhood.

There are many forms of space that takes place in a development: Open space, spaces within a home or business, yard space and streetscape. There are also forms of space that would be considered void space with little use.

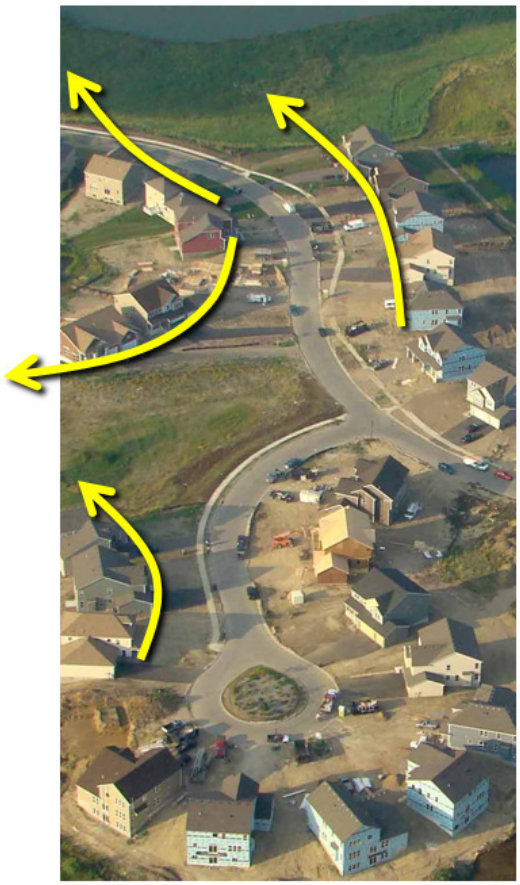
Open space is what is commonly required by regulations that developers must adhere to. Most designers of developments worry about maintaining the minimum area more than figuring how that space can be made useable. There are instances where open space cannot deliver perceivable space. For example, a heavily wooded 50 acre site with thick undergrowth stops viewable space a very short distance from its perimeter. To the person on the street, the 50 acres may as well be 5 acres. Planners typically try to spread minimum required spaces in areas that might be undesirable for the development such as steep slopes, narrow buffers, etc. Cities may require the open space to be bordered by public street which is supposed to promote its use. However, that significantly increases non-fronted (by housing) street right-of-way, which places an increased financial burden on every home owner, and the on-going maintenance borne by that Municipality. Prefurbia prescribes a balance of this exposure, not necessarily by increasing street exposure, but to offer what is called view shaping.

View shaping places the homes in a path directing views to open space by using the homes as the foundation for these paths.

Valuable open space is exposed without too much street waste (varies with every unique development).

Open space that is viewed from the street will be valued by all. Open space hidden in just a few home rear yards limits value.

Scale is also important. Some cities require additional setback from the street thinking this increases space. Yes it increases space, but when every home is at the exact same setback, that space will not be felt. It is the feeling of space that matters more than the actual area provided. If a space feels 2 acres but it is actually ½ acre, the desire for space is fulfilled. The only way to increase the feeling of space when outside the homes and businesses is to provide “scale”.



A person cannot grasp space unless there is a benchmark to compare with. A talented home designer uses tricks with scale to make a small home appear much larger than it is. Within the home, an adjustment of a wall just ½ foot can make a significant difference in how large the home feels. When outside that home, a ½ foot difference makes no difference. The mass of the streetscape requires some aggressive movement to give the illusion that there is more space than actually provided. The typical home buyer looks to see how much area is in the home, not the lot. Their buying decision is based upon the square feet or meters of the house. However, when it comes to lot size, they will look not to exact numbers, but more on how large the lot feels. What determines the feel, is the distances along a view direction (viewshed) to the next object (home, fence, landscaping border, etc.).

The reason viewsheds and view shaping is so critical for sustainable neighborhoods, is the desire for space can now be satisfied and accomplished without sacrificing density. In many cases, both space and density can be increased!

Prefurbia is the first organized form of planning that blends architectural space as a major component of the overall neighborhood design. Today we have the technology to take planning to a much higher level.

When we plan both neighborhood and architectural spaces together, they increase functionality. Blending interior spaces to the surroundings, we enhance livability without necessarily increasing the cost of housing!

The perception of space expands far beyond the home lot perimeter. (see figure at bottom of page 5).

Prefurbia sets a new standard for delivering actual and perceived space.

Prefurbia: Enhancing the sense of neighborhood

A front porch may be nice but it certainly does not make a subdivision a neighborhood. Among all of the previously discussed points that help combine a more functional place to reside, there must also be cohesion that identifies the space as a neighborhood. This is where Prefurbia borrows from New Urbanism and Smart Growth, where architectural and landscaping elements help create character and identity as a neighborhood. Prefurbia also borrows the idea of places and spaces as destinations. That said, the way Prefurbia accomplishes all of this is with a far more open, organic and efficient foundation.

Prefurbia: Embracing lower impact forms of design - cautiously

The main difference between sustainable design and green design is that to be sustainable the design must also be "green". A product can be "green" but totally unsustainable. There are many examples that can be used, but here are a few:

Geothermal can significantly reduce the heating bill. But geothermal can cost $50,000 above a high efficiency HVAC system. When contractors quote the advantages of geothermal compared to conventional systems, they use 89% efficient HVAC systems, considered a minimal system today. Upgrading to a 96% conventional HVAC does cost a few thousand dollars extra but the efficiency skyrockets making the geothermal less attractive. Replacing traditional fiberglass batting with foam in a new home could easily cost more than $10,000. Using a 1" thick foam to seal the home and get most of the benefit (when also adding fiberglass insulation) adds only a few thousand dollars. Adding a full geothermal and insulating the entire wall cavities are certainly a way to reduce energy costs but there would be no real-world payback. By using far less expensive methods, most of the benefits can be realized and the payback can be very quick. Both will work, but only the methods used in moderation are sustainable.

The same goes for land development. Pervious paving, for example, at first appears a great solution. Those selling the paving will boast how it has survived a few Minnesota winters but that's not much of a test. Will they guarantee replacement if the product wears prematurely? Rain passing through paving sounds great but where does that water go? Pervious paving requires an absurdly expensive base to work. If that was not bad enough, before the freezing of winter months, the base must be vacuumed of moisture – that cannot possibly be cheap. Who's going to service all of this? What about rain-gardens? Yes, these are wonderful devices that filter run-off, but again, require specialized ($$) maintenance that is on-going or those areas quickly become weed gardens of little use or value.

Recycled goods are another area where the green movement has embraced. Those Bamboo floors do require some minimum level of humidity to be maintained – otherwise it has a tendency to split. That roof that looks like slate made up of old plastic and tires might have a 50 year warranty but its likely to fade and curl in just a few years under the sun, and color is not typically part of that 50 year warranty!

In Prefurbia, it is encouraged to use every possible method to reduce environmental impacts but in a sustainable manner. Site engineering is another matter - new forms reduce both costs and environmental impacts.

Prefurbia: Developments for the masses

For a city to be sustainable it must offer a higher standard of living at prices for all of those in the housing rental and purchasing market. This is why every method introduced in Prefurbia must be equal to or less costly to implement than a conventional method.

Smart Growth may declare that it is a viable solution for the "less wealthy", but where are the examples? Replacing a downtrodden area with a New Urban gentrified utopia certainly does nothing to improve the lives of those less fortunate who were prior residents. Yet Prefurbia has proven to be solutions not bound by economic, race, or social status. Many of the award winning developments designed using these techniques were specifically for low income residents – many not even requesting subsidies. If it is not affordable to the general public, it cannot be either green or sustainable. Prefurbia exceeds these expectations.

Prefurbia: Mixed Use Alternatives

Prefurbia has many different design methods for commercial and non-residential uses. Many of the techniques that apply to the residential design can be applied to commercial uses as well. For example, flow may be even more critical in non-residential high traffic situations – making it easy to get to a business will increase the sales – pretty simple.

Prefurbia maintains a high level of exposure for retail business owners from both vehicular and pedestrian access. Smart Growth often intentionally sets barriers to vehicular access to encourage both public transportation and pedestrian alternatives. This restricts customers to a retail business – how can that possibly be sustainable? Prefurbia promotes access of all forms.

Strip malls can be attractive but many are a blemish on the suburban landscape. Prefurbia introduces the neighborhood marketplace that retains the convenience of the strip mall that retail businesses desire but without the loading docks along residential uses. In Prefurbia, local retail becomes an asset not a liability to the surrounding residential.

Prefurbia: Traffic systems that make sense

Anything that intentionally destroys flow such as, roundabouts, are discouraged. Instead Prefurbia prescribes traffic diffusers which operate much like a roundabout but maintains flow through the dominant street and provides a higher level of safety for pedestrian crossing.

One size does not fit all. A municipality will demand a minimum width for all streets as if all have the same amount of traffic – nothing can be further from the truth. Prefurbia prescribes sizing walks and streets for the traffic volume that is intended when the municipality is open minded enough to embrace such a concept. This could also mean that in some instances, the street width may actually be wider than minimums!

Everything that can be done to reduce pedestrian conflicts with vehicular traffic is promoted through design and separation of the systems.

Concluding thoughts

Planning and development tends to be trendy. In the 1970's, the term "cocooning" was popular as the form of the future – today can anybody even remember what that even meant? In the early 1980's, building homes into the earth was touted as the wave of the future. The unfortunate few who followed in these footsteps were awarded with underground homes having little resale value.

Planning is not a religion where one must have complete faith that a single method of design will solve all social and economic ills. There is a definite place for Smart Growth and the New Urbanism and certainly some elements of those movements that make sense are indeed a part of Prefurbia. Prefurbia provides a solution that residents of suburbia desire – increased space without sacrificing economic viability bringing a new era in reach of all income levels. Prefurbia sets a foundation that will continue to maintain value and livability long after the developer sells the last lot. And finally, Prefurbia accomplishes all of this in a more environmentally responsible manner that transcends convention.

Of course everything you just read is meaningless if the consultants hired to design the sites that developers hire them to do, simply continue to depend upon a software function to do their job for them and do not bother to take the time to learn new methods.