A Pattern Language for Growing Regions

Economy • Technology • Quality of Life

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A Pattern Language for Growing Regions:
Economy, Technology, Quality of Life

A Collection of 56 New Patterns for a New Generation of Urban Challenges

A Companion Volume to the Classic 1977 Book,
A Pattern Language: Towns, Buildings, Construction

Michael W. Mehaffy, Ph.D.

To Christopher, and to all those others who continue his fascinating and hopeful work.

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WHO IS THIS BOOK FOR?

Introduction

One of the most pressing needs today is to improve the quality of urban development for growing regions around the world – to maximize the benefits that urbanization can bring, while minimizing the problems and negative impacts in the future. To that end, this volume presents a so-called "pattern language" of best practices that have been identified through our research at Sustasis Press, and with our partners at KTH University, the University of Strathclyde, and a number of other universities and research centers.

This book also represents a contribution to our five-year collaboration with UN-Habitat on implementation of the New Urban Agenda, a framework document that seeks to maximize the benefits of urban development for the next twenty years. In 2016 the New Urban Agenda was adopted by consensus by all 193 countries of the United Nations, in an act of remarkable international unity – but the remaining need is for implementation, and for finding the effective evidence-based tools and strategies to do so. This volume is one contribution aimed at addressing that need.

This volume is also intended to stimulate a wider effort, not only toward applying the information herein, but adding to it, and developing parallel efforts, ultimately forming a many-stranded network for sharing of the best available knowledge, tools and strategies for better-quality urbanization. In that spirit, this work is by no means a "final word" – but it is our best formulation of the current state of evidence-based urban design and architecture.

Why pattern languages?

In many fields today, pattern languages have been used successfully to develop and share best practice design tools and strategies. Perhaps the widest usage is in computer science, where pattern languages of programming (also called design patterns) are used to develop common operating systems, most games, and many other kinds of programs. In a remarkable spinoff, pattern languages also led to the development of wiki, which was created as a tool to share patterns of design, and later used (more famously) to create Wikipedia, and other widely-used websites. Additional software spinoffs included Agile development, Extreme Programming, and Scrum methodology.[1]

Pattern languages have also been applied usefully in many other fields, including molecular biology, business management, production engineering, and many others. This is a remarkable diversity, particularly considering that pattern languages had their origin in design problems of the built environment.

What accounts for the usefulness of pattern languages across such a diversity of fields? They are in essence a way of capturing useful knowledge about the nature of a design problem, and expressing it in a way that can be easily shared and adapted to new contexts. However, the form of the knowledge is not rigid, but context-dependent and relational. This feature is especially useful for design problems that require very local and context-specific responses. Of course, this is the case for problems of urban design and architecture too.

Why these patterns in particular?

This volume is not meant to provide an exhaustive library of patterns; rather, it is meant to help stimulate a much broader development of new patterns and new approaches to address timely challenges. In order to do so, it offers a representative compendium of additional patterns that provide important benefits from particular kinds of urban form, as the evidence has shown. The book is therefore divided into twelve scales of form or action, with four representative patterns at each scale.

These are not the only patterns that are possible, certainly – and indeed, many regions are using very different patterns today. But the thesis of this book is that the patterns herein are representative of a more reliable, evidence-based approach to sustainable, resource-efficient urban development, promoting a higher quality of life, and at the same time, a healthier and more resource-efficient form of economic development. We document this thesis with numerous research citations within the patterns, and we further demonstrate this thesis by showing some concluding examples of several contemporary cities that do incorporate these patterns very successfully, with measurable economic, social and ecological benefits.

Many of the patterns collected here are also reflected in the specifications of the New Urban Agenda, the international framework agreement on urbanization. The document places heavy emphasis on the role of public spaces, including streets and sidewalks, as essential systems for healthy urbanization. It articulates this new priority for public spaces in no fewer than ten paragraphs.

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[1] See for example Cunningham, W. and Mehaffy, M.W. 2014. “Wiki as Pattern Language.” In *Proceedings of the 20th Conference on Pattern Languages of Programs* (PLoP'13), Monticello, Illinois, USA (October 2013). 15 pages.

For example, Article 37 promotes

> *... safe, inclusive, accessible, green and quality public spaces, including streets, sidewalks and cycling lanes, squares, waterfront areas, gardens and parks, that are multifunctional areas for social interaction and inclusion, human health and well-being, economic exchange and cultural expression and dialogue among a wide diversity of people and cultures…*

The New Urban Agenda also emphasizes the economic importance of public spaces, as in Article 53:

> *We commit ourselves to promoting safe, inclusive, accessible, green and quality public spaces as drivers of social and economic development, in order to sustainably leverage their potential to generate increased social and economic value, including property value, and to facilitate business and public and private investments and livelihood opportunities for all.*

The New Urban Agenda also emphasizes the interconnected, "network" character of public spaces, with special emphasis on streets as public spaces, and the ways they and other public spaces connect to private edges. For example, Article 100 supports

> *...the provision of well-designed networks of safe, accessible, green and quality streets and other public spaces that are accessible to all and free from crime and violence, including sexual harassment and gender-based violence, considering the human scale, and measures that allow for the best possible commercial use of street-level floors, fostering both formal and informal local markets and commerce, as well as not-for-profit community initiatives, bringing people into public spaces and promoting walkability and cycling with the goal of improving health and well-being.*

Finally, a number of other articles in the New Urban Agenda emphasize the integration of public spaces with other key characteristics of urban form, including "polycentrism" (many regional centers with a full mix of housing, employment and recreation). For example, Article 51 supports

> *...the development of urban spatial frameworks, including urban planning and design instruments that support... appropriate compactness and density, polycentrism and mixed uses, through infill or planned urban extension strategies, as applicable, to trigger economies of scale and agglomeration, strengthen food system planning and enhance resource efficiency, urban resilience and environmental sustainability.*

An evolving theory of urban form, based on an evolving science of cities

This emphasis on public space frameworks organized around streets and their active edges, and around mixed use, polycentrism and compactness, reflects a notable shift from the dominant 20th Century urban theories. These older theories, rooted in an earlier industrial model of cities, have given way to a more dynamic, more complex view of cities – one that also reflects new scientific insights from the biological sciences, and from other advancements in mathematics and other fields.[2]

The form of many cities today is still dominated by the older models. It must be recognized that these models have proven effective in supporting rapid urbanization and economic growth, and in removing millions from poverty. This achievement cannot be minimized. At the same time, the older models rely on unsustainably high rates of resource consumption and depletion, and related long-term consequences like pollution, greenhouse gas emissions, climate change and other potentially disastrous long-term impacts. The evidence increasingly points to the need for a major transition to more resource-efficient forms of urbanization, and of technology – and to urbanization that also more efficiently delivers better long-term quality of life for human beings, without the many negative impacts of the older models.

Accordingly, the patterns herein reflect this new view of cities, and indeed the new understanding of the inter-connected, web-like patterns within cities – a view on which the technology of patterns itself is based. Therefore, in accordance with the New Urban Agenda, the patterns here describe compact, polycentric urban development, public space frameworks, a mix of uses, multi-modal forms of transportation over well-connected, walkable street systems, active street-level building edges, human-scale design, ample greenery and natural characteristics, and other related specifications. Again, these patterns are not the final word, but they do reflect our best current formulation of the state of the urban science, and the lessons for urban best practice.

The original book *A Pattern Language* – in need of revision and extension

In a sense, this volume is meant to serve as one timely companion to the 1977 classic book of urban planning and architecture, *A Pattern Language: Towns, Buildings, Construction.* It reflects the twin belief that the previous classic book was a seminal contribution to the literature of environmental design – and yet it was woefully incomplete, and even erroneous in places. That critique is not at all inconsistent with the intentions and expectations of the original authors, as we discuss below.

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[2] These topics are discussed in much greater detail in Mehaffy, M.W. and Salingaros, N.A. (2014), *Design for a Living Planet,* Portland: Sustasis Press.

In this volume, we have curated a collection of patterns that seem to us to be especially useful and relevant for urbanization in the first few decades of the 21st Century. Perhaps more important, however, is that we take this occasion to launch a new on-line repository for the exchange, update, modification and further development of patterns and pattern languages, focused primarily (but not exclusively) on patterns for the built environment. When the original book came out in 1977, before the advent of the Internet, this was not possible. Now that it is, we think such a step is long overdue.

We note that more than forty years have now passed since the first publication of *A Pattern Language.* Even today this landmark volume is still a bestseller, and unquestionably, it has had monumental influence. At this writing, the phrase "pattern language" scores some half a million page hits on the world's most common search engine, and its software counterpart, "design pattern," scores 16 *million* hits. William Saunders of Harvard Design Magazine stated that *A Pattern Language* "could very well be the most-read treatise on architecture of all time." He went on to say, however, that in the architecture schools he knew, it was as if the book had never existed.

There are several interesting explanations for this anomaly. One is that architects are a rather peculiar breed of designer, and while other designers (like software engineers) have found enormous usefulness in this approach, architects have been too focused on the ideology of "creativity" as an individual artistic act, *sui generis*.

Another, perhaps more relevant explanation is that the book itself was simply too attractive for its own good. That is, the original collection of 253 patterns seemed to be forever trapped in the printed text of this alluring, bible-like volume, unable to be amended or added to. Yet this was the clearly-stated aim, made in the opening pages of the book:

> *We hope, of course, that many of the people who read, and use this language, will try to improve these patterns — will put their energy to work, in this task of finding more true, more profound invariants — and we hope that gradually these more true patterns, which are slowly discovered, as time goes on, will enter a common language, which all of us can share...*
>
> *You see then that the patterns are very much alive and evolving. In fact, if you like, each pattern may be looked upon as a hypothesis like one of the hypotheses of science. In this sense, each pattern represents our current best guess as to what arrangement of the physical environment will work to solve the problem presented. The empirical questions center on the problem — does it occur and is it felt in the*

> *way we have described it? — and the solution — does the arrangement we propose in fact resolve the problem? And the asterisks represent our degree of faith in these hypotheses. But of course, no matter what the asterisks say, the patterns are still hypotheses, all 253 of them — and are therefore all tentative, all free to evolve under the impact of new experience and observation. (Alexander et al., 1977, pages xv-xvii)*

With the exception of a few pockets of practice, this continued evolution has been woefully absent. Instead, the very success of the book has served to freeze its contents, protected even by copyright as well as by the practical difficulty of modifying or adding to printed pages. Yet the text above makes it clear that the invitation to "improve these patterns" expresses the intention to launch an open-source project, for which "these patterns" were, by virtue of that clear wording in the original text, placed into public domain.

A new life for pattern languages in environmental design?

For many years this open-source exchange was difficult to accomplish at any significant scale, requiring the cumbersome use of xerox machines and the like. A few authors published compendia of new patterns, but without the ability to interact with and incorporate the original 253, they did not have a very large impact. Of course, with the advent of the Internet, it became much more practical to share patterns, and even to turn the references that each pattern featured into "live" links that could be used to "click through" to other patterns. This is precisely what was done in 1987, not by environmental designers but by software engineers. In that year, Ward Cunningham created the "Portland Pattern Repository," advancing both pattern languages of programming and their more famous outgrowth, wikis.

Both design patterns and wikis were developed to address a fundamental problem in software: simply specifying new solutions to new problems in sequence leads to a cluttering of code, and an increased likelihood of malfunctions from unforeseeable and unintended interactions. In 1987, Cunningham and his colleage Kent Beck, working at Tektronix Corporation near Portland, Oregon, were seeking new forms of software that would display what mathematicians sometimes refer to as "elegance": the ability to do more with less. Cunningham embodied this principle in the question, "what is the simplest thing that could possibly work?" This encourages a process of exploration and learning, without assuming the need for detailed specifications in advance.

Cunningham was intrigued by the capacity of language, in its very ambiguity, versatility and economy, to serve more ably as a useful working model for problem-solving. A problem is, by definition, not pre-decomposed into simple functional units, but as Alexander noted, has many overlapping and

ambiguous connections. Language mirrors this capacity, and therein lies its usefulness. Therefore the goal is, in a sense, to achieve the same robustness of language, by endowing the model with its own set of powerful (but limited in number) generative components, much as language does.

Thus, the goal is not simply a matter of economy, but one of greater context-adaptive problem-solving power. In fact it goes back to the heart of Alexander's concept of language-like networking: a simple grammatical system, functioning generatively, can be far more powerful than a complex set of specification-based processes. As Cunningham put it, when asked by programmer Tom Munnecke to explain how "the generativity of a pattern is a way of expressing complexity:"

> *That was an idea that excited me, and that seemed more powerful than most notion that I had seen. ...And that is, language is generative, I follow some rules, and I can't remember when I learned them, but I was probably pretty young. And that idea that I can have a set of rules that generates something that I could value is really important. So the question was, why don't we do everything that way? And the answer was, well we pretty much did, until we let professionals get involved. And they said, no, no, no, no, it's really much simpler, you know, and they made it complex by trying to make it simpler, because they didn't understand how some system of rules could generate behaviors instead of specifying behaviors.*

This generation refers to the capacity to reproduce the essence of a functioning structure, without having to specify all of its characteristics. A simple example is the distinction between the way a genetic process generates the blue eyes, say, of a child, which recapitulates the blue eyes of the parent without having to specify them in minute detail (their intricate retinal pattern, precise round shape, etc). Instead, the genetic process is able to generate, and regenerate, an intricately complex structure from a relatively simple set of language-like (or recipe-like) instructions.

So it is with pattern languages and their patterns. The goal is to pick out the most salient features that are needed for regeneration *within a specific context*, and to establish a generative process that uses those patterns. This process is very much like the way older cities and buildings were traditionally generated using linguistic concepts, often without the need to state them explicitly. In the case of pattern languages, the process is only formalized, so that designers can be more articulate about the needed design aspects, and so that the result can be more successful, more durable, and more sustainable, responding to the best available evidence, and representing a best adaptation to human need.

Just now, by contrast, the human species is drowning in overly complicated and malfunctioning designs, from a human point of view. They may be exciting, they may be stimulating, they may be entertaining – indeed, they

may not be malfunctioning in the short term, but instead, offer great power and allure. But we are like the fabled Sorcerer's Apprentice, unleashing a power we cannot control. Especially in comparison with the durable structures of nature, and of our own history, the results lack long-term resilience and sustainability. We can enjoy them, we can marvel at them, we can admire them – but we must also commit ourselves to deep reforms.

An apparent paradox is that today we are able to produce more *volume* of building than ever before in human history. Indeed, we are in an era of unprecedented urbanization, on course to build more sheer area of urbanization in the next fifty years than in all of human history. It is therefore a matter of highest urgency to address the nature of this urbanization, and its long-term impacts on economy, technology and quality of life (hence the subtitle of this book) – and to determine the levels at which reforms are needed in policy and practice.

It is a thesis of this book that those levels are very deep indeed. At the heart of the pattern language methodology is a recognition of changes needed in the very nature of technological methodologies, and the inadequate feedback capacities of our current systems – particularly as they impact the use and depletion of resources, the systems we use for developing and applying adaptive knowledge, and related challenges.

This is also the reform-minded insight behind the related movements of Agile, Scrum, wiki, and other innovative reforms in methodology of design, and technology more broadly. Pattern languages, as we have discussed, are already closely related to these other movements, and have greatly influenced them. Yet it is a thesis of this book that the final story of pattern languages – and especially, pattern languages in the built environment, where they originated – has not been written.

One of the great advantages of pattern languages is that they do contain within them the capacity to establish reciprocal feedback channels through their networks of hyperlinks. The implications of this capacity are broad, and a full discussion is beyond the scope of this book – although additional information can be found in the *Further Reading* section at the end of this volume.

New *kinds* of patterns

The sections of this book offer patterns at a number of different scales – as did the 1977 book – but addressed to new challenges, including rapid urbanization, new urban technologies (like autonomous vehicles), and the particular challenge of developing urban public spaces. (This is a key focus of the New Urban Agenda, and a particular focus of our own research work as well.)

Several sections also include new kinds of patterns as well – at least new by the standards of the 1977 book – including patterns devoted to retrofit processes (such as slum upgrading, and so-called "sprawl repair"), more detailed geometric patterns, and also implementation tool patterns (including community design and building processes, and financial tools). This focus on patterns of *process* represents an expansion of the earlier focus on patterns of configuration within human environments.

In all these innovations, this volume represents one open-source project to expand the capacity of pattern languages – and it is far from the final word. Like the first set of patterns, it amounts to a set of hypotheses based on our best assessment of available evidence. Like the hypotheses of science, these patterns are able to be challenged and revised, if and when truly better evidence – as opposed to *ex cathedra* doctrines, or ideologically motivated theory -- becomes available.

Accordingly, the text herein is licensed under Creative Commons' "Attribution-ShareAlike"[2]. Those who would like to revise, extend, modify, or otherwise re-publish the text with their own (we would hope) evidence-based alterations, are welcome to do so, in whatever media they choose, with the only stipulation of attribution to this original source, and continued openness to peer review and challenge on evidence.

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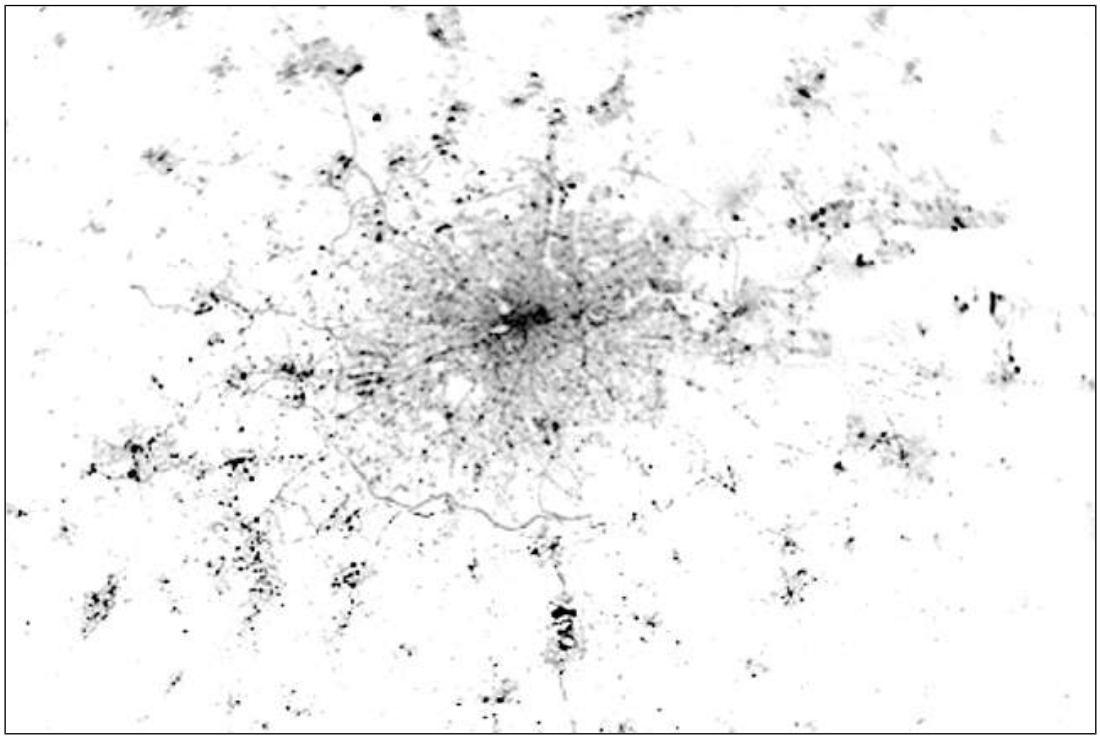
REGIONAL PATTERNS

POLYCENTRIC REGION



…We need to establish a settlement area as it relates to a wider regional structure. This pattern governs the relation of urban centers to their peripheries. Other patterns may help to establish the relation to urban hinterlands, for example CITY COUNTRY FINGERS, AGRICULTURAL VALLEYS et al.

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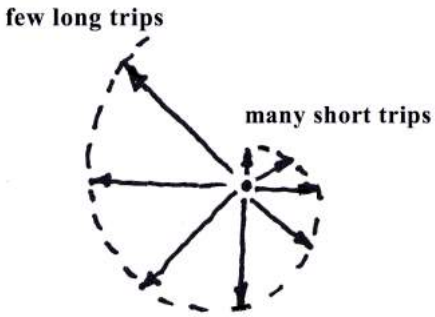
Problem-statement: Cities that are too centralized too often require excessive commuting from their edges, and their cores can become unhealthy monocultures.

Discussion: We can see that where cities and towns have developed in a more natural pattern – especially prior to the automobile – there has been a remarkably regular distribution of city sizes, with a few large urban centers, many smaller satellite towns, and a medium range of mid-size settlements, often suburban town centers. Similarly, most residents in these areas make a great many short trips – for example, daily trips to a nearby grocery store or to school – as well as a few long trips, perhaps to a major cultural event in another town. In between these extremes, they make a medium number of medium-size trips – for example, trips to work. This range of trip lengths could be illustrated this way:



But when a city is too centralized, even routine trips can become long commutes – for example, when the center is a monoculture of offices and workplaces, and the edges are primarily residential. A healthier pattern will break up this monoculture, and create a more diverse mix of activities and uses in each settlement of whatever scale – forming a "polycentric" region, or a region with many diverse, mixed centers, offering a complement of most of the routine destinations, activities and amenities of urban life.

This pattern can be seen clearly in the example of the London region (the photograph for this pattern). There a series of "urban villages" offers most of the needs for most residents to live, work and play within their own area, while they can also take longer trips less frequently.

This pattern also extends to the smaller cities and towns of a larger region. Their residents also need to be connected to the same regional economy, with similar life opportunities and exchanges, but focused more on the activities that are best suited for their regional location – for example, regionally specialized production of local resources, agriculture, and other location-specific economic activities.

All of these nodes in the local, regional and even global network, need to be well-connected and well-developed to provide balanced life opportunities for all residents. Evidence shows that when some populations are cut off from genuine opportunity for growth and human development, there are political, economic and environmental impacts that are likely to become unsustainable over time. The lesson is that it is dangerous to treat city cores as economic "silver bullets," and to over-concentrate economic activity there..

Therefore:

Develop cities as nodes within polycentric regions, consisting of a range of sizes of mixed, diverse, well-connected "urban villages" that offer a full complement of daily and weekly needs, and good access to other parts of the region for less frequent trips.

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Establish a rough structure of a 400M THROUGH STREET NETWORK, creating continuous walkable and multi-modal urban areas. Where interruptions occur, such as natural geographic obstructions, connect the centers as much as possible with a continuous network, organized around MOBILITY CORRIDORS and MULTI-WAY BOULEVARDS.

BLUE-GREEN NETWORK

… Settlements that follow the pattern of a POLYCENTRIC REGION will also adapt to the terrain of the land, its watershed and vegetation patterns ...

❖ ❖ ❖

Problem-statement: A region that does not adapt its form to its watershed patterns cannot be sustainable.

Discussion: Every settlement area has a hydrology, no matter how minimal. In recent decades, it has been common to pipe over the system of hydrology, but this is doubly destructive. First, it fails to allow the natural systems to function as they can to clean the water, recharge the groundwater, and support vegetation with natural irrigation. Second, it deprives the human community of an important quality of life asset and sense of connection to their own regional ecosystems.

In order to work with a region's hydrology, it is vital to recognize its network connectivity through mapping, and then to lay out settlement patterns such as streets and infrastructure in response to its "blue-green network," that is, its network of creeks, watersheds and vegetation corridors. These usually offer segments that can become important blue-green corridors for walking, cycling, recreation and vehicular transportation (with proper mitigation of danger, noise, emissions and other impacts)

The blue-green network of Portland, Oregon USA, located at the intersection of two major rivers and a number of creeks and watersheds. These have been fashioned into major corridors for infrastructure, movement, recreation and ecosystems services. Photo: Google Maps.

Therefore:

Lay out the settlement with the pattern of blue (water courses) and green (vegetation corridors and watersheds) networks.

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Identify key corridors of the Blue Green Network as potential locations for a GREENWAY or MULTI-WAY BOULEVARD.

MOBILITY CORRIDOR

… In a POLYCENTRIC REGION, develop proper high-speed connections between the centers of the region as well as to other regions.

❖ ❖ ❖

Problem-statement: There is a need for corridors that allow high-speed vehicular movement within and between cities. This need extends into the hearts of the cities.

Discussion: Few structures have been more damaging to modern cities than freeways. Yet the solution of creating freeway bypasses on the outskirts of cities is equally disastrous – sapping the centers of commercial movement and activity, and at the same time generating new sprawling zones at the edges.

This is not a unique problem of the automobile age. Railways can be no less destructive of urban areas, and so can canals, rivers and other structures – in fact, any structure that interrupts the connectivity and flow of pedestrians is likely to be problematic. But there are excellent examples of cities that have managed this problem, by separating the grades of the mobility corridors, and by creating a continuous fabric of connections across them. Examples can be seen in London, Paris, and many other mature cities.

Grade-separated mobility corridor in Paris: Place de l'Europe over a railway line.

The issue is not whether a mobility corridor is present, but whether the urban fabric above it remains intact. This must be done carefully, maintaining a continuous, tight fabric with minimal intrusion of noise, emissions, and visual disorder. Examples like Place de l'Europe in Paris demonstrate the value of ample vegetation, fences and other screening devices. Some cities have simply taken their mobility corridors underground, like Oslo. Some cities bring buildings across the bridging structures, like the Ponte Vecchio in Florence.

One problem for many cities is the cost of excavation and retaining structures. One strategy to minimize this cost is a "balanced cut and fill" grade change, rising gently in the urban fabric to the edge of the mobility corridor, and then cut more deeply to accommodate travel

lanes at a lower grade. A related strategy is to utilize existing natural watershed grade changes, taking care to avoid water pollution from vehicle emissions.

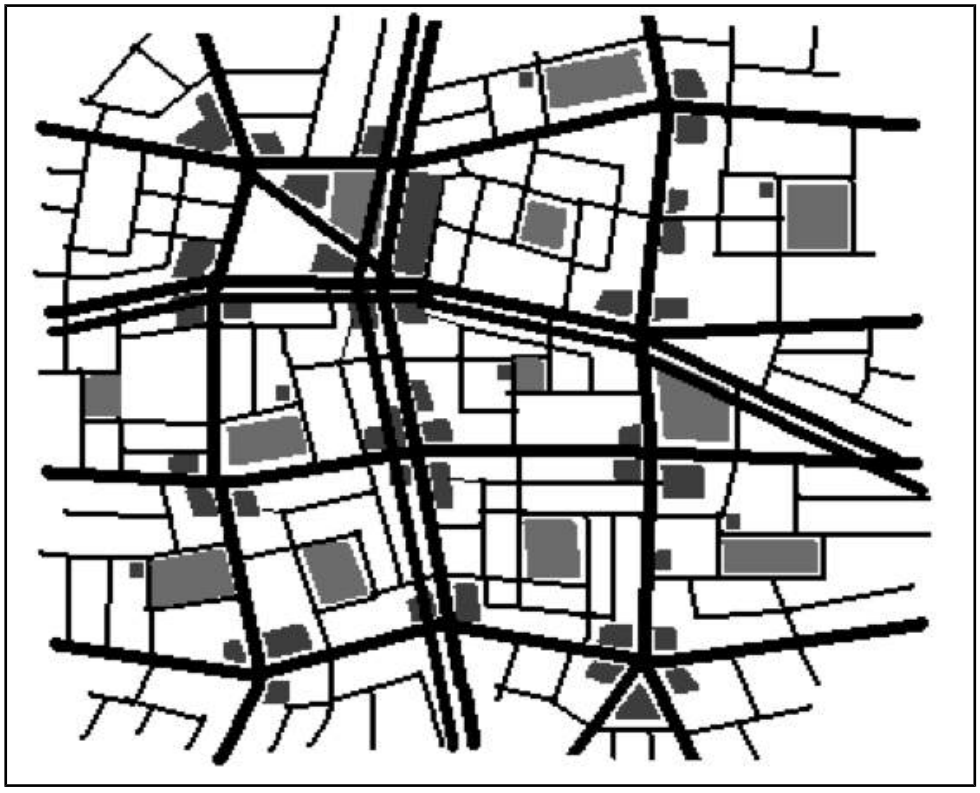
Therefore:

Do not push freeways, railways and other destructive activities to the edges of the city. Instead, find ways to integrate them into the urban fabric with minimal disruption, using careful grade-separating strategies. Assure that the streets above are continuous, walkable, and as protected as possible from negative impacts like noise and emissions. Plan for at least two major mobility corridors crossing each large urban area, and connecting to others.

❖ ❖ ❖

Integrate mobility corridors into the network, maintaining a 400M THROUGH STREET NETWORK across all interruptions, providing bridges and other connections.

400M THROUGH STREET NETWORK



… Within a POLYCENTRIC REGION, we need to establish a balance between vehicular mobility and pedestrian safety, while maintaining, as much as possible, a continuous connectivity through the urban region.

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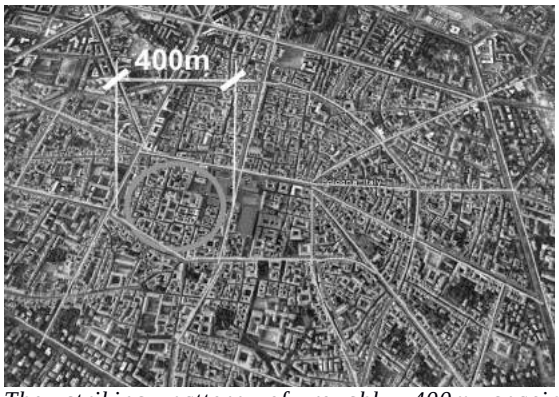
Problem-statement: At a larger urban scale, there is need for higher-speed vehicular mobility. But at a smaller sub-neighborhood scale, there is a need for resident-pedestrians to have their own sanctuary, free of the dangers and disruptions of areas dominated by vehicles.

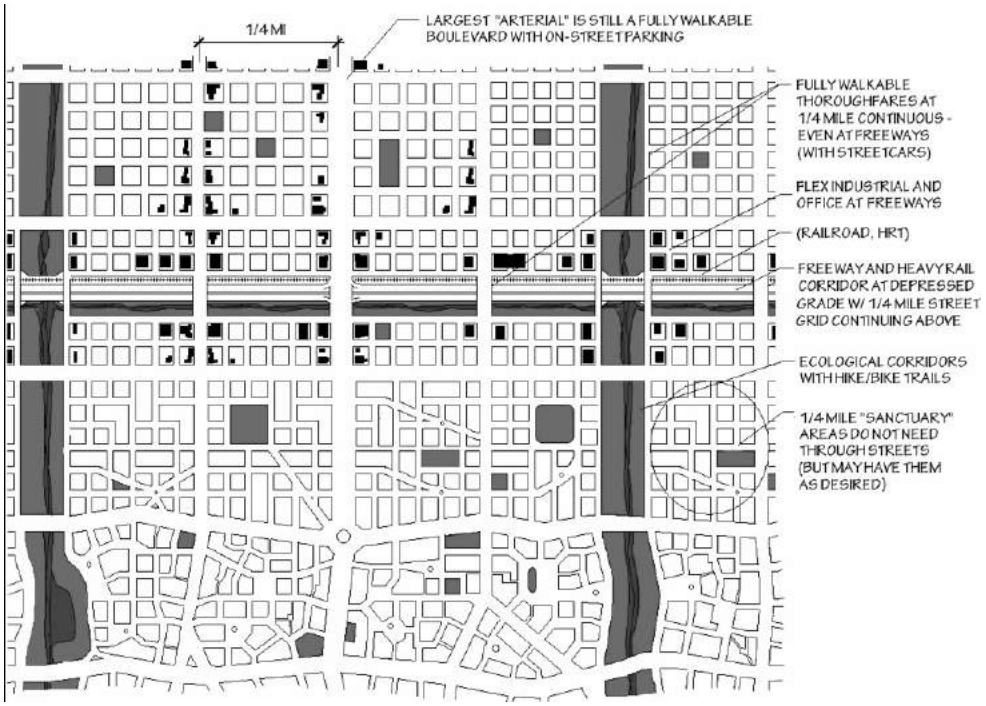
Discussion: In many cities around the world, there is a surprisingly consistent pattern of through vehicular streets, spaced at roughly 400 meters or ¼ mile, or less. This pattern long predates the automobile, a fact that is not so surprising when we consider that vehicles of various kinds (carts, carriages, etc.) have existed in cities for millennia, and that these vehicles all pose some dangers to pedestrians. It seems that neighborhoods have self-organized to achieve a balance between the needs for pedestrian protection and vehicular mobility, by creating a protective zone (or "sanctuary," as described by Donald Appleyard) that is roughly equal to an easy walk, or slow drive, to the nearest vehicular street. That distance is about 200 meters, or 400 meters in diameter.



The striking pattern of roughly 400m spacing of principal through avenues and "sanctuaries" in Bologna, Italy. The same pattern can be seen in many other cities around the world.

It is important to understand that this pattern does not require a regular grid, or standard block sizes, although many cities (especially older cities in the United States) do in fact have the 400 meter pattern within a regular grid, and often with standard-sized blocks. The pattern also does not prohibit some smaller streets from aligning within these

400 meter zones or through their edges. It only requires that these smaller streets do not accommodate fast-moving vehicles, traveling relatively straight for long uninterrupted distances (typically 3 kilometers or 2 miles).



This illustration (not to scale) shows that regular blocks and street grids are not required for the pattern, and a much more irregular pattern of principal through avenues at 400m (as shown below) is possible.

Therefore:

When laying out street grids, use a rough spacing of 400m (¼ mile) or less for principal through streets. Within these roughly 400m areas or "sanctuaries," make shorter, interrupted, lane-like streets that accommodate vehicles, but allow pedestrians to dominate.

❖ ❖ ❖

At larger scales, accommodate higher-speed mobility with MULTI-WAY BOULEVARDS that combine mobility with safe paths and crossings for pedestrians and bicycles. Where the highest speeds are required, use MOBILITY CORRIDORS with grade-separated pedestrian and bicycle paths, and crossings at no more than 400 meters. At smaller scales, create SANCTUARIES with SHORT LANES and SHARED SPACE STREETS.

URBAN PATTERNS

WALKABLE MULTI-MOBILITY

… Within the 400M THROUGH STREET NETWORK, we need to assure that pedestrians can access all points within and along the network, as well as access other modes of travel. We must assure that pedestrians are not blocked by a MOBILITY CORRIDOR but have multi-modal access to urban points across the POLYCENTRIC REGION ...

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Problem-statement: At the start and end of all trips through the city are walking trips; therefore, pervasive walkability is needed throughout the city, carefully coordinated with other modes of travel.

Discussion: For most of human history, the ability to walk was a key characteristic of all cities. But in the last half-century, many portions of cities have become unwalkable, often because the design of vehicular facilities has disrupted pedestrian movement. This condition is not sustainable, given the correlation with high rates of resource consumption, depletion, pollution, and other impacts of an unwalkable lifestyle.

Walkability has simple requirements. First, there must be a pathway that is adequate in width. Second, it must be safe from vehicles, and at the same time, visible enough to discourage crime. Third, it must be attractive to walkers, offering places to sit, vegetation, interesting views and other rewards. Fourth, it must be well-connected with destinations and with alternate routes, at a maximum distance of 400M or ¼ mile (see 400M THROUGH STREET NETWORK).

Pervasive walkable multi-mobility in Portland, Oregon.

Therefore:

Make walkability a pervasive characteristic of the city, with special emphasis on the 400M through street network, and the mixed residential areas within this network. Coordinate the

walkable network with other modes of travel, including well-distributed multi-modal hubs for public transit.

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… Assure that walking is the dominant mode within each local SANCTUARY. Coordinate other modes of travel including BUS STOPS, light rail, bicycle racks and other facilities.

LEVEL CITY

… Within the POLYCENTRIC REGION., create variations in density, but following a relatively continuous building volume...

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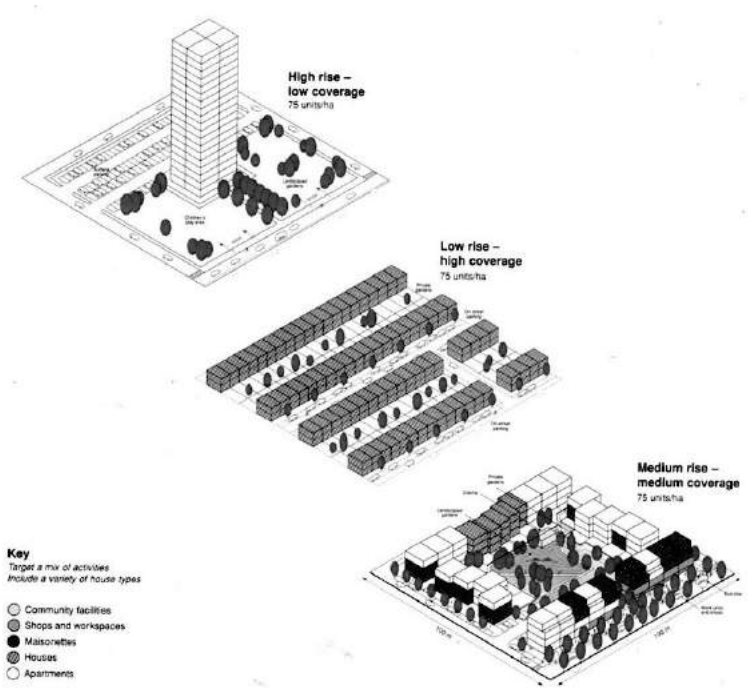
Problem-statement: Evidence indicates that one of the most optimal urban forms is a relatively continuous building volume with a height of between two and ten stories – what we may call the "level city". Yet in the last half-century, many cities have taken on a discontinuous and disruptive form, with significant long-term negative impacts on the quality and resource efficiency of city life.

Discussion: Many people assume that in order to achieve a compact, sustainable, prosperous city, it is necessary to "go up:" to adopt an urban form with many tall buildings. The evidence shows that this view is mistaken – and it overlooks research on the many negative impacts of tall buildings, especially in the longer term.

Some advantages of tall buildings are obvious: they offer very nice views (when not blocked by other tall buildings), they confer status and prestige, and they create very visible branding for companies and for ego-promoting individuals. But many other commonly claimed benefits of tall buildings are contradicted by the evidence, as our research[1] and others' has shown.

Among the more ludicrous claims are that tall buildings, by adding housing units, will help to promote affordable housing – yet they count among the most expensive construction systems in the world, particularly given costs associated with structural stiffening, egress requirements (space devoted to stair and elevator cores), and other diseconomies. No less dubious is the claim that tall buildings can be inherently more sustainable, given their high embodied energy and materials, greater exposure to heat gain and loss, and typically high-maintenance, short-life-cycle mechanical systems, requiring frequent and resource-intensive overhauls.

In fact many of these claims rely on a deeper misconception, that tall buildings are necessary to achieve beneficially higher densities. But there is abundant evidence to disprove this fallacy as well. As a UK House of Commons fact-finding report concluded, tall buildings "do not necessarily achieve higher densities than mid or low-rise development and in some cases are a less-efficient use of space than alternatives...Tall buildings are more often about power, prestige, status and aesthetics than efficient development."[2]



Three very different urban forms at very different heights – but they all achieve precisely the same density. Many people fail to understand that tall buildings are commonly placed very irregularly, typically between large unwalkable areas of green space, parking lots, or low buildings, with little or no net increase in density over other possible forms. Source: UK Urban Design Task Force, 1999.

The research also shows that there are many other negative impacts of tall buildings, including environmental impacts on adjacent buildings and public spaces (shading, loss of views, wind effects, loss of human-scale experience); social impacts ("vertical gated communities," loss of ground-floor activation, etc), and economic impacts (increased maintenance costs over time, obsolescence of design fashions, threat of market failures and abandoned buildings, etc).[3]

Tall buildings do indeed allow some people and companies to achieve literal superiority over the city, expressing their social and economic dominance. At some point, however, this concentration of wealth is likely to prove unhealthy, exacerbating inequality and instability. A "level city" (maintained by zoning codes, incentives and disincentives, or a mix) offers a more "level playing field" – a more equitable and more evenly distributed kind of urbanism.

This is not to say that higher density is not desirable – or indeed, that a very high density is always required. In fact the best cities offer a range of densities, tending to increase toward their regional centers, but containing many variations or "density rings" throughout the region. For example, a "polycentric region" will contain many density rings of lower and higher densities, offering choices corresponding to stages of

life (children, couples, singles, elderly etc) and preferences (active centers, quieter backs, etc).

Finally, it is important to note that there is an important role for some tall buildings to serve as wayfinding landmarks, and as monuments to the city's public life. These structures should be exceptional, and they should be civic in nature – for example, spires within public spaces, like the Eiffel Tower in Paris, or structures that express a shared spiritual experience, like the Sagrada Familia cathedral in Barcelona (seen in the photo at the beginning of this pattern).

Therefore:

Maintain a building height limit of typically no more than ten stories, together with incentives for maximizing infill of buildable sites, aiming to produce a continuous and efficient urban form. Allow taller structures when they are civic monuments and public buildings, and when they assist with wayfinding. Allow variations in density, while assuring a continuous walkable urban fabric.

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Use PERIMETER BUILDINGS to maximize continuous fabric along the street. Cluster housing and other activities within DENSITY RINGS.

PUBLIC SPACE SYSTEM

… Within the POLYCENTRIC REGION, establish the distribution and connectivity of public space, following its BLUE-GREEN NETWORKS...

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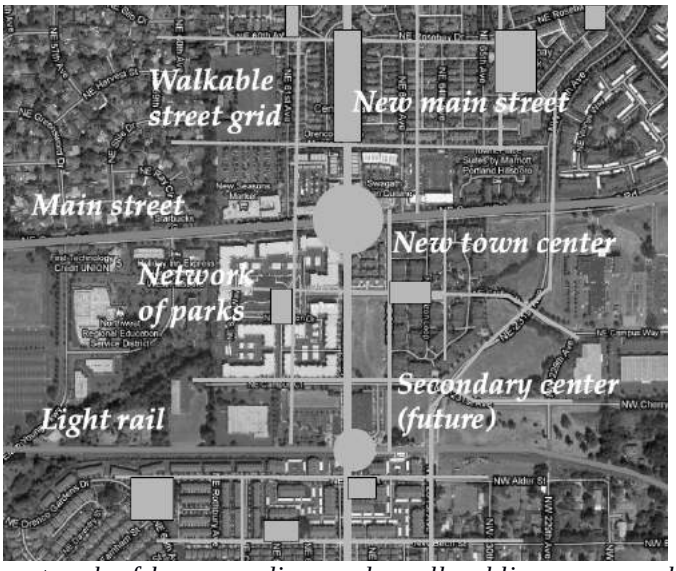
Problem-statement: Public space is the ultimate foundation and connective structure for all human spaces; and cities with inadequate public space systems will fail in critical ways.

Discussion: Over the last century, cities have seen an alarming decline in the quantity and quality of their public spaces. In part this has occurred because of the increasing prevalence of the automobile, but another major reason is the failure to understand the importance of public spaces – including pedestrian-friendly streets – as integral components of settlement. This problem is becoming more urgent with the rapid urbanization around the world in the first decades of the 21st Century.

Extensive research has documented the many important benefits of healthy public space systems, including social, economic and ecological benefits.[1] By contrast, cities that lack well-connected, walkable public spaces, must make up for this weakness with an artificial system of connection – automobiles, private spaces, communication networks and other systems, requiring growing and unsustainable levels of resource consumption.



A network of large, medium and small public spaces, well-connected to each other and within 200m (750 feet) of all homes, in a new development on the Portland OR light rail line.

Therefore:

Lay out every city, and every increment of a city, as a system of inter-connected public spaces, large, medium and small, including streets, squares, parks, and the public areas of buildings. Make these spaces walkable and pedestrian-friendly, with attractive destinations at frequent intervals. Assure that every residence is within 200M of an active public space.

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Assure that the public space system follows the 400M THROUGH STREET NETWORK, and extends along its streets, squares and parks. Lay out the system as a series of PATHS AND GOALS, incorporating ACTIVITY POCKETS and OUTDOOR ROOMS. Create PLACE NETWORKS all along its edges, and assure it has POSITIVE OUTDOOR SPACE….

BIOPHILIC URBANISM

… Within the POLYCENTRIC REGION, assure that buildings and structures are conducive to high-quality human experience...

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Problem-statement: People have an instinctive need to be surrounded by the forms of nature, including biological nature. This need extends into the structures of cities, including their buildings.

Discussion: Many people recognize the value of greenery, especially in urban areas. Indeed, many cities have lush canopies of street trees and other vegetation. At the same time, many cities have buildings that are quite unlike any structures in nature,

Caption.

Therefore:

Incorporate biophilic properties into urban structures at all scales, including buildings.

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Use biophilic urbanism to create HUMAN-SCALE DETAIL and ORNAMENT...

STREET PATTERNS

GREENWAY CORRIDOR

… Within the POLYCENTRIC REGION, provide functional and beautiful pathways for transportation...

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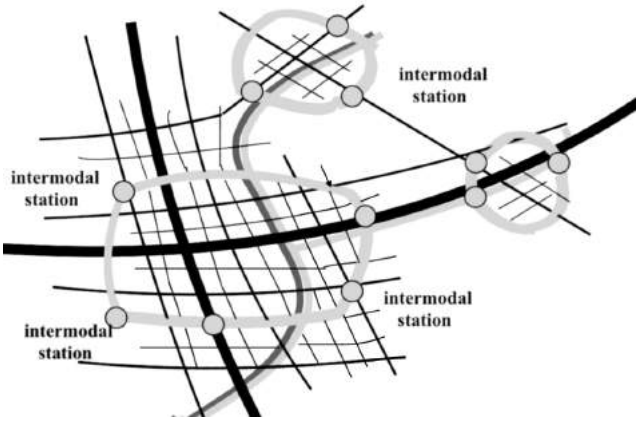
Problem-statement: People need human-scaled pathways around their city that offer many different modes of travel including walking and cycling, that are beautiful, ecological and functional, and that link with other modes of travel.

Discussion: Mobility corridors are focused on high-speed inter-urban mobility for vehicles, but they leave out the lower-speed forms of travel for more routine urban trips. The pattern of the greenway corridor combines generous lanes for walking, biking, surface trams, moderate-speed surface vehicles, and below-grade trains, all linked by periodic intermodal stations. It is thus convenient to travel along a greenway corridor to intersect other train stations and transit lines within the region and beyond.

Greeway corridors can be laid out, at least partially, along existing stream corridors to take advantage of natural vegetation and ecology, but taking care to protect sensitive features – for example, placing the more disruptive pathways along the banks above stream corridors. They can also be developed out of previous corridors, such as the Ringstrasse in Vienna – seen in the photo at the beginning of this pattern – which was redeveloped from the corridor formed by the old city wall.



A polycentric region with several green corridors.

Therefore:

Within the 400 meter grid, lay out a greenway corridor system at a roughly 1600 meter (1 mile) spacing, forming rings around central

parts of the city. Assure that they connect to key nodes of transportation and intermodal travel.

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Run the greenway corridors adjacent to SANCTUARIES that provide housing and other uses...

MULTI-WAY BOULEVARD

… Between MOBILITY CORRIDORS we need slower surface corridors that still accommodate a higher volume of vehicular traffic.

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Problem-statement: The major surface arteries of cities can choke the life out of their neighborhoods.

Discussion: There are several problems with major surface arteries in cities. One is that they lack safe places for pedestrians to cross at regular enough intervals. Another is that they are so fast-moving that their edges create unsafe and unattractive zones for pedestrians. In addition, bicyclists also require another level of mobility, as well as vehicles that need to move more slowly in order to park, or to pick up pedestrian passengers. These multiple needs have been met with a multi-way boulevard, combining faster travel lanes, slower "slip lanes," and ample spaces for pedestrians and bicycles to travel, and to cross the faster-moving vehicular lanes safely.

A multi-way boulevard design in West Linn, Oregon

Therefore:

Periodically (typically at 800m or ½ mile spacing in both directions) create multi-way boulevards, consisting of several lanes for faster travel, slip lanes for slower travel and parking, wide pedestrian and bicycle sidewalk zones, and periodic crossings as frequent as possible, but not more than 400 meters apart. Make these beautiful urban spaces, with tree-lined medians and periodic focal points.

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Space multi-way boulevards regularly between AVENUES and at the edges of SANCTUARIES. Provide ample medians and STREET TREES.

AVENUE


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… In laying out the 400M THROUGH STREET NETWORK, create a sub-network of streets between the MOBILITY CORRIDORS and MULTI-WAY BOULEVARDS.

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Problem-statement: People need streets that allow their vehicles to travel longer distances safely at moderate speed, while still giving good access to the buildings and neighborhoods along them.

Discussion: Multi-way boulevards are a good solution for large volumes of traffic, but many other streets within the network do not require multiple separated lanes. It is sufficient for these streets to have a single group of lanes – typically no more than two in each direction – and on-street parking to provide protection to pedestrians, and to slow traffic to moderate speeds (typically 30 KPH or 20 MPH). If these streets are spaced (together with multi-way boulevards) at a regular 400m interval, they can handle ample volumes of traffic without negatively impacting pedestrian safety and neighborhood livability.

Therefore:

Alternate the Multi-Way Boulevards with a network of Avenues, within the 400M spacing system. Provide on-street parking, and limit lanes to no more then two in each direction.

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Develop the areas between avenues as SANCTUARIES, providing SHARED SPACE LANES.

SHARED SPACE LANE

… Between AVENUES and MULTI-WAY BOULEVARDS, there is a need for a much slower, safer kind of street...

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Problem-statement: Within quieter local areas, vehicles must move slowly and safely around pedestrians. They can do so within lanes that are designed to share space with pedestrians, bicycles and other slower modes of travel.

Discussion: There are many varieties of shared-space lane that have been developed around the world. One of the best known is the Dutch "woonerf", which is a generally narrow, irregularly shaped passageway designed to slow vehicles and to create safe places for pedestrians to move.

It has been assumed that areas that mix cars and pedestrians would be unsafe without extensive controls including signals and signage. Research has shown, however, that in low-speed areas, vehicles and pedestrians can share space, as long as the visibility is good, and as long as the geometry prevents high-speed driving. An example is the Seven Dials intersection in London, where a monument in the center forces vehicles to drive slowly as they enter the intersection.

Seven Dials, a remarkably busy intersection in the heart of London, yet lacking conventional traffic controls. Pedestrians and cars mingle freely.

Therefore:

Within the spaces of the 400M network, and where not occupied by other special districts, create a network of shared space lanes providing vehicular access, but also providing safe movement throughout for pedestrians.

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Create shared space lanes within SANCTUARIES that are quieter parts of neighborhoods, between busier kinds of streets…

NEIGHBORHOOD PATTERNS

STREET AS CENTER

… GREENWAY CORRIDORS, MULTI-WAY BOULEVARDS and AVENUES need to serve as connectors, ,ot as dividers...

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Problem-statement: Too often in the last century, streets have been used to divide instead of unite.

Discussion: It is often assumed that streets are inherently dangerous, and therefore it is necessary to turn away from them and face inward toward a cell-like residential enclave. This is terribly destructive, promoting the idea that streets are only "car sewers" meant to convey cars away at maximum speeds. In fact streets fulfill many functions, and must do so on a balanced and responsible way.

We have already seen that streets are

This street forms an impenetrable barrier between its two sides. It in no way serves as a center of the surrounding neighborhood.

Therefore:

When developing on both sides of a street, make certain that the development is compatible, and that it aligns to and engages with the street. Do not turn away from the street with blank walls, parking lots or other unsuitable structures, but make the street a focus of attention and use.

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Assure that all sides of streets have WALKABLE STREETSCAPES…

SANCTUARY


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… Within the 400M MAIN STREET NETWORK, identify the zones between the principal streets – roughly 400M square – and treat them differently from the areas along the streets themselves, which include STREETS AS CENTERS. Away from these streets, incorporate SHARED SPACE LANES for quieter, safer spaces around residences and businesses requiring slow-low-volume traffic…

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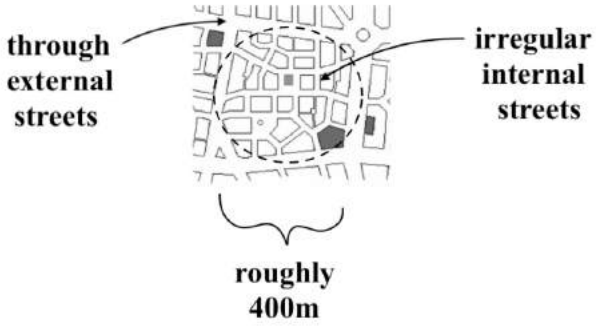
Problem-statement: Within the scale of a neighborhood, there is a need for a quieter zone where pedestrians dominate, and where vehicles are guests on their best behavior.

Discussion: Vehicles are needed in daily life, to carry goods, to convey those who are unable to walk, to serve as transit, and for many other needs. Yet there are places in the city where vehicles are dangerous to pedestrians, especially children and the elderly.

Vehicles do have the right of way on the principal street network of the city, which provides efficient mobility while also allowing pedestrians to navigate their sides. But away from these streets, pedestrians should have greater right of way, within "sanctuaries" that provide quieter, safer spaces, including streets.



The streets within a sanctuary can be quite irregular and "picturesque," which helps to make walking more interesting and more pleasant than driving.

Therefore:

Lay out the streets within the principal through streets as slower, narrower and more irregular lanes. Do not

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Within the sanctuaries, create NEIGHBORHOOD PARKS to provide for quieter recreation and gatherings. At the edges, create NEIGHBORHOOD SQUARES that are adjacent to more active commercial activities…

NEIGHBORHOOD SQUARE

… At the edges of the SANCTUARIES, identify key sites, especially corners, for the provision of neighborhood public spaces...

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Problem-statement: At the scale of neighborhoods – roughly 1-2 square kilometers, or ½ square mile – there is a need for a lively public space for gathering, recreation, markets, and community events, adjacent to neighborhood commercial activities. This need is different from the need for recreational "green" parks.

Discussion: The size of urban squares and plazas can vary, and some can be quite small. The critical factor is the maximum distance that residents must walk to reach these spaces – optimally a maximum of 400 meters or ¼ mile. This in turn suggests a spacing of roughly 800 meters or ½ mile in all directions.

Old Town Plaza in Albuquerque, New Mexico, a classic neighborhood square following the "Laws of the Indies" regulations that required squares to be placed at the center of commercial and civic activity.

Therefore:

Create neighborhood squares adjacent to neighborhood through streets, and at nodes where commercial activities are present or likely. Place them

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At the edges of the neighborhood squares, place at least some active commercial uses in PERIMETER BUILDINGS, positioning carefully for economic success. Develop PLACE NETWORKS along the streetscapes, and assure WALKABLE STREETSCAPES all around the square.

NEIGHBORHOOD PARK

… Within the SANCTUARY, provide amenities for recreation and gathering...

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Problem-statement: At the scale of a neighborhood, there is a need for quieter recreational spaces with ample vegetation, and more protected from faster-moving vehicles.

Discussion: Neighborhood parks are not the same as regional parks, which may be quite large. Generally, neighborhood parks can range from one hectare (2.5 acres) to as small as 20 square meters (200 square feet) or the size of a "pocket park". The important factor is that every residence is within about 250 meters, or about 750 feet, of one of these parks. A secondary factor is that these spaces are focal points for the surrounding neighborhood, allowing quieter family-scale gatherings and informal sports events.

A key requirement for neighborhood parks is that they are visible from nearby residences, and there is an opportunity for residents to provide stewardship for their security and care. There is also a need to have active uses along their edges, so that these edges do not become dead zones, severing and isolating the parks from the surrounding neighborhood.

Neighborhood parks can also provide pavilions and other shelters to allow for small-scale events such as weddings, acoustic music performances, and other activities that are compatible with surrounding residences.

Pavilions in a neighborhood park in Hillsboro, Oregon, that hosts weddings, acoustic music events and other neighborhood-scale activities.

Therefore:

Within the sanctuaries, create neighborhood parks that serve as quiet oases for residents, with ample greenery and natural characteristics such as ponds and waterfalls. Assure that one of these parks is within about 250 meters (750 feet) of every residence. Provide for recreational activities including play structures for children. Provide sheltered spaces for activities including acoustic music and small neighborhood gatherings.

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Create room-like spaces, especially at the edges, forming PLACE NETWORKS…

SPECIAL USE PATTERNS

SCHOOL CAMPUS

… Within SANCTUARY zones, place school campuses, distributed according to need...

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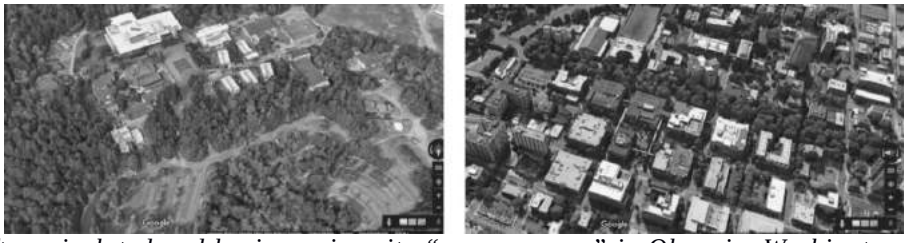
Problem-statement: There is no reason that school campuses have to turn their backs on the city or suburb, and create dead zones in the urban fabric as well as isolated, boring places for students; they can embrace their urban context, and create benefits for both.

Discussion: Schools are certainly unique elements that have special requirements – among them safety for students, ample space for recreation, and sufficient size to provide for economies of management. Yet they do not need to be isolated or pose impenetrable barriers to the city. Especially, they do not need to be so large and isolated that students (or their parents) must drive to school.

Perhaps the best example of a necessarily large school is the university campus, which often has to accommodate many thousands of students. Yet even large university campuses can be integrated directly into the walkable urban fabric, served by streetcars and other public transit, and



Left, an isolated and boring university "supercampus" in Olympia, Washington, and right, a lively campus integrated into the urban fabric of Portland, Oregon. The latter campus is in a walkable, bikeable setting, and served by streetcar and other transit.

Therefore:

Do not isolate school facilities and surround them with dead inactive edges, but weave them into the city fabric, providing stimulation to students and non-students alike. Wherever possible, put buildings on the edges, and where sports fields must go to the edges, build attractive pergolas and other structures to promote walkability. Assure that buildings are attractive at pedestrian scale, and offer interesting window views to surrounding streets.

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Assure that the school campuses have WALKABLE STREETSCAPES with well-articulated PLACE NETWORKS...

MARKET CENTER

… Along the active edges of SANCTUARIES, where the demand for market centers is significant, and transit service and mobility are highest, create integrated complexes of buildings that serve as market centers...

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Problem-statement: Shopping is one of the most fundamental activities of daily life, and it should be accessible, convenient, safe and attractive. It must not be allowed to disrupt the pedestrian scale of the surrounding neighborhood.

Discussion: Too often, shopping centers have been allowed to grow monstrous, and create urban dead zones at their edges: parking lots, concentrated vehicular arterials, and other disruptions. This is unnecessary. A market center can be successfully integrated with the surrounding pedestrian fabric, by providing multiple blocks connected by subterranean levels and bridges.

The original plan for shopping "malls" came from the architect Victor Gruen, who was – ironically – seeking to reproduce the car-free ambience of European village squares. Of course, residents pay a heavy price, for these inward-turning megastructures draw the life from their surroundings, and create large dead zones within the urban fabric – either ugly and unecological parking lots, or declining streets, or both.

The final irony is that enclosed shopping malls are becoming much less popular, and buyers crave real streets with vibrant activities. In response, some shopping mall developers have created "lifestyle malls" built around open streets, only some of which are pedestrianized. This is a step in the right direction, although any market center will thrive on adjacency and mix, rather than a segregated monoculture of whatever kind.

The problem is not simply that malls have roofs (typically of glass). Indeed, some of the most successful and well-loved market centers in the world have glazed roof enclosures, among them the Galleria Vittorio Emanuele in Milan, Italy. So do many city-operated market centers. The important factor is the connectivity of the center to its surrounding urban fabric, and its mix of lively activities at many hours of the day.

Left, a typical shopping "mall" outside of Portland, Oregon, surrounded by an ocean of parking lots. Right, an integrated shopping center with similarly large stores, but integrate into the surrounding urban fabric of downtown Portland. Multiple blocks are connected by bridges and tunnels. Parking is accommodated with garages built into the urban fabric, and many people arrive by transit, walking or bike.

Therefore:

Do not build gigantic, isolated shopping "malls", which are becoming undesirable to shoppers. Instead build lively market centers, allowing different buildings to span over the street network.

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Assure that the edges of the centers have WALKABLE STREETSCAPES. Articulate these spaces, and the spaces within, with PLACE NETWORKS…

INDUSTRIAL AREA

… Within the POLYCENTRIC REGION, there are many places where industrial activities must be accommodated. These should be integrated into the walkable street...

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Problem-statement: Industrial employees increasingly want to work in vibrant, mixed neighborhoods. But industries need a certain amount of security and privacy for their operations.

Discussion: The response to the need for security in the 20th Century was to develop a "supercampus" - a very large, gated, and impenetrable section of the urban (or more often suburban) fabric. This has been a terrible mistake. It has created dead zones at the edges of these supercampuses, and almost always prevented employees from walking, biking or even taking transit to or from work – more likely forcing them to drive, and to own a car. Even worse, it tended to isolate work from home and other activities, causing an imbalance between jobs and housing, requiring extensive commuting time, and contributing to a fragmented, resource-inefficient, dysfunctional city.

In the early years of the 21st Century, the most sought-after employees have begun to demand more walkable, mixed places of work, close to their homes and other destinations.

Evidence has grown that there are other economic benefits for the companies as well. Creative innovation does not thrive in isolated, inward-turning campuses, but in places that allow mixing and "knowledge spillovers" – not only within industries, but between them as well.

Of course there are requirements to protect intellectual property as well as other kinds of company property. However, in an age of advanced digital security, it is no longer necessary to have prison-like guard houses and fortifications, and security is now much more easily managed at the building scale. Employees can now move easily between buildings with proper digital technology.

Left, an industrial "supercampus" outside of Portland, Oregon, and right, an industrial district within the city. Walkable mixed neighborhoods like the one on the right are in high demand by today's most sought-after technology employees.

Therefore:

Do not build isolated "supercampuses" as industrial workplaces. Instead, create a flexible cluster of buildings within a walkable street system, mixed with other uses so that employees can live nearby, and visit other destinations.

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Provide a WALKABLE STREETSCAPE within the industrial area, with a mix of other uses to provide amenities and close-by housing for some employees…

HOSPITAL


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… Also at the edge of SANCTUARIES and within the 400M MAIN STREET NETWORK there is a need to accommodate medical facilities...

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Problem-statement: Hospitals have advanced requirements for germ isolation and patient protection; yet their patients also have a basic need to stay connected to their neighborhood environments.

Discussion: In the past, it was assumed that the best way to maintain sterile conditions and patient comfort was to isolate hospitals in remote campus locations. This practice has caused excessive driving for patients and staff, and contributed to the fragmentation of urban areas.

A hospital facility need not be confined to a single building. Many hospitals use a cluster of several buildings, inter-connected with subterranean spaces as well as overhead bridges. Sensitive areas can also be located in the subterranean levels, including surgery and nuclear medicine facilities.

In this way, the hospital complex can integrate with the surrounding walkable street network, providing a vital connection for patients to the life of the neighborhood.

Two hospitals in Portland, Oregon – one a disconnected supercampus that requires driving for almost all visits, and the other, integrated into the walkable neighborhood fabric.

Therefore:

Build hospitals as integrated facilities within their neighborhoods. If necessary, use bridges, tunnels and subterranean levels to connect different buildings and functions as needed across the walkable street fabric.

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Create a WALKABLE STREETSCAPE around the hospital, with a mix of other uses including clinics, offices, commercial spaces and residences…

PUBIC SPACE PATTERNS

PLACE NETWORK

… Along the 400M MAIN STREET NETWORK and within the SANCTUARIES too, there is a need for articulation of public space and private space, and the tissue that connects them ...

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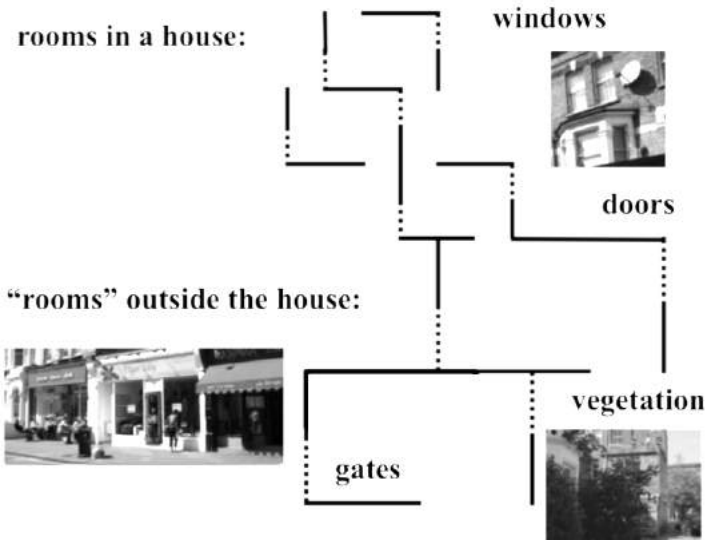
Problem-statement: Humans have a basic need to occupy room-like spaces that are connected to other spaces – but whose connections they can control. This basic need exists at all scales of place.

Discussion: The human mind tends to segregate elements form one another, like buildings, streets and squares. Designers tend to follow this segregation in the works they produce too, with the result that these structures are separated from one another as if stand-alone objects. Yet the connections between these elements are the very essence of life in the city.

It's easier to think of the rooms in a house as being part of a system of spaces that allow us to control our degree of contact with others, and conversely, our privacy, starting with the most private rooms in the house, the bedrooms and bathrooms, and progressing to the more public spaces where we come into more contact with one another, and ultimately, to the people from outside who may come in as visitors. We can control the degree of contact by modulating the connections between these spaces. We can close doors, open windows, draw blinds.

But just so, the spaces outside of a house or other building also need to afford us an ability to control our connectivity to others, or else they will not function well. We need yards with gates, or porches with steps and railings, or street frontages with subtle demarcations of zones, expressing a gradient of privacy and offering a measure of control of our contact with others.

Human beings need this degree of control, not so that they can retreat into the most private parts of a building, but precisely so that they can feel in control when making even greater contact with others. A house that has no gradient of privacy at the edge is like a goldfish bowl, and the occupants can only retreat to the back corner. But a house with a gradient of privacy, and well-sheltered spaces offering both connection and refuge, will invite *more* contact with outsiders.



The best places are a tapestry of room-like spaces, whether indoors or out..

Therefore:

When planning a building, a street or other parts of an environmental structure, conceive of them as part of a tapestry of places – a place network. Work to articulate these places as part of a continuous network with many connections, and many points of modulation of connection: doors, windows, gates, hedges, fences and other structures.

❖ ❖ ❖

Create place networks all along the WALKABLE STREETS ...

WALKABLE STREETSCAPE

… Along the AVENUES, GREENWAY CORRIDORS and MULTI-WAY BOULEVARDS there is a need to provide for WALKABLE MULTI-MOBILITY ...

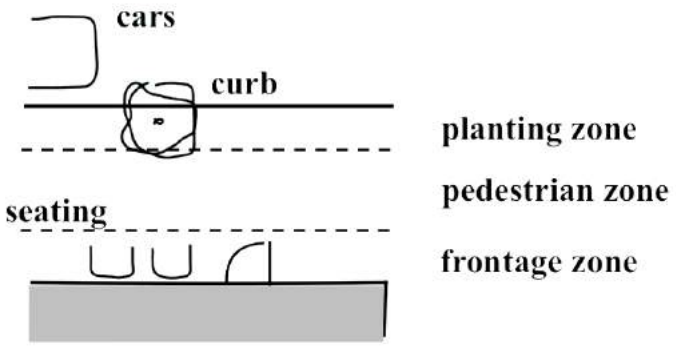
❖ ❖ ❖

Problem-statement: There are many potential conflicts between pedestrians and other forms of movement, as well as potential conflicts between pedestrian needs and the needs of adjacent building users.

Discussion: Along streets, pedestrians need ample space to walk, and to pass other pedestrians who are walking in the other direction or standing briefly. This pedestrian travel zone will vary depending on the population of the area, but in general it is a minimum of 1.5 meters, or approximately 5 feet. More ideally it is at least 3 meters, or 10 feet. In addition, there is a need to accommodate seating areas and commercial elements such as planters and signage, which generally require another 1.5 meters or 5 feet. Finally there is a need for a zone for street trees, light poles and other elements, which require approximately 1.5 meters or 5 feet. All together, the space for the pedestrian right of way should be at least 4.5 meters or 15 feet, and more typically 6 meters or 20 feet, not including any additional yard space for adjacent buildings.

There is also a need to accommodate bicycles, which can pose dangers to pedestrians. The best way to do both is to have a separate travel lane for bicycles at a separate grade, between the pedestrian area and the parking zone, or other protective zone between bicycles and vehicles.

In low-speed street areas – typically those with speeds limited to 30 kilometers per hour, or about 20 miles per hour, the bicycles can travel safely in the vehicle lanes.



The distinct zones of a walkable streetscape.

Therefore:

Assure that every streetscape along an avenue, greenway corridor or multi-way boulevard is walkable, by providing adequate width for pedestrian travel (typically at least 3 meters, or 10 feet) in addition to space for seating, and space for planting and light poles.

❖ ❖ ❖

Line the streetscape wherever possible with PERIMETER BUILDINGS, and elsewhere place pedestrian-friendly visual elements such as trellises, pergolas, vegetation and other attractive screens. Provide HUMAN-SCALE DETAIL includ9ing architectural and urban elements, along the length of the streetscape ...

MOVABLE SEATING

… Along the WALKABLE STREETSCAPE, provide places for people to sit and relax comfortably...

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Problem-statement: Along streets and in other public spaces, people need to do more than walk – they need to sit too. And they need to be able to change the position of their seating depending on their activity.

Discussion: Sometimes people are comfortable with rigid benches that face in only one direction. Many times, however, they want to turn toward their companions, or toward interesting things happening within the public realm. For this reason, they need movable seating. This need is greatest at the edges of public space, where people are most likely to congregate and view others.

This poses a problem for security, since the seats can potentially be stolen. There are two remedies for this issue: either tether the seats to secure cables, or provide seating through adjacent private businesses, who can remove them when they close.

Caption.

Therefore:

Provide ample seating within the walkable public realm, especially at the edges. Make sure that at least some of the seating is movable, so that people can adjust their position for comfort.

❖ ❖ ❖

Provide HUMAN-SCALE DETAIL adjacent to the seating ...

CAPILLARY PATHWAY

… Within the SANCTUARIES there is a need to provide pathways that are not part of the street or lane system, but are nonetheless public pathways…

❖ ❖ ❖

Problem-statement: Some of the most powerful urban public spaces are not along streets, but along separate pedestrian pathways. These pathways form a kind of "capillary" system for pedestrians.

Discussion: The term "capillary" refers to the very small hair-like passageways of the bloodstream, where individual blood cells reach individual body cells. A similar structure exists in the best cities, where capillary pathways form a secondary system of pedestrian movement away from and complementing the street network.

In some cases these pathways may be owned by private entities, but it is imperative that pedestrians be granted easements for access. Private ownership of adjacent structures is also a beneficial condition, since they provide security as well as potential commercial activities and other mixed uses.

Capillary pathways should in any case not draw pedestrians away from the surrounding streets. Rather, they should be seen as a complementary network, making walking paths shorter and more interesting.

A capillary passageway leading to a courtyard and beyond in Albuquerque's Old Town Plaza.

Therefore:

Where there is sufficient volume of pedestrians, and sufficient activities to provide adequate security, create capillary pathways in an orthogonal pattern, crossing streets and interconnecting them, as

well as other destinations. Provide ample "eyes on the pathway" and other security measures to assure safety.

Provide INDOOR-OUTDOOR COMPLEXITY along the pathways. Where feasible, take pathways into COURTYARD BUILDINGS, or create courtyard-like spaces along their lengths...

BLOCK AND PLOT PATTERNS

SMALL BLOCK


3D
Google
Imagery ©2018 Google, Map data ©2018 Google
United States
Terms
Send feedback
100 ft

… Within the network of WALKABLE MULTI-MOBILITY, there is a scale of block patterns that is most conducive to walking ...

❖ ❖ ❖

Problem-statement: Blocks that are too big create street networks that are unwalkable. But there is a practical limit to how small a block can be.

Discussion: Blocks that are smaller than about 60 meters in any one direction (about 200 feet), exclusive of the street right of way, create problems for accommodating outdoor space or alley conditions within the blocks. A more optimal minimum dimension is 70 meters (230 feet).

But blocks that get much larger than double this distance in their longest dimension – about 150 meters or 500 feet – create long pathways for pedestrians that discourage walking.

Jane Jacobs, in her landmark *The Death and Life of Great American Cities*, argued that small blocks are one of the four most important factors in generating diversity.

The

small blocks of Portland, Oregon – almost too small, but praised by Jane Jacobs and others for their walkability.

Therefore:

Lay out blocks so that their short sides are roughly 70 meters (230 feet) and no more than 90 meters or approximately 300 feet. Make their long sides no more than about 150 meters or 500 feet.

❖ ❖ ❖

Create a mix of SMALL PLOTS and a flexible condition for EVOLVING PLOT SIZE, within regulated parameters. Place PERIMETER BUILDINGS at the edges of the blocks...

PERIMETER BLOCK

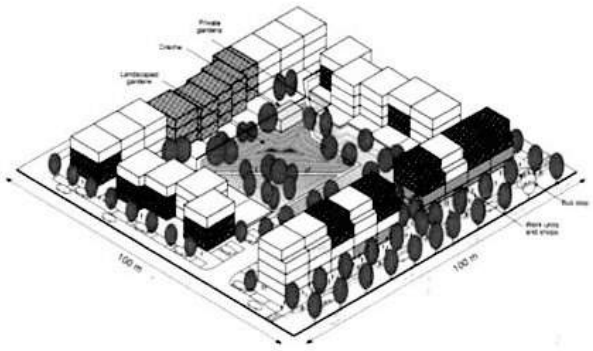
… Within the SMALL BLOCKS, buildings must be organized in relation to outdoor spaces for various functions…

❖ ❖ ❖

Problem-statement: Within a block there is a need for outdoor space which is connected to the buildings but not to the street.

Discussion: Residences require outdoor space for recreation, for gardening, for parking and other needs. Commercial users also need outdoor space for utilitarian functions and service access. This space can me one large open area, as shown on the example of Barcelona at the beginning of this pattern, or it can be subdivided into smaller courtyard spaces, as happens in Berlin and other cities.

The important advantage is that buildings benefit from proximity to the walkable streetscape, and at the same time get ample light and adjacent outdoor space in the quieter and more secluded interiors of the blocks.



A perimeter block with a mix of uses, as proposed by the UK's Urban Villages Forum.

Therefore:

Place the bulk of building mass at the perimeter of the blocks, leaving the interior for outdoor space to serve the adjacent occupants, accommodating recreation, gardening, parking, service and other functions.

❖ ❖ ❖

Place PERIMETER BUILDINGS at the edges of the blocks...

SMALL PLOT


2D
Google
Imagery ©2018 Google, Map data ©2018 Google
United States
Terms
Send feedback
50 ft

… Within the PERIMETER BLOCKS, it is important to keep a variety of scales of buildings...

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Problem-statement: Large plots are more expensive, and tend to attract a more limited pool of users. A mix of small plot sizes helps to keep spaces more affordable, and promotes greater diversity of business types and characteristics.

Discussion: The evidence for this pattern is easy to see in examples where plot sizes are universally large. The buildings on these plots are also generally very large, often with large users as well. Even in the case of smaller "demised" lease spaces with in a larger building (such as a ""strip" shopping center) there is often a homogeneity of "chain" type businesses.

There is a place for large plot sizes as well, particularly if they are "demised" into smaller retail and residential spaces (e.g. in condominiums). But there is an advantage in having a mix of fee-simple plots, each of which is able to grow and adapt according to its owner's individual needs.

Rowhouses on small plots in Washington, D.C.

Therefore:

Lay out plots with the fundamental unit quite small, perhaps no wider than 6 meters or 20 feet. Include a mix of sizes, with some larger plots depending on market conditions.

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Lay out ROW BUILDINGS at the edges, ...

MID-BLOCK ALLEY

… Within the SMALL BLOCKS, make sure there is room where needed for vehicular access...

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Problem-statement: Within and through the interior of a block, there is a need for low-speed vehicular and pedestrian movement

Discussion: The mid-block alley can provide an important function of service access, car parking, utility easements, and movement of pedestrians and vehicles. But a number of conditions need to be carefully considered.

One of the most important is to ensure that the alley is safe, which generally requires good sight distance from the windows of adjacent buildings. An additional measure of security is provided by accessory dwellings ("carriage houses") positioned directly on the alleys.

An additional concern is that the alleys should not disrupt the pedestrian character of the intersecting streets. This is best accomplished by enclosing the buildings on either side of the alley at the street, to make the entrance as narrow as possible (typically approx. 6 meters or 20 feet).

A mid-block alley in Seabrook, Washington, also pictured in the photo at the beginning of this pattern.

Therefore:

Where vehicular access is needed to the interiors of blocks, consider using a mid-block alley. Place dry utilities in this alley easement, and provide parking as needed. Assure that there is good visibility on the alley from adjacent buildings to provide minimal security.

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Make the mid-block lley attractive to pedestrians with HUMAN-SCALE DETAIL and ORNAMENT...

BUILDING PATTERNS

PERIMETER BUILDING

… Within PERIMETER BLOCKS, create buildings at the edges. Build some of them on SMALL PLOTS, with fine-grained features at the streetscapes. Use PLACE NETWORKS to create layers and articulations of space along the frontages...

❖ ❖ ❖

Problem-statement: Along the sides of streets and lanes, there is a need for buildings to form attractive, active edges. At the same time, there is also a need for the buildings to be exposed to light and open space, and to include yard zones to form transitional layers from public to private. They can do this by lining the edges of the blocks, forming perimeter buildings.

Discussion: The buildings need not abut the pavement or sidewalk directly, but can step back into a small front yard area. They can also shift back and forth, creating different zones of outdoor space. They can also step back with balconies, terraces and other outdoor spaces at upper levels, creating more interest and variety.

The rowhouses of Orenco Station in Oregon form perimeter buildings, with 12' outdoor terraces as well as small 4' yards forming a double layer of semi-private front space along the streetscape.

Therefore:

Create perimeter buildings that abut the streets surrounding each block, with almost continuous building frontage to the maximum extent possible. Create variety in the building form with step-backs and setbacks, and layers of semi-private space.

❖ ❖ ❖

Create ORNAMENT and HUMAN-SCALE DETAIL along the frontages of the buildings....

GALLERY BUILDING

… Along the edges of the PERIMETER BLOCK, there is a need to create a stronger connection between the buildings and the public spaces...

❖ ❖ ❖

Problem-statement: In many areas, there is a need for shelter as well as transitional space between the private interior and public exterior. This can be done with galleries and other porch-like structures. These are the gallery buildings.

Discussion: Gallery buildings are archetypal structures in many cities. We can think of the famous arcades of Bologna, or the galleries surrounding the plazas of the American Southwest. They create sheltered places along the street, especially valuable when adjacent to squares and other public spaces.

However, care must be taken when galleries front along retail uses that there is adequate visibility. This can be done by ensuring that there is sufficient height to the galleries so that there is adequate light on the retail spaces. In some contexts, however, the customer traffic volume is so high that this is not a concern.

Arcade buildings on the plaza in Albuquerque, New Mexico.

Therefore:

Create gallery buildings when there is a need to shelter people adjacent to public spaces, to promote architectural connectivity to the street and the public realm, or to allow gatherings at upper levels, such as restaurants overlooking squares.

❖ ❖ ❖

Create ARCADES – integral galleries built into the building – as part of especially important buildings. Create GALLERY SURROUNDS whenever possible, using porches, awnings and other structures ...

COURTYARD BUILDING

… When laying out the PERIMETER BLOCK, conceive of the block as a series of courtyards, with some of them penetrating into individual buildings…

❖ ❖ ❖

Problem-statement: In busy neighborhoods, there is a need for quiet outdoor space that is part of the building, and for light and air to enter the rooms in the middle of the building. This is the archetypal courtyard building.

Discussion: Courtyard buildings can be seen across many cultures and climates, and even in colder climates, where they typically form small outdoor spaces of L-shaped or U-shaped buildings. In hotter climates, courtyard buildings are often O-shaped, with the outdoor space completely surrounded by the building. In some cases, there are multiple courtyards within the same building.

Courtyard buildings do pose some challenges, including a larger exterior wall area requiring additional insulation in buildings that require heating or cooling. Some courtyard buildings employ operable or retractable roofs over the courtyard, including glazed roofs.

A courtyard house in California.

Therefore:

When buildings become too deep to admit air and light, or when they would benefit from private outdoor space within them, lay them out as courtyard buildings. Create porches fronting them, or wrapping two or more sides. If the courtyards are not entirely

enclosed by buildings, enclose them with appropriate walls or fences, so that they function as private outdoor spaces.

❖ ❖ ❖

Create INDOOR-OUTDOOR AMBIGUITY within the courtyard building, by using fully pr partially glazed roofs. Create a CIRCULATION NETWORK within the spaces surrounding the courtyard ...

ROW BUILDING

… On the PERIMETER BLOCK, provide attached buildings on SMALL PLOTS...

❖ ❖ ❖

Problem-statement: It is economical to attach buildings that are legally and physically separate, and line them in a row on the street. But this form of construction also introduces a number of challenges.

Discussion: One of the most serious problems is the amount of natural light that enters a row building. The narrower and deeper the building, the less light will enter its interior. One solution is to jog either the front or back wall of the building, to create an "L" shape. Another solution is to create small courtyards or light wells that bring light into the interior. A third solution, and the simplest, is to keep the depth of the building quite shallow, while the width is greater – at least 6 meters or 20 feet, or wider.

An additional problem is created by the independent structure of each building, requiring careful coordination during construction – which must be sequential – and during any remodel or reconstruction. The owners need to be bound by an agreement or regulation that specifies how these independent construction activities will be managed so as to minimize problems for adjacent buildings.

Caption.

Therefore:

Make row buildings wide and shallow, and provide natural light to the interior with light wells or L-shaped wall jogs as needed.

❖ ❖ ❖

Create layers of room like spaces or PLACE NETWORKS along the fronts of the row buildings, and provide HUMAN-SCALE DETAIL....

BUILDING INTERIOR PATTERNS

INDOOR-OUTDOOR AMBIGUITY

… Within each COURTYARD BUILDING or ROW BUILDING, there is a need to create an experience of spatial richness that binds the indoors to the outdoors...

❖ ❖ ❖

Problem-statement: Buildings should not contain hermetically sealed "interior" spaces, but should include ambiguous relationships between inside and outside.

Discussion: Some of the richest spaces blend interior and exterior elements, often blurring the lines between them. Spaces that appear to be exterior are discovered to be interior but quasi-exterior – like the former courtyard at La Fonda Hotel in Santa Fe New Mexico, seen in the photo at the start of this pattern. The doors appear to be exterior doors, even though they connect to another interior space. Treatments in the courtyard that seem exterior, like plants and fountains, add to the ambiguity.

It is possible to connect these spaces even further to other indoor and outdoor spaces, further blurring the lines. Courtyard buildings often do this masterfully, as they proceed through a sequence of courtyards, some of which are truly outdoors, some of which are more ambiguous.

Caption.

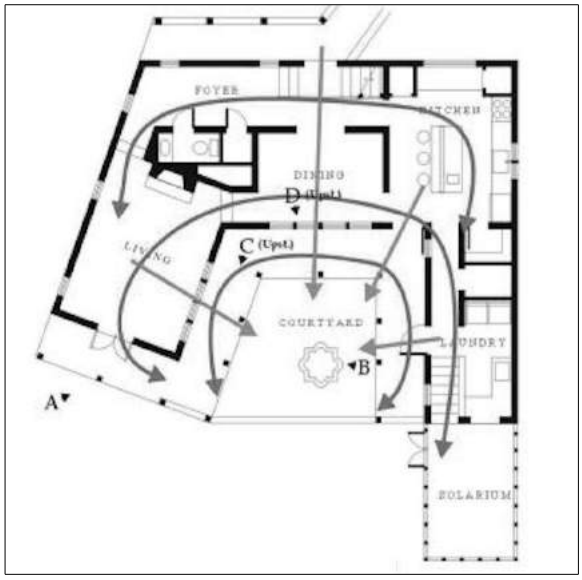
Therefore:

Create structures that blend interior and exterior, including courtyards and solarium galleries. Use glass doors and windows to further blur the distinction between what is truly outdoor and what is quasi-outdoor.

❖ ❖ ❖

Use INTERIOR WINDOWS and SOLID DOORS WITH GLASS to blur the distinction between indoors and outdoors. Use POOLS OF LIGHT created by skylights and glazed courtyards to create indoor spaces with outdoor qualities. Use rough, typically external materials like stone and brick – COMPLEX MATERIALS – to further blur the distinction....

CIRCULATION NETWORK

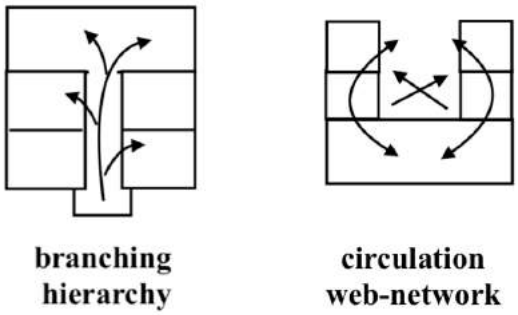


… The COURTYARD BUILDING needs to be structured to take advantage of its spatial complexity...

❖ ❖ ❖

Problem-statement: Too often, circulation within a building is conceived as an elementary branching hierarchy or "tree" structure. This is a deadening kind of space. The richest spatial experiences come from inter-connected circulatory network structures, offering rich overlapping relationships.

Discussion: A "functional" approach to architectural space typically conceives of a linear, branching relationship: a central hallway "spine" leads to some boxy spaces at the sides, and perhaps to some main space at the end. But a more complex kind of spatial relationship comes from circulation networks, where the spaces are part of a circuit that inter-connects around and across the spaces.



Left, a branching hierarchy, with little interaction between the spaces, and little life. Right, a web-network that allows connection and circulation in a complex pattern that is far richer.

Therefore:

Do not lay out buildings with long boring central hallways, lacking views or connections. Instead, conceive of building spaces as sequences of interconnected spaces forming circulation networks, retaining views and inter-connections to all the spaces.

❖ ❖ ❖

Employ LOCAL SYMMETRY in creating plan elements. Use LAYERS AND FRAMING to generate complexity and delight...

LAYERED ZONES

… Along WALKABLE STREETSCAPES, and within CIRCULATION NETWORKS, there is a need to articulate the layers of space, especially layers of public to private...

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Problem-statement: People have a basic psychological need to experience layers of space.

Discussion: The experience of layers is one of the most fundamental of human experiences, with its roots deep in our evolutionary history. It is related to the need to experience enclosure, and to define membranes of privacy. But layers of space can also exist as articulations of room-like zones, as described in PLACE NETWORKS. We can see quite complex examples of these layers in some of the best and most active streetscapes.

Typically, the layers also help to define a complex, tissue-like transition between the most public spaces (e.g the street) and the most private ones (e.g. internal rooms). But layered zones can also exist in entirely public spaces – like parks – and entirely private ones, like the articulation of interior spaces with columns.

The complex layered zones shown in the photo at the beginning of this pattern..

Therefore:

Create layered zones of space, especially where articulations of gradations of privacy are required, or where definition of spaces is needed (such as at the edges of parks and other public spaces). Articulate these zones with columns, railings, fencing, vegetation,

elevation changes, and other clear demarcations. But keep a connection as well as a separation of the layers.

❖ ❖ ❖

Fill the layered zones with HUMAN-SCALE DETAIL and ORNAMENT...

PASSAGEWAY VIEW

… Within your building's CIRCULATION NETWORK, be careful about the placement of passages...

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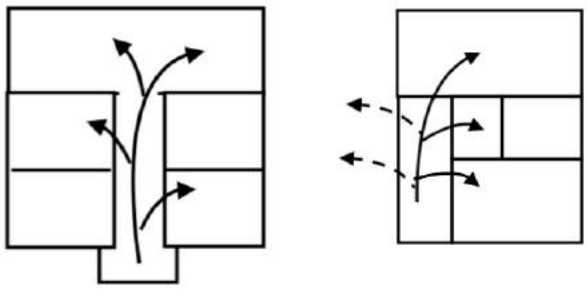
Problem-statement: People tend to assume that in walking from room to room, we are focused on the utilitarian goal of moving, while we only care about a view when we arrive in a room. This is exactly backwards.

Discussion: In fact, when we occupy a room, we are often engaged with tasks that distract us from views: talking to others, reading a computer screen or printed material. It is when we are moving that we are most aware of our surroundings, and most impressed by the views they offer.

In practical terms, this means that the common pattern of a dark central hallway feeding a chain of rooms on each side – known as a :double-loaded corridor" – is a terrible pattern, cutting us off from experience of the outside world, and the rest of the building. A better pattern is to wrap passageways along the exterior walls for at least part of their length, and to cluster rooms in a more complex configuration.



Left, a typical "double-loaded corridor" passageway, offering no views other than a dark corridor. Right, a passageway offering views of the exterior, and perhaps other parts of the building.

Therefore:

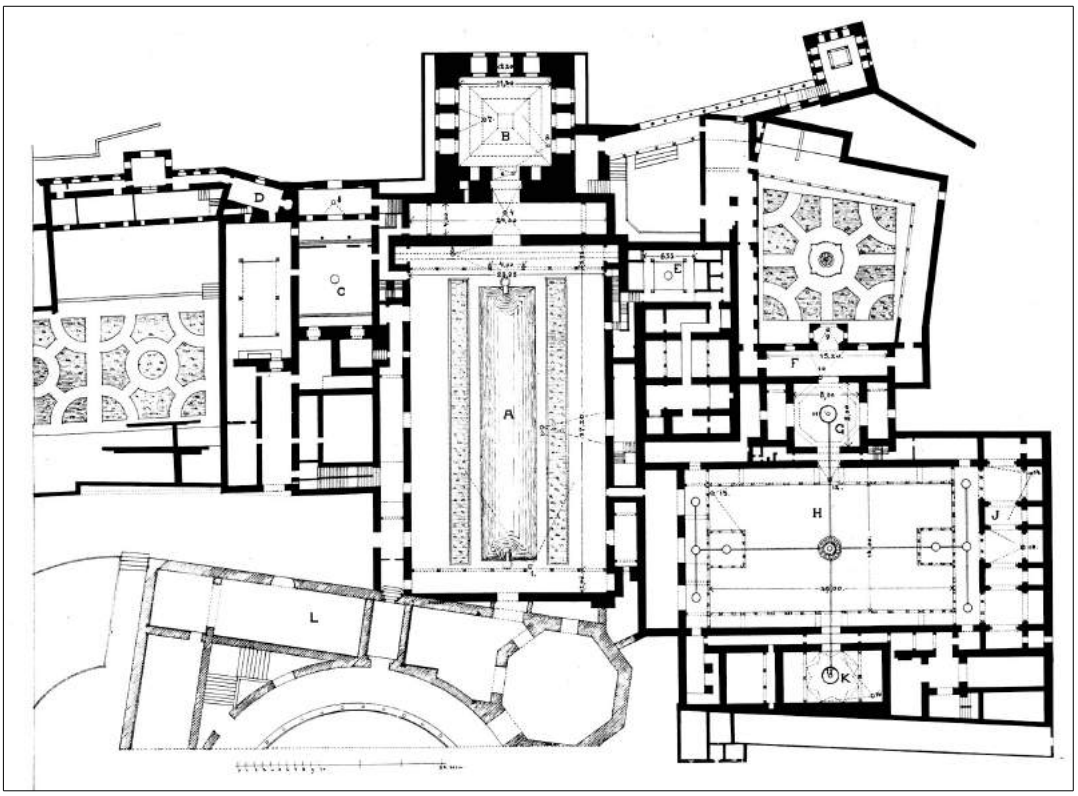
Do not make long, dark passageways that offer no views to the exterior. Instead, connect at least part of each passageway to the exterior, offering views from windows.

❖ ❖ ❖

Use FRAMING to connect passageways to the outside, and to other parts of the building. Provide **HUMAN-SCALE DETAIL** and LOCAL SYMMETRY to create geometric richness and complexity…

GEOMETRIC PATTERNS

LOCAL SYMMETRY



… This pattern begins a section on broader geometric properties that are included in many other patterns at many scales. We can see these geometric patterns in BIOPHILIC URBANISM, in PLACE NETWORKS, in COURTYARD BUILDINGS, and in many other parts of the city...

Problem-statement: Environmental structures without a legible symmetry are chaotic and ugly. But environmental structures with relentless symmetry at all scales can become lifeless and oppressive.

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Discussion: Symmetry is in many ways the most important property in cities, and in living structures too. There are many kinds of symmetries – bilateral (like our two hands), radial (like the irises of our eyes), folded and so on. But breaks in symmetry are also very important, as we are learning from the field of physics today. A relentless form of symmetry that does not break when adaptive conditions require it is oppressive, and usually indicates a faulty process of generation. (Including a designer who has become megalomaniacal with their design, as can be seen in, say, the vast, overly-symmetrical palaces of some despots.)

A more benign form of symmetry can be seen occurring spontaneously in many places – exquisitely symmetrical at local and human scales, but interrupted at larger scales, especially when topography or other conditions prompt an adaptive shift. This "symmetry-breaking" is a key generator of a more complex form of order.

There is a very high degree of symmetry in the Alhambra in Spain, seen above and in the image at the start of this pattern. It includes bilateral, radial and other forms. However, this symmetry exists only at smaller "local" scales. At larger scales the symmetry often breaks, as can be seen in the asymmetrical upper building in this image.

Therefore:

Use symmetry to create beauty at local and human scales, but use it sparingly at larger scales. Break the symmetry as needed to respond to changes in terrain or other environmental conditions. Do not use symmetry slavishly, but as an asset to be applied within a looser, more complex geometric system.

❖ ❖ ❖

Use local symmetry to create ORNAMENT and HUMAN-SCALE DETAIL...

SMALL GROUPS OF ELEMENTS

… In laying out a PUBLIC SPACE SYSTEM, a WALKABLE STREETSCAPE or a specific building or structure, consider the groupings of elements and whether they are legible to residents...

Problem-statement: There is something inherently appealing and satisfying in compositions that are groups of small numbers of elements, typically two, three or four, but rarely more than seven.

❖ ❖ ❖

Discussion: There is evidence that the human brain prefers to view compositions made up of nested small groups, which are easier to grasp mentally. George A. Miller's classic 1956 paper "The Magical Number Seven, Plus or Minus Two" showed that people prefer these kinds of compositions, made up of subsidiary elements or "chunks" as he called them, totaling a maximum of approximately seven elements (up to as many as nine) within any one group.

Most traditional buildings adhere remarkably well to this pattern. It seems to have its roots in the grouping patterns that form spontaneously in nature, and that humans have encountered repeatedly in their evolutionary history – for example, the Fibonacci Sequence, in which each number is a sum of the two preceding numbers, i.e. 1,1,2,3,5,8…

Many contemporary buildings deliberately violate this pattern, favoring a relentless large-scale repetition. They do so in what one architect has called an "alchemistic promise to transform quantity into quality through abstraction and repetition," which he dubbed a failure and a hoax. But this design trick is certainly attention-getting, probably because it contrasts so sharply with natural structures. Of course, getting attention is not the same as creating satisfying human habitats.

Many "modernist" buildings deliberately violate this pattern – with results that are dramatic for them, but simply ugly and stressful for many others.

Therefore:

Keep your design composed of groups of elements, and groups of groups, which contain no more than nine elements at any scale, and focus more on small groups of two, three and four.

This pattern is a valuable aid in achieving HUMAN-SCALE DETAIL and other characteristics of a more legible, human-centered design...

FRACTAL PATTERN

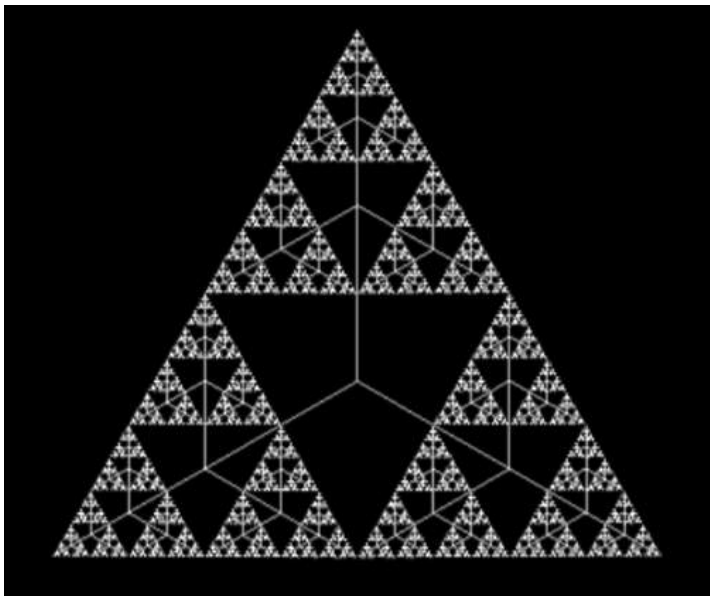
… Fractals are a basic characteristic of a BIOPHILIC URBANISM..

Problem-statement: How can we generate complex and beautiful patterns in design?

❖ ❖ ❖

Discussion: One of the most common patterns in nature, and also one of the most beautiful, is the fractal. The mathematician Benoit Mandelbrot coined the term to refer to structures that contain self-similar elements at different scales. It turns out that very many patterns in nature do have this fractal structure – as do many traditional structures in human environments. Examples of common fractal structures include trees (the leaf vein is self-similar to the twig, which is self-similar to the branch, which is self-similar to the trunk, etc).

A common way of generating fractal patterns in a human design is the use of the motif. This can be a particular geometric shape (sometimes quite simple) that is repeated at small and large scales – like the arch patterns that are repeated many times at many scales in the photo at the beginning of this pattern, a section of the Alhambra in Spain.



One of the simplest fractal patterns, a series of identical triangles repeated at many different scales.

Therefore:

Use fractal patterns to enrich your design and make it more complex.

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Combine your fractal pattern with LOCAL SYMMETRY. Use it to generate HUMAN-SCALE DESIGN and ORNAMENT...

FRAMING

… …

Problem-statement: It is natural to want to remove elements that seem to obscure or clutter a view. But the most powerful views are in fact framed by other elements at their boundaries.

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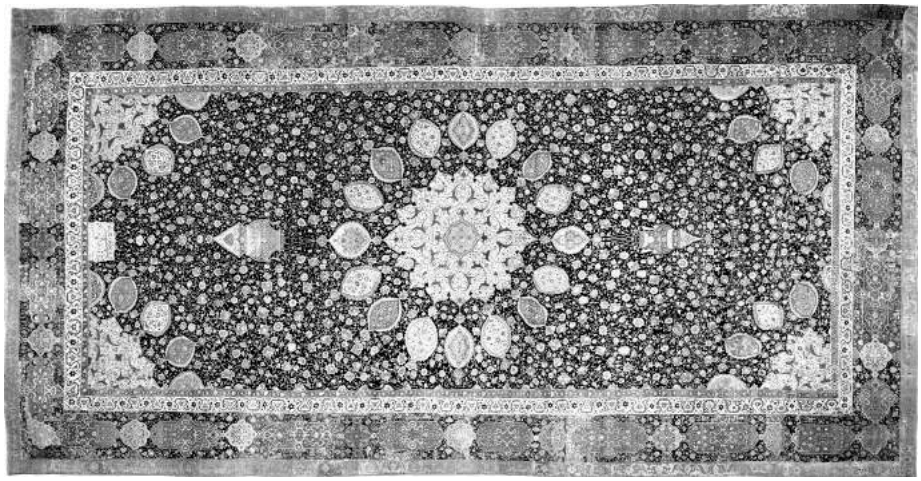
Discussion: Any photographer knows that it's important to have a foreground, middle ground and background, and that the foreground can serve as a powerful way of framing the view. So too a designer needs to recognize the power of a frame and a border, in creating a more powerful relationship between the viewer and the viewed.



The border of this carpet serves to frame the complex pattern inside it.

Therefore:

Do not try to clear out and simplify a design when there is a natural frame around it – whether that is vegetation, a portion of another building, columns or other interruptions. Instead, work with these elements as frames, and use them to make the experience more powerful.

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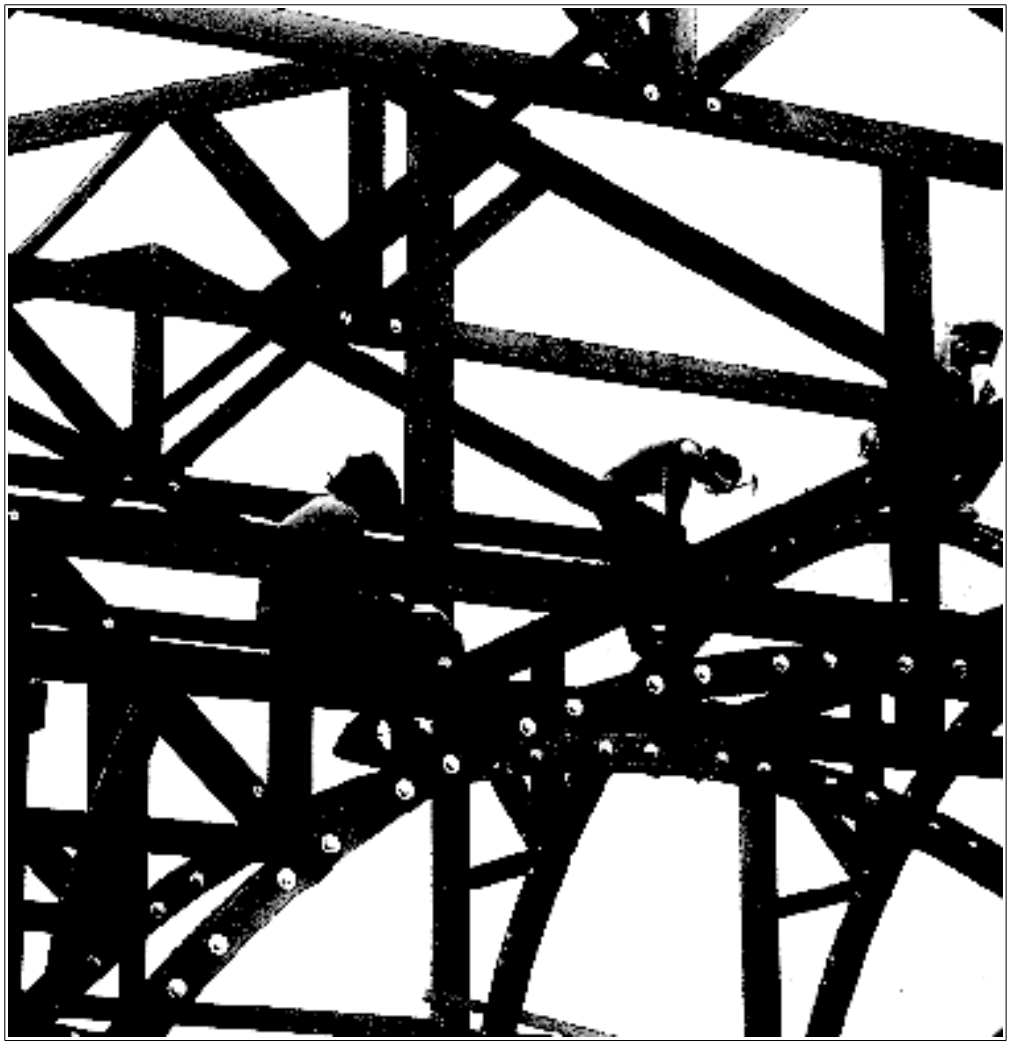
Use framing to enrich HUMAN-SCALE DESIGN…

CONSTRUCTION PATTERNS

DESIGN-BUILD ADAPTATION



… In order to get the richest quality of BIOPHILIC URBANISM and high quality buildings, develop the construction process to be able to evolve and respond to context as it proceeds…

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Problem-statement: If a design is not allowed to adapt to the evolutionary opportunities of its context during construction, it will be destined to be profoundly limited. Yet a design-build approach can introduce uncertainty, complexity and cost into the construction process.

Discussion: Some of the most beautiful and successful buildings in the world have been produced from a design-build process. The great medieval cathedrals are a case in point: often construction commenced with little more than a floorplan and an elevation of a single bay, drawn with ink on plaster. Many hundreds of shop drawings, models and mockups followed, and the beautiful results emerged out of that careful evolutionary process.

At the same time, design-build approaches can be expensive if they are not managed well. The critical issue is the governance of changes, in such a way that any change does not introduce additional cost and/or time, over what has been planned. This can be done if managed carefully.

Therefore:

Incorporate a design-build methodology into construction processes. Use an interactive collaboration between designers, builders and craftspeople, looking on site for

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Use COMMUNITY MOCKUPS to judge the results of design changes in their actual contexts...

HUMAN-SCALE DETAIL

… Within the construction process of DESIGN-BUILD ADAPTATION, create elements that will reflect the scale of human beings…

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Problem-statement: People need to see their own scale reflected throughout the environment. This is true at close distances and at long distances as well.

Discussion: At close distances, the incorporation of human-scale detail is obvious: simply create elements that are the size of human beings or smaller, and easily relatable by human beings: doorways, windows, door handles, and other details. At longer distances, the challenge is greater. It is necessary to use forms that are clearly human-scaled. For example, a window that is approximately 1 meter wide and 2 meters high (roughly 3 feet by 6 feet), extending up from the ground to upper levels of a building, will readily convey a human scale.

Even though the Hermitage in St Petersburg is a massive building, a human scale can be easily perceived within it, from the size of its roughly human-sized windows throughout.

Therefore:

Create a generous number of elements that are human-scale, i.e. 1 meter by 2 meters or less. Make sure that many of these elements are structures that people are physically familiar with, e.g. roughly human-proportioned windows, hand-crafted patterns, etc.

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Use ORNAMENT and COMPLEX MATERIALS to enrich the human scale...

ORNAMENTAL CONSTRUCTION

… HUMAN-SCALED DETAILS need to be beautiful and well-connected to the rest of the design…

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Problem-statement: Many people assume that ornament in construction is a superfluous decoration, like little bits of icing added to a cake. This view is mistaken.

Discussion: In fact, as the pattern ORNAMENT argues, ornament is a kind of "glue" that binds the environment together, psychologically speaking (and in a sense, physically speaking too). It helps to connect the different regions of space, and draws our attention to them, much as we are drawn to the ornamentation of a pair of earrings heightening our sense of the shape of a person's head. There is a natural reason that people have had a desire to create ornaments for their constructions from time immemorial.

A doctrine was introduced in the early 20th Century (by the Austrian Adolf Loos) that ornament was a "crime" in that it was a waste of resources. This was a terrible idea, failing to understand the real value played by ornament in the human environment, and leading to an era of of stripped-down, ugly buildings. Worse, it was borne of a racist doctrine, that Europeans were a superior race that, with their superior mechanical technology, had outgrown the need for ornament.

This was a naive attitude at best. It was not understood until recently that ornament, like biophilia, plays a key role in generating comfort and well-being in the built environment.

Therefore:

Do not be afraid to use ornament, in a careful and disciplined way, and in a way that grows out of context and structure. For example, allow rafter tails to express an ornamental repetition, or bricks to express an ornamental alternating pattern.

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COMPLEX MATERIALS

… In creating a BIOPHILIC URBANISM, take care that the materials are not too simple and monolithic…

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Problem-statement: Too many buildings are made with dull, simple expanses of metal and glass. Repeated endlessly, these materials are ugly.

Discussion: The most beautiful materials are also the most complex – that is, they have rich structural divisions within them that can be seen at human scales. Wood, stucco, brick, rusted metal, and other materials have this rich complexity. Perfectly smooth metal, glass, and painted wood panels do not.

Therefore:

Avoid large expanses of perfectly flat, smooth panels of metal and glass. Use complex materials that have subtle structural characteristics that can be perceived at human scales.

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RETROFIT PATTERNS

SLUM UPGRADE

… Upward...

Problem-statement: How can we help those who live in slums to enjoy a better quality of life and greater opportunities, without forcing them to move to places that might make their lives worse?

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Discussion: Informal settlements – slums – often have many positive qualities, including existing neighborhood relationships, cultural creativity, resource efficiency, and remarkable levels of innovation and resourcefulness. But they often also lack mobility and access, good utility service, sanitation, security, and other essential conditions necessary for quality of life.

The approach often used in the past was to force slum dwellers to move to new buildings which included utilities, sanitation and other amenities. But this approach is expensive, and history shows that it often fails. Peopel lose their web of social contacts, and the new buildings often become even more unsafe than the buildings from which they moved.

We are recognizing that a key aspect of healthy urbanization is its self-organizing character, where people work “bottom-up” to address their own needs, and to create remarkably complex, well-functioning neighborhoods with strong social capital.

At the same time, people need transport and utility systems and they need a public realm that is sufficiently structured to promote safety in numbers and “eyes on the street” to improve security.

Many cities have begun to implement strategies to upgrade slums in place, reinforcing their best qualities and addressing their weaknesses with pro-active policies. For example, the city of Medellin, Colombia, instituted participatory budgeting to allow neighborhoods to decide their own allocations for infrastructure, including escalators and overhead cable cars. Beautiful new civic structures like libraries were placed directly in the center of slum communities, promoting a mixing of populations and an opportunity for commerce across a wider section of the city.

Therefore:

Do not assume that the only remedy for informal settlements is to demolish and relocate. Instead, institute policies for slum upgrading, allowing people to stay in their homes and communities, and improve their quality if life.

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SPRAWL RETROFIT

… Within the POLYCENTRIC REGION, one of the most important tasks is to improve the urban quality of many suburban areas...

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Problem-statement: The existing suburban regions that are low-density, segregated by use and by population, high-consumption, fragmented and dysfunctional, represent one of the greatest land resources for the future. But the challenge of retrofitting and urbanizing these areas is enormous, with many barriers remaining.

Discussion: The sprawling suburbs represent a large and growing percentage of the world's population, particularly in countries like the USA where auto-dependent suburban development has dominated for decades.

One challenge is that existing owners are resistant to change, and political processes therefore often inhibit urbanization. But there are economic mechanisms to promote urbanization, including developing attractive new urban centers on adjacent empty land such as parking lots and unneeded right of way. Another strategy is to acquire future easements that do not go into effect for the foreseeable future, and that property owners will therefore be more willing to sell or otherwise grant permission.

Another significant barrier is the holdover of zoning codes and laws from a period when sprawling development was seen as more benign than it is now. A key challenge is that sprawling development is still very profitable, even to city bureaucracies in the form of increased fees and tax base. This means it is necessary to find ways to change the "operating system", especially by changing the economic incentives and disincentives. For example, taxes, fees, system development charges, and other mechanisms can help to make good-quality urbanism more cost-competitive in these suburban locations.

Caption.

Therefore:

Find creative ways to retrofit suburban sprawl, by creating new infill development, and by changing old zoning laws, standards, codes and charges. Find new economic incentives and other creative mechanisms to fund good projects.

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Use TAX INCREMENT FINANCING and LAND VALUE TAX to make good-quality urbanization more competitive, and more likely to proceed...

URBAN REGENERATION

… Within the POLYCENTRIC REGION, the urban cores also represent a valuable asset for careful regeneration…

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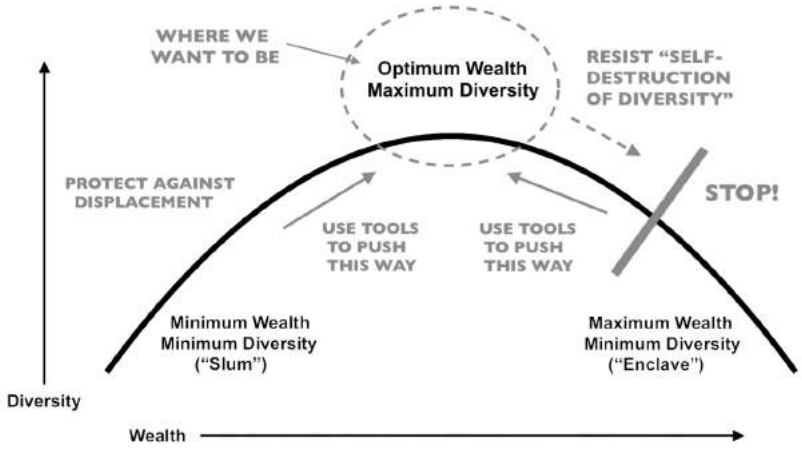
Problem-statement: There are many opportunities to re-urbanize existing declining urban areas. But care must be taken to avoid runaway gentrification.

Discussion: In her landmark *The Death and Life of Great American Cities*, Jane Jacobs described the dangers of gentrification, but she also made an important point. The problem is not when the wealth of a neighborhood increases from poverty to a mix of incomes – a condition she called "unslumming". The problem arises when the neighborhood tips over from there into higher income, driving out those of more moderate income. She called this "the self-destruction of diversity." In other words, increasing wealth that increases diversity is good, but increasing wealth that decreases diversity is very bad – perhaps as bad as decreasing wealth that also decreases diversity (e.g. when a neighborhood declines into a slum).

Jacobs' point could be illustrated with a graph, showing a kind of "Goldilocks zone" of maximum diversity. Our goal, not only as planners and designers, but also as policy leaders and citizens, is to implement policies and tools to resist the destruction of diversity on either side of the curve. In existing neighborhoods, our challenge is to restore diversity with policies that can recognize when "enough is enough."



"JACOBS CURVE"

The "Jacobs Curve" shows an optimum point of diversity reflecting a mix of incomes, Anything on either side of this Goldilocks zone" – either too much poverty, or too much wealth – is bad for the neighborhood.

Therefore:

Implement policies to regenerate existing urban areas in decline, while also assuring that these areas do not tip over into gentrification. Do this by providing a range of new housing at a range of prices, and by expanding opportunities in many palces at once, so that no one place becomes over-heated.

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Promote a more equitable form of urban development with LAND VALUE TAX...

URBAN CONSOLIDATION

… At times the POLYCENTRIC REGION is developing erratically, and emphasis needs to be shifted to consolidate some areas…

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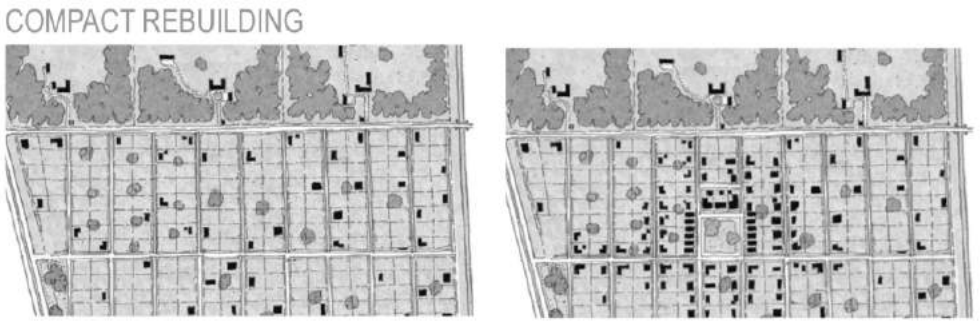
Problem-statement: In some areas where homes have been lost due to environmental disasters or population decline, it is sensible to consolidate homes and businesses in more compact, walkable areas, and to create new public spaces or environmental preserves with the remaining land.

Discussion: The decision to consolidate development needs to be a democratic one, taking special care to allow residents to choose their own futures. However, often there are no residents, or few residents, and a more sensible alternative is to offer them a higher-quality alternative in a consolidated area.



The proposal for new public squares in the Gentilly district of New Orleans, where many homes were destroyed by Hurricane Katrina..

Therefore:

When consolidation of urban areas is warranted, take care to give the remaining homeowners a say in their future. Create a meaningful choice for a more consolidated, higher-quality urban form, with new parks and green spaces nearby.

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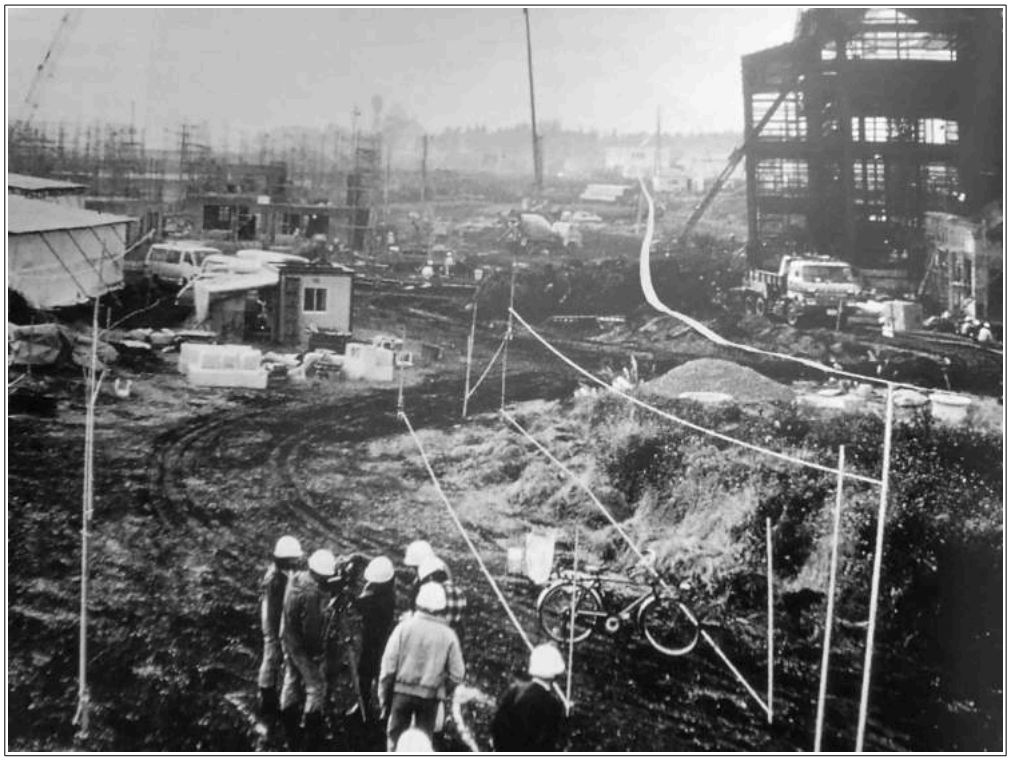
IMPLEMENTATION PATTERNS

COMMUNITY MOCKUP



… In making urban changes to the WALKABLE STREETSCAPE or other features, it is helpful to be able to do temporary structures that help to mock up the results...

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Problem-statement: How can changes to the neighborhood design be tested and accepted by stakeholders before commitments are made and significant expenditures are committed?

Discussion: An approach that has proved successful is to create mockups of the changes that are proposed. These can be done with large stakes, flags, or paint on the surface of pavement areas.

One example is known as the Better Block project. Where changes are proposed to the streetscape to enhance pedestrian quality, proponents come in and make temporary and reversible changes, using paint, planters, seating, and other temporary changes. These can then be viewed and assessed – often with enthusiastic results, and commitment to more permanent changes.

Another approach is to use augmented reality to create images that are visible on smartphones and other GPS-sensitive devices.

Community residents create a mockup of streetscape improvements in Kansas City.

Therefore:

Use community mockups to simulate the changes that are proposed, using temporary materials such as stakes, fabric, washable paint, and movable elements, or using augmented-reality technology.

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Use AUGMENTED REALITY DESIGN tools to assist residents with ..

NEIGHBORHOOD PLANNING CENTER

… In order to accomplish neighborhood-scale improvements in SLUM UPGRADING, SPRAWL RETROFIT, URBAN REGENERATION and URBAN CONSOLIDATION, it is necessary to work closely with residents, who will act as co-developers in almost all cases. An institutional framework is needed...

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Problem-statement: Many people participate in small-scale development at the neighborhood scale, in effect "co-producing" the city. They need neighborhood-scale resources to help them.

Discussion: Homeowners and business owners who are engaged in development of their properties face a bewildering environment of obscure and often contradictory requirements: technical demands for rebuilding based upon highly local conditions; financial requirements of insurance companies, mortgage lenders and government agencies (often in conflict); and planning and permitting requirements that present multiple options and multiple potential problems.

The neighborhood planning center is a way to bring resources to where they are needed – the neighborhood scale. The centers are places where informal discussion and peer-to-peer exchange of information can take place – both physically, and through a web-based component. They are also venues for periodic community meetings on timely topics of city-wide and local planning issues. No less importantly, they are places for the efficient distribution of knowledge and expertise on topics like construction systems, historic preservation, green building and other topics.

The centers also give residents the opportunity to participate in planning of their own neighborhoods, and development of planning regulations such as zoning, coding and enforcement provisions. The residents can also develop versions of their own pattern language (both individually and as a neighborhood) to help to coordinate the growth of their neighborhood in a beautiful and diverse way.

Therefore:

Create a series of neighborhood planning centers, one for each walkable neighborhood area (roughly 800 x 800 meters or ½ mile x ½ mile).

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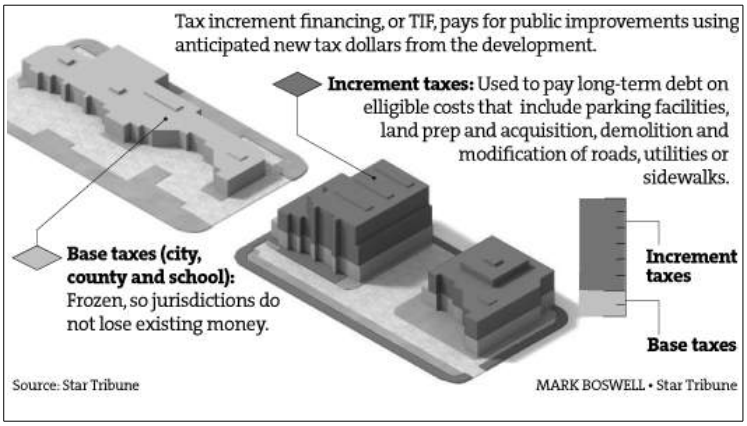
Provide digital resources for the centers, including AUGMENTED REALiTY DESIGN tools and CITIZEN DATA tools, including community wikis and other resources tools...

TAX-INCREMENT FINANCE



… Redevelopment and new development projects like URBAN REGENERATION and SPRAWL RETROFIT need sources of revenue...

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Problem-statement: How can the benefits of future improvements be transmitted financially to the present day, so that they are economically viable in the period before they generate profit?

Discussion: One of the most common mechanisms to accomplish this goals is known as tax increment finance. In essence the government entity with taxing power recognizes that the improvements will generate an increment of increased taxes (through sales tax, income tax, property tax or other means) and this increased revenue can be used to service a bond or pay back a revenue expenditure to the taxpayers.

Care must be taken in tax increment finance projects to avoid commingling the public sector with its interests and priorities, with the private sector with its own distinct interests and priorities. This is best done by focusing expenditures on public improvements, including utilities, transportation infrastructure, and especially, public space improvements.

Therefore:

Use tax increment finance to

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Use tax increment finance carefully with LAND VALUE TAX, since they can operate at cross purposes. For example, a dependence on property value tax to service debt of tax increment finance can make it difficult to implement land value tax. Therefore, it is better to rely on other streams of revenue than property tax to service tax increment finance ...

LAND VALUE TAX

… In finding funding for the PUBLIC SPACE SYSTEM, and accomplishing the other important goals of URBAN REGENERATION and other improvements, it is necessary to reform the taxation system, among other systemic reforms.....

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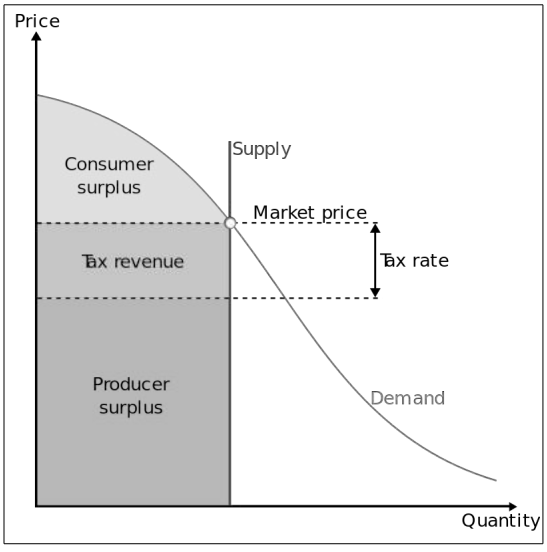
Problem-statement: The best way to make efficient use of resources, including land, is to tax them directly at a fixed rate, so that the more efficiently they are used, the more their owners benefit financially.

Discussion: The first major proponent of land value tax was the 19th Century American economist Henry George. In his best-selling work *Progress and Poverty* (1879), George argued that because the value of land depends on natural qualities combined with the economic activity of communities, including public investments, the economic rent of land was the best source of tax revenue.[5] This book significantly influenced land taxation in the United States and other countries, including Denmark, which continues 'grundskyld' (Ground Duty) as a key component of its tax system.[58] The philosophy that natural resource rents should be captured by society is now often known as Georgism.



The land value tax model. This supply and demand diagram showing the effects of land value taxation. As the supply of land is fixed, the burden of the tax falls entirely on the land owner. There is no change in the rental price and quantity transacted, and no deadweight loss.

Therefore:

Implement a land-value tax, carefully coordinated with other taxes to create a maximum incentive to conserve land and other resources, and to maximize urban benefits per unit of urban land.

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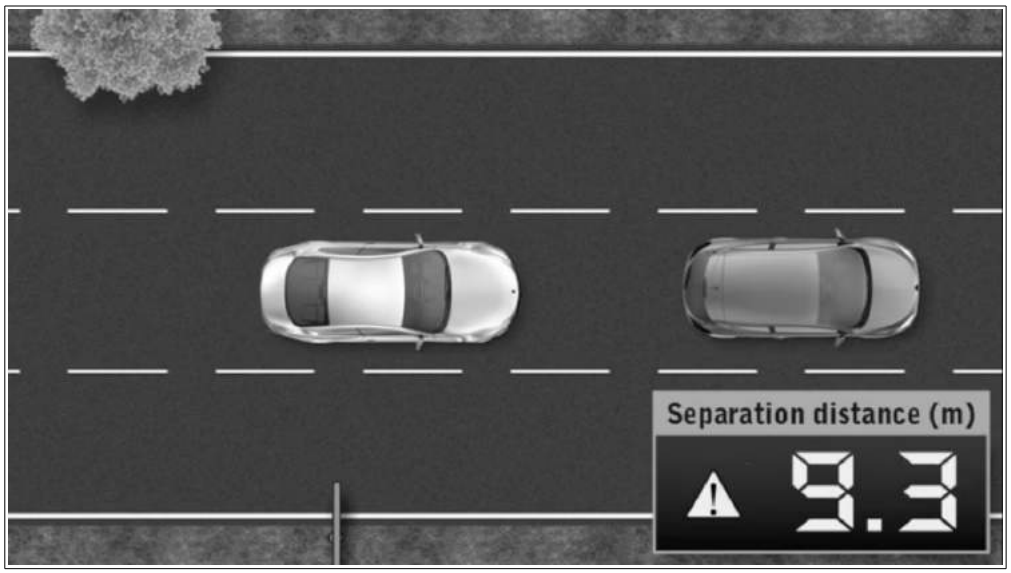
Use land value tax to fund NEIGHBORHOOD PLANNING CENTERS and other community resources for better-quality urban development...

NEW TECHNOLOGY PATTERNS

SMART AV SYSTEM



… Within the POLYCENTRIC REGION, policies and designs are needed to plan for autonomous vehicles...

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Problem-statement: Autonomous vehicles could be a boon to cities – in effect serving as driverless taxis that are more numerous, close-by and convenient. But they could also become nightmares for cities.

Discussion: The worst case scenario for AVs is that they are used as roving living rooms – roaming around the city, entering drive-through lanes at the whim of their occupants, adding enormously to congestion – which is of little concern to occupants, since the vehicles find their own way around impasses. In this scenario, the number of vehicles on the road would expand enormously, greatly adding to drive times and creating delays for those who do need to get to destinations quickly. Even worse, because AVs brake automatically for pedestrians, many pedestrians would likely walk out in front of them, further increasing congestion.

An opposite scenario is that these vehicles are used much more sparingly, more like carshares without the need to drive them – or even go to them. In this scenario, residents might well choose not to own a vehicle, since one would always be available close by, and there would be no need to park the vehicle. This could translate into a significant *reduction* in the number of vehicles on the road.

Which scenario will become the reality – or will it be something in between? This is the choice we have now, and the answer will depend on the mix of design and policy changes. For example, will we reduce the number of parking spaces, on the basis that fewer cars will require parking? How will that change the design of street sections, especially where parked cars are used as a buffer to protect pedestrians? Will we use AVs for larger groups and fixed routes – for example, multiple-destination shuttle buses and rapid transit vehicles? How will these pathways be accommodated? These and other issues must be addressed.

Therefore:

Do not allow autonomous vehicles to be used as "roving living rooms" by occupants. Institute progressive congestion charges that make it increasingly expensive to remain in a vehicle for more than a reasonable amount of time (with a hardship exception for those who must travel long distances, or travel frequently). Instead, encourage AVs to be used as shared vehicles on a timeshare rental

basis. Provide in addition for lower-cost, multiple-passenger AVs such as shuttle buses and fixed-route rapid transit vehicles. In every case, do not allow AVs to degrade the urban fabric, but employ them to protect and enhance existing environments.

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AVs can be used by RESPONSIVE TRANSPORTATION NETWORK COMPANIES...

RESPONSIVE TRANSPORTATION NETWORK COMPANY

… AUTONOMOUS VEHICLES can benefit from being part of a transportation network operated by a service company…

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Problem-statement: Transportation services like Uber and Lyft have the capacity to be beneficial, since their digital capabilities are very sophisticated and flexible. But these companies also have a number of important drawbacks. At worst they are simply ways to deregulate taxicab companies, and put many people out of work

Discussion: One of the most important issues is the fact that these companies are in competition with existing taxi companies, which generally have stricter rules on employee pay and benefits, and other rights. Moreover, these companies are on a path to shift to autonomous vehicles – meaning that they will put many more drivers out of work.

Of course, technology often displaces many people, and this is not a new problem. But it is one that requires careful management and transition, assuring that those displaced have other opportunities.

Of particular importance is that the TNCs integrate into the regional transportation system, and have data that responds to the system's needs. For example, TNC services can be coordinated with existing fixed transit, and even supplement it with multiple-passenger AVs (not unlike today's shuttle vans). In addition, existing taxi companies might still employ driver-escorts to assist those who need special attention or assistance (for example, assisting the elderly or the infirm, or those with baggage). In such a system, TNCs could enhance, and not disrupt, existing transportation networks.

Therefore:

Do not allow a free-for-all with transportation network companies. Instead, require them – through thoughtful regulation and incentives – to integrate into the regional transportation system .

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Downward...

DESIGN WITH AUGMENTED REALITY

… When doing COMMUNITY MOCKUPS, or as part of a NEIGHBORHOOD PLANNING CENTER, provide digital tools that help residents to assess the character of a proposed design, and participate in its development ...

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Problem-statement: It can be difficult for residents to visualize how a new design proposal will fit into the neighborhood.

Discussion: The new augmented reality tools can provide the capability for anyone with a smartphone device to see a model of a new design as if it were in front of them and their smartphone (or VR headset if they have one). Late the form and approximate character of a new structure.

Therefore:

Use augmented reality to simulate proposed designs for stakeholders.

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Use design with augmented reality in conjunction with CITIZEN DATA projects...

CITIZEN DATA

… In SLUM UPGRADES and URBAN REGENERATION, it is especially important that citizens have access to digital technology to be able to manage their own local issues...

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Problem-statement: Many urban problems are known only to the citizens who live there, and reporting is often cumbersome and ineffective.

Discussion: A new generation of citizen data is being used to gather information about neighborhood-scale issues and to identify resources that can be brought to bear to address these issues. They include relatively small-scale problems like potholes, graffiti, vandalism, garbage and the like. Citizens armed with a new generation of digital reporting tools can notify agencies, who are able to take this information in an efficient and aggregated form, and develop a response that is locally calibrated to be effective. For example, a community worker can respond to a series of individual reports in sequence, avoiding the need to respond to each report individually (or more often, to simply ignore the reports).

Therefore:

Use the new digital reporting technologies to respond to neighborhood-scale challenges where they occur, without the need for individual time-consuming and expensive responses by staff.

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CASE STUDIES

Case study of many of the patterns in action in a prosperous "modern" city: Portland, Oregon USA

NOTE: Section to be re-written (from the book *Cities Alive*)

Figure V.1.1. Walking, biking, transit and car are all viable choices for travel in Portland's well-connected urban grid. This intersection, next to the celebrated Powell's Books, includes streetcar, bikes, walking, cars, bus, and a light rail connection three blocks to the south.

Portland is a remarkable example of many of the patterns in this book. It is a modern American city with a prosperous economy, and yet it also demonstrates quite well the urban structure that Jacobs and Alexander championed. It thereby demonstrates that sustainable urban development is not antithetical to a prosperous economy with ample opportunity for employment. Indeed, as this book argues, these things are increasingly tied together.

In the 1960s and 70s, Portland was a fairly dreary town, not so different from Pittsburgh or Chattanooga in those days. But as in those other cities (and countless more), city leaders here were inspired to change things. Jacobs and Alexander are often mentioned as inspirations in part for these changes, and Jacobs herself came here occasionally to comment on and encourage the work. Alexander's

"pattern language" methodology was also used to develop much of the planning for the city in those years (as well as the better-known University of Oregon, recounted in his book *The Oregon Experiment*).

Figure V.1.2. Downtown Portland in the 1960s, full of freeways and parking lots. The riverfront freeway to the left was later removed to create the much-loved Tom McCall Waterfront Park. Photo: Oregon Historical Society.

Figure V.1.3. Pioneer Square, often described as the city's "living room," occupies the site of a former parking lot. It now has two light rail lines passing by it as well as a streetcar line nearby.

Luckily, the city had great urban bones — its small walkable blocks, streetcar grid and diverse mixed-use fabric. The city's remarkable renaissance was begun with some added public spaces (Pioneer Square, Ankeny Square etc.), appropriate contextual infill (Pioneer Place, RiverPlace, etc.), adaptive reuse of existing buildings (EcoTrust's Vollum Center, University of Oregon Graduate Center, etc.), and a mix of light rail, streetcar, bikeways and better bus service.

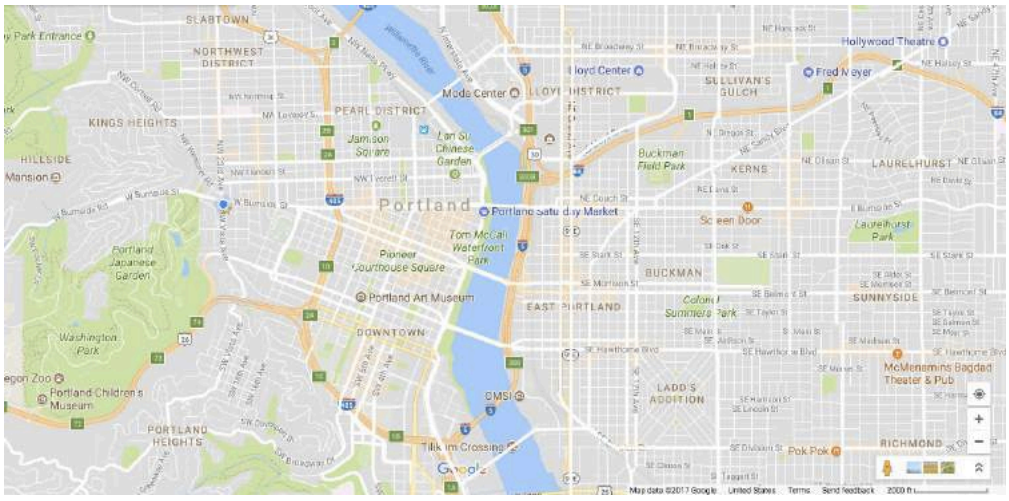

FIGURE V.1.4. Portland's remarkably well-connected walkable grid, stretching continuously across the river, freeways and other obstructions. Principal through streets are spaced at roughly ¼ mile, or 400 meters, which is a common pattern in walkable cities. The author's apartment building is at the circled dot on West Burnside, to the center left of the map. Image: Google Maps.

To give a flavor of the urban renaissance that happened here (and can happen elsewhere), I will offer a personal report on life in one particularly livable part of town, where I have my own home and office.

Figure V.1.5 Portland's walkable grid stretches right across the 405 freeway in West Portland (at bottom of photo), with light rail, streetcar and bus lines, as well as bike pathways and wide walkable sidewalks. At right is the Northwest neighborhood, and at left is Goose Hollow. The author's apartment is at center top. Image: Google Maps.

I live and work in an area that adjoins Portland's well-known "Northwest" neighborhood, also called the Alphabet District or Nob Hill. I actually live just across the borderline, in an area called Goose Hollow. Geographically, However, Goose Hollow and Northwest are part of a continuous urban area bounded by the West Hills on the west and south, the river on the north, and Downtown and the more famous Pearl District on the east.

Figure V.1.6. Farmer's Market in Portland's Northwest neighborhood, a beautiful and functional place to live for the author and many others.

This is a remarkable place — close to a textbook example of well-connected, mixed, walkable, multi-modal urbanism. It's economical-

ly diverse, with people of very modest incomes as well as wealthy people and those in between. It's also very beautiful and livable. I live in a historic 1911 "courtyard apartment" — very typical for the area — with a balcony overlooking the neighborhood. It's one of 45 units on a 10,000 square foot lot, or about 930 square meters. For planning geeks, that's a net density of 196 units per acre, or 480 to the hectare — unusually high by the standards of most American cities. The gross density of the neighborhood is above 20 units to the acre — about 24 or so depending on how it's measured — which is one of the highest in Oregon. (Yet the neighborhood has very few tall buildings — a point that fans of tall buildings should note, along with other cautionary evidence. My very livable yet high net density apartment is 6 stories.)

Figure V.1.7. The author's 1911 courtyard apartment building, typical for the neighborhood, with a net density of 196 units to the acre (about 480 to the hectare). The author's apartment is on the far side, with a balcony overlooking the neighborhood.

I live and work in a small one-bedroom unit with quite reasonable rent by US West Coast standards, about $1.55 USD per square foot per month, or about $17 per square meter. That includes heat, water and sanitation. It should be noted however that rents have been soaring here in recent years, a result of the phenomenon I have called "voodoo urbanism" (see chapter IV.5). I also pay about $25 per month in electric bills, using the local utility's renewable "green" energy option. I don't own a car, and I bike or take transit to most loca-

tions, and use car-share for others I can't get to. The location itself is a major factor in affordable (as well as very pleasurable) living.

Figure V.1.8. Although Northwest Portland is one of the densest neighborhoods in Oregon, its diverse mix of housing, including single-family detached, duplexes, rowhouses and apartments, makes it remarkably livable and attractive.

On a typical day here I wake up, shower and get dressed, make some coffee, answer some emails, then walk or bike to a nearby deli to read the paper, say hello to friends and acquaintances, and eat a bagel or some huevos rancheros. Then it's back to the office (in my apartment) to make some calls, do some work, or prepare for a meeting. On some days I teach an on-line course from my home at a university where I am an adjunct. Frequently I'll head off to a meeting, most often on my bike, which is often faster than driving or transit would be. On the rare occasion that I need to drive to a meeting, I check out a ZipCar from just around the block, or I carpool with colleagues.

Figure V.1.9. Elephant's Deli, where the author often walks to have breakfast, read the newspaper and visit friends.

For shopping I can bike to three different grocery stores within about 4 blocks of here. One of them is a high-end specialty store, another is a warehouse-type organic store, and another is a more generic and affordable grocery store. My bank, dentist, laundry, print shop and other routine services are also in the same area. I can also bike easily to the famous Powell's Books (see Figure V.1.1), or other downtown department stores and specialty stores, for office supplies, clothes, or household goods.

Figure V.1.10. The Portland Streetcar passes in front of Good Samaritan Hospital and a row of shops offering neighborhood services.

I do have to drive to visit my two daughters and five grandkids (or they have to drive to visit me) a few times a month. Both live in smaller nearby towns close to their workplaces. One family lives in a beautiful small town up in the Columbia Gorge called White Salmon, and another in an exurban town called Wilsonville, farther south in the Willamette Valley. For those visits I check out a ZipCar, since neither family is on a reliable transit connections to here. (This is a significant problem for the suburbs here, although the city itself has quite good transit.) For most trips, including regular business meetings, I am able to bike or take transit. When I head to the airport for a business trip, I use the light rail line, which has a station a few blocks away from here.

It's true that this neighborhood is not as practical for families with more than one or two children. When my wife and I were raising our three daughters, we briefly considered living here. However, we opted to live in a nearby suburban town, and we did own cars — although the neighborhood was also walkable and bikeable, with well-connected mixed-use streets and reasonably good transit. (The core of Portland and other cities is not the only kind of place that is experiencing a renaissance of urbanism.)

Figure V.1.11 A number of former residences have been converted to retail uses at the ground floor along Portland's NW 23rd Avenue forming a complex and spatially attractive streetscape.

To be clear, Portland is far from perfect: it has its share (or more) of problems with over-gentrification, loss of affordability, displacement, inequality, homelessness, traffic congestion, poor-quality over-development, loss of livability and heritage, and other common urban ills in the USA. But it has those problems in spite of, not because of, the near-perfect urban form in its core. Bigger problems occur in the sprawling suburbs, where over two-thirds of the region lives, and where car dependence, traffic congestion, poor transit service, and other related ills occur, as they do in so many other cities, new and old. However, another more recent kind of problem is also occurring in the core of the city — a destructive kind of hypertrophic growth, resulting from ill-conceived policies that amount to "killing the city with kindness." This is the phenomenon I referred to as "voodoo urbanism", discussed in more detail **elsewhere.**

Figure V.1.12. Comparison of Portland's connected, walkable urban form to 20th Century models criticized by both Jacobs and Alexander. Top left: typical isolated "drive-to" shopping mall surrounded by parking. Top right: Pioneer Place, a multi-block complex connected by tunnels and bridges, and allowing the walkable street grid to continue at grade, and serving pedestrians, bikes, cars, and two light rail lines. Upper left: A typical suburban hospital "supercampus", and upper right, Portland's Good Samaritan Hospital, again a multi-block complex connected by tunnels and bridges, allowing the street grid to continue at grade, serving pedestrians, bikes, cars, and a streetcar. Lower left, a typical isolated university campus, and lower right, Portland State University, once again a multi-block complex with a continuous walkable street grid throughout, connected also by bridges and tunnels, and featuring a streetcar. Bottom left, a typical suburban industrial supercampus, and bottom right, Portland's Inner Eastside industrial area, including a light rail line. Photos: Google Maps.