THE DIFFERENT LIVES OF SPACES
Reconsidering the city block as a new neighborhood in Washington DC
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Benjamin Butz

Jaan Holt - Committee Chair

Susan Piedmont-Palladino - Committee Member

Paul Emmons, Ph.D. - Committee Member

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The city with its urban density, infrastructure, and cultural, social and educational opportunities can be a desirable place to live for all - regardless of age, income or background. The city of today has changed considerably from the city of the 19th century. Neither is it the city of the future. However, it has great potential to anticipate to the challenges we will face in the future. It is a place that constantly changes. It is a living organism!

This constant change is a challenge for architects to develop concepts and design-solutions that can react to shifting uses, zoning requirements, and dweller habits. The constant alteration of lifestyle, residential and commercial use, as well as job-related needs demands a high flexibility and adaptability in architecture and urban planning. Today’s life is fast and unpredictable.

Other contemporary issues such as sustainability or climate change are becoming key issues of today’s discussion - in society, in the media and in world policy. Architects responsible for our built environment - have to find innovative solutions to such ever-changing problems within their profession - within architecture.

**How can a concept, project or building be designed or constructed to anticipate those future needs, and what are the limits?**

To explore these questions and many more that followed I chose a site in midtown Washington DC. My thesis project includes 23 townhouses with partial retail, incorporated along an alley in the interior of a city block. The new development is integrated into the existing structure.
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YanYan Li, Christian Schmidt, Cristian Yazigi, Juan Pablo Scaraffia, Elisa Uano, Isidora Lobos, Yves Six, Jost Crasseit, Hamid
Tabatabaei, Kelli Franz, Yvan Conna, Christine Büttner-Gräfenhain, Daniel Büttner, Ramona Sonntag, Nashwell Hays, Agustín
Merino, Marissa Kane Nering, Adam Perris, Carolyn Perris, Ana Victoria Zannoni, Andro Mand, Antoun Al-Masri, Brian
Bohlen, Cecilia de la Vega, Santiago Mosso, Lori Marmolejo, Kelvin Webster, Toni Torres, Laureen Schlather, Laura Croce,
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location, analysis, existing conditions

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Vita
"With infill building, new construction fits into available space - be that a single lot or an entire block - in the existing city. It often uses historically evolved low-rise, high density housing types such as the row house and perimeter block. Greeting rather than confronting the fabric, these buildings re-establish the physical continuity of the city as they tie new construction to the city’s past. This establishes a visual dialogue that comments vividly on the relationship of the old and new buildings while it preserves the city as the physical emblem of human memory."  

Marta Gutman

1 Gutman, Marta  Housed Together: the Shape of Urban Infill, Reweaving the Urban Fabric: Approaches to Infill Housing, 1989
There is an increasing tendency worldwide to leave the countryside and move into the cities. Based on my European background, and driven by my appreciation for the city, I chose a thesis site in the city of Washington DC.

From the beginning, one of my goals was it to combine the American Dream of a suburban house with a big garden with European urban density. I believe today’s problems and perhaps those of the future obligate rethinking the idea of suburbia. At the same time, we need to solve many problems in the cities, such as crime, pollution and unreliable public transportation, in order to make our cities more attractive places. They have to become cleaner and healthier, yet be open and flexible towards change and development.

Our lifestyle and our environment change so much faster than in the past. Today it is common for people to frequently change homes, workplaces, and even professions. Even in Europe nowadays apartments and houses are mostly turned over not to the next generation but to completely new users with different needs and wishes. My parents’ generation went to school, got an education, or earned a degree, and then started a career. The goal was to find a secure job - hopefully lifelong and, if possible, at the same company. A family friend just retired from the same firm where he had started his career 45 years ago. Today all this is different. The world around us is different. Taking myself for example, I think two or maybe three years ahead, but it seems nearly impossible for me to imagine where I might be in five years.

Due to these social changes that we have today, my idea was to develop a concept and building type that can react architecturally and structurally to development patterns and cultural shifts that we cannot accurately predict today. How can a house or neighborhood be planned so that it can be modified easily to match changing demands, conditions and requirements? How does a building need to be constructed and designed to deal with that? Which parts of a building or structure can be adaptable or flexible? Which parts can or should be exchangeable? How much adaptability is desirable? How much is necessary? Do open building concepts need any fixed elements or structures to function properly? And if so, which might these be?

In addition, a project that will be located in the urban density of the contemporary city requires even more thought. Issues such as social communication, private and public spaces, personal and architectural interaction, transportation, supply and disposal systems, accessability and walkability must be considered. When proceeding with my project I focused increasingly on developing a system of single dwelling units that connect to each other and to the existing city structures. Within such a system each single component plays a role - it gives, takes and represents. Each unit is a part of the whole, and the total units create a unified system. By sharing infrastructure and space it minimizes the use of resources, and helps technical equipment run more efficiently. Natural resources such as sunlight or rainwater can be used, collected, and distributed benefiting the entire community. Each unit becomes a collector and user within the system - in a technical, architectural and social way. I also tried to develop a modular system of pre-fabricated interior and exterior panels and floor elements that would be adaptable and exchangeable, and supported by a light steel structure. They became tools that helped me in my further design process.

Throughout my thesis I tried to find answers and solutions at various scales - from the city block to the detail. I studied public elements such as the porch and the alley, private spaces like the garden or yard, and adaptable elements such as panels. Furthermore, I focused on social places like the plaza or the playing street, and technical elements such as solar panels, elevators, pipes and load-bearing structures. Issues considered also include natural light, ventilation and the choice of material.

My thesis book is divided into three main parts. The first chapter is an analysis of the site, the second documents the conceptual and design process, and the third section presents the final work and conclusion.

INTRODUCTION
The site of my thesis project is located about ten blocks north of the National Mall in Washington DC, facing the new Convention Center on the east side. The city block is placed between 9th and 10th Street, Northwest, and in walking distance to the Mount Vernon Square Metro Station. This Yellow Line stop connects this part of the city with the Northern and Southern areas of the District, as well as some parts of Northern Virginia such as Alexandria, Crystal City or Springfield. It passes the National Mall, and connects to the national railway system and the Ronald Reagan National Airport. In this context, it can be considered a very central and well-connected location. Moreover, the site is well positioned between several cultural and commercial nodes, recreation areas and transportation hubs.

The interior of the block is dominated by warehouses, storages, vacant buildings, and garages. In general, the structures are of low value. An existing alley runs north-south through the entire block.
ZONING REQUIREMENTS FOR SITE IN 2007

**R-4**
Permits matter-of-right development of single-family residential uses (including detached, semi-detached, row dwellings, and flats), churches and public schools with a minimum lot width of 18 feet, a minimum lot area of 1,800 square feet and a maximum lot occupancy of 60% for row dwellings, churches and Flats, a minimum lot width of 30 feet and a minimum lot area of 3000 square feet for semi-detached structures, a minimum lot width of 40 feet and a minimum lot area of 4000 square feet and 40% lot occupancy for all other structures; and a maximum height of three (3) stories/fifty (40) feet. Conversions of existing buildings to apartments are permitted for lots with a minimum lot area of 900 square feet per dwelling unit.

**C-2-A**
Permits matter-of-right low density development, including office, retail, and all kinds of residential uses to a maximum lot occupancy of 60% for residential use, a maximum FAR of 2.5 for residential use and 1.5 FAR for other permitted uses, and a maximum height of fifty (50) feet/height of fifty (50) feet.¹

The block appears fragmented, in some parts even vacant and degenerated. The buildings along 10th Street that face the Convention Center are mostly abandoned and in poor condition whereas the townhouses along 9th Street are mostly occupied and in a good shape. A few buildings are under restoration or construction. The entire block as well as the bordering neighborhoods clearly show a process of gentrification. The northeast corner of the block belongs to the zone C-2-A² and the rest is zoned R-4².

The main alley and various secondary paths and local streets provide access to the interior. However, some voids are visually open but not accessible. The buildings defining the perimeter of the block are mostly three to four stories high, while the interior buildings are mainly one to two stories high.
SITE

analysis - existing conditions and suggestions
SITE analysis - exterior walls
In the first phase - based on existing site conditions and the results of my analysis - I started to study different urban patterns to determine a direction for the design development. Do I break with the existing urban pattern? Should I work with infill elements that work as fillings for small vacant lots? What would happen if I create an isolated oasis in the center of the block? Or do I weave the new design into given structures and the existing block pattern? What is a good relation between open and built spaces?

At the same time I started to research on open building systems and pre-fabricated buildings as well as adaptable and flexible structures. The idea to break a typical house into two main elements that are different in terms of use, function, location and durability seemed desirable. The terms core, base building, shell and infill² dominated my thinking and reflecting on the topic. I started to develop ideas for a different housetype based on and derived from the shape of a typical townhouse. Now I question the meanings of core, shell and infill², and how are these elements determined, interpreted and finally given shape?

At the end of the conceptual phase I had designed a first urban design model and various study models that were not yet really related to each other. However, the urban model set a path that I wanted to pursue in my design. It gave preliminary answers in terms of shape, location and pattern that lead to my final design.
CONCEPTUAL IDEAS

Emphasizing the edge of the city block and new breakthroughs to existing streets around

Structure to maintain and circulation after clean-up

Focusing on the inside of the city block

urban form - early sketches and ideas
CONCEPTUAL IDEAS

urban form - sketches of options I
CONCEPTUAL IDEAS

urban form - study models of different options
CONCEPTUAL IDEAS

urban form and study model - sketches
CONCEPTUAL IDEAS

urban form - study model
CONCEPTUAL IDEAS

building system - core, shell, modular system
CONCEPTUAL IDEAS

building system - wall, infill, modular system, alley
To begin the process of design development, I first focused on modifying and finalizing the urban design, and weaving it into the existing block pattern. This prompted new questions: What is the right size of a town house? To what extent do structure and use determine interior and exterior dimensions? What is a decent distance between opposing houses in an urban and dense environment? How should the alley be embedded between the houses? What will define this space? How big is the private space behind each house? Will it be a garden or a yard? How public or private should the alley be? What is the relationship between public, semi-public and private spaces? Related to that what role does topography play compared to social needs and habits? How can the porch be interpreted in a contemporary and innovative way and still relate to its original function? How may it look today? Does this have to do with identification and flexibility? What makes a good relationship between setback and projection? Is there a distinct front and rear? What is the right amount of stories? To begin to determine answers to these questions I did studies on building heights and roof shapes. I finally developed a rhythm of two and three story buildings underlined by setbacks and projections. When satisfied with heights and roof shape I began to consider the individual units. Moreover, I tried to identify conditions and places that have a unique character within the urban context that require specific answers in terms of shape, height and orientation.
DESIGN IDEAS

urban form - modifications
DESIGN IDEAS

urban form - roof and layout modifications
DESIGN IDEAS

dwelling units - shape, circulation, openings
The examination of the front porch, that is a dominant and common element in small scale residential neighborhoods in the United States, led to a new interpretation of this traditional element. My interpretation basically consists of a wall of loose concrete blocks that run parallel to the front facade of the shorter houses. Stairs and a walking deck are mounted between this wall and the building. It simultaneously rises and encloses the private entrance of a house, while it opens towards the alley encouraging social communication and interaction between public and private. The porch incorporates a small bench that can be used by the owner and visitors for various reasons: waiting, relaxing, resting, eating, talking, etc. A similar bench is found in the entrance area in front of every core tower between two buildings for the same reason. Here the private atmosphere is not achieved through the rise of the level but mainly through the distance to the alley and the rather narrow gap between the houses.

On the accessible roofs privacy is achieved through a balanced distribution and a well considered layout of balcony, roof deck and green roof. Privacy is strengthened by the arrangement of openings and opaque walls which screen spaces from view of the neighbors. However, this arrangement also creates areas where the architecture supports direct interaction among neighbors.

**DESIGN IDEAS**

the porch and the roof
Today parking is a crucial issue in all city centers, therefore early in the design development I generated the idea to have an underground parking deck to accommodate parking for 20 to 30 new townhouses. Having chosen the underground parking deck as the means to handle this additional parking requirement, I worked on the relation between the underground world and the one above ground. Are those two related? And if so how? Much thought was given to bring natural light into an underground space that is usually very dark and a place where people do not feel comfortable and safe. How would the ventilation work? Would it be possible to exchange fresh air for bad air through a direct connection? At this point I realized that technical, structural and architectural solutions would have to successfully resolve this situation!
Step-by-step, the world underneath and the world above merged together. At the end the core tower became a key element functioning as both a horizontal and vertical connection - connecting the townhouse horizontally and the underground deck to the surface vertically. The towers function as little hubs much like bamboo that is woven together in the soil but appears as separate canes above ground. This strong picture helped me to visualise the conceptual design.
Though definitions and labels vary, the literature on Open Building identify two basic parts - core and shell. There is distinct between the purpose and function of each. The core, often referred to as base building or support, stands for the permanent part of the building, while shell and infill are adaptable elements.

A third component lies above the building level: the town fabric. The town fabric or tissue level contains the building blocks. The idea is that buildings may be demolished and rebuilt, but the basic town fabric remains mostly unchanged. This concept resonated with me and became the basis of my urban concept.

Even though the Open Building Concept is based in some way on construction methods that come from commercial and industrial building, it has developed partly out of the re-interpretation of older building traditions. Traditional Japanese building for example used demountable and sliding screens and removable tatami floors between structural posts. And at traditional Dutch canal houses the roof and fenestration was built first, then the rooms were arranged behind the windows.

I decided to use a concrete tower as the solid core element. The tower would hold the bathrooms, the entire supply and disposal systems, light and air shafts and a service elevator serving two adjacent townhouses.

However, to provide greater flexibility and more individual freedom, I placed the stairs within the dwelling units rather than the core. The concrete tower serves several connective functions. As mentioned earlier, first, it serves to connect floors within each unit, was well as the connection to the underground parking deck. A load-bearing steel structure as part of the shell is mounted to the core that secures its stability.
DESIGN IDEAS

roof shape, connection underground - core
DESIGN IDEAS

layout options of floorplans 1
DESIGN IDEAS

layout options for floorplans II
DESIGN IDEAS

sketches longitudinal section
DESIGN IDEAS

studies longitudinal section
DESIGN IDEAS

exterior panels - studies
DESIGN IDEAS

sketches details of interior panels
FINAL PROJECT

interior panel system 1
DESIGN IDEAS

interior panel system II
The proposal for a new masterplan for my site is laid out and designed around existing residential structures and on proposed demolition of low value buildings in the inside of the block. The masterplan integrates the new building structure with green roofs, rain water collection, accessible roof decks, balconies and solar panels. The new hybrid structure is a system which serves each single unit as well as the entire neighborhood. Treated rainwater (underground level and/or core tower) can be used for toilets and watering purposes. Solar panels, installed ontop of the south facing core towers, give them a unique round roof. This distinctive roof line contributes to the character of the new neighborhood. The green roof gardens, visible by the neighbor and by the home owner, increase the pleasure and quality of living for both. They lower the average temperature in the neighborhood in the summer and hold back rainwater run-off not collected by individual units. The roof decks and balconies offer each unit additional outside space. However, compared to suburbia, it clearly puts the user in an urban context. He is in the city and he is a part of the city.

The new layout is orientated along the alley that runs north-south deviding the proposed buildings into two rows of townhouses. A net of paths and smaller roads crossing this main access integrates the new structure (residential and retail/office) into the existing street grid. Proposed apartment blocks fill existing gaps, and emphasise the new and old secondary axes that connect the interior to the periphery - the new neighborhood to the existing city. A small plaza is placed where the main alley meets two of the secondary axes. This plaza can be considered the new heart of the block. Here a core tower is modified to a transparent element serving as the main staircase to the underground world. The back yards are defined by a row of trees running along the playing streets used as buffers between new and existing buildings. Each unit can be entered through the ground floor at the front and on the second floor at the back. This layout increases options when subdividing the dwelling unit.
green roof

accessible roof/ balcony
media, supply and disposal system underground
Core  Shell

Fixed elements: trees, walls, cores, 'porches'
urban design - floorplans and roof plans
My thesis project tries to answer how we may construct and live in dense urban areas in the future. By reconsidering an existing city block, I developed a new neighborhood structure that tries to be seamlessly woven into existing urban fabric, and I re-interpreted the townhouse.

It is important to point out that though the townhouses in this neighborhood are site specific, they are easily modified to adjust to different situations or sites. Through a well considered concept the underground is interconnected as a continuous system with the city and the neighborhood as a fairly permanent infrastructure. Above ground on the other hand is mostly individualized for living units that changes relatively easily and quickly giving both scales their separate lives.

One important goal was to create vivid and interesting spaces through architecture and urban design while reducing the use of materials and resources during the construction or renovation process, and ultimately during a long life cycle of the buildings.

I tried to find a balance between flexibility, adaptability and permanence. By choosing durable, high quality materials on the necessary and/or permanent elements, these components’ meaning was elevated. For example, I chose copper as the cladding of the concrete core towers and cedar wood for the outer skin of the exterior panels. All concrete structures are to be made of high quality concrete.

My project may go through different lives. And I hope to have established and designed buildings and structures that will survive these lives. I give them the ability to adapt to new and unpredictable conditions. In this sense my project is about the different lives of spaces!

CONCLUSION
„I think we usually find our way around. Where there is a will there’s a way. It’s confusing at times, you may lose some minutes in trying to find a place, but I think eventually you get where you want to go to."

Kevin Lynch
Pople, Nicholas  Experimental Houses
New York
Watson-Guptill Publications 2000

Vermeulen, Stephanie  The Evolution of Infill Housing from Urban Cores to Close-Lying Suburbs
Arch 384
Competition Elective - Living Smart: Big Ideas for Small Lots
Essay Component, August 2004

Hertzberger, Herman  Articulations
Prestel Publishing, 2002

Hermanuz, Chislaine; Gutman, Marta; Plunz, Richard  Reweaving the Urban Fabric: Approaches to Infill Housing
Princeton Architectural Press, 1989

Lynch, Kevin  Image of the City
The MIT Press, 1960

Lynch, Kevin  Good City Form
The MIT Press, 1984

Kostof, Spiro  The City Shaped
Bulfinch, 1993

Innovative housing projects - database
Bauhaus University Weimar
Architecture
Joint project of the Chair of Design and Housing Construction
and the Chair of Computer Science in Architecture
van der Werf, Frans  
Open Ontwerpen  
Uitgeverij 010, Rotterdam 1993

Habraken, N. John  
The Structure of the Ordinary  
Form and Control in the Built Environment  

Kendall, Stephen  
Base Building and Fit-out  
Principles for the 21st Century  
Housing Future Institute  
Department of Architecture  
Ball State University  
Muncie, Indiana, USA

Kendall, Stephen  
An Open Building Strategy for Balancing Production  
Efficiency and Consumer Choice in Housing  
Housing Future Institute  
Department of Architecture  
Ball State University  
Muncie, Indiana, USA

Habraken, N. John  
An Efficient Response to User's Individual Preferences  
Housing Design 2000 Conference, Singapore, September 1992

Arieff, Allison; Burkhardt, Bryan  
Prefeb  
Gibbs Smith, Publisher, 2002

Schneider, Friederike  
Floor Plan Atlas - housing, Grundrissatlas - Wohnungsbau  
Birkhäuser, 1997
Eekhout, Mick; Verkaik, Kay; Haagsman, Ernst

Concept House
Towards a customized industrial concept house
Chair of Product Development, TU Delft
A cooperation of Delft University of Technology and Technical University Einhoven
May 2004

KwK Broschüre
Kraft-Wärme-Kopplung
Chance für Wirtschaft + Umwelt
Bundesverband Kraft-Wärme-Kopplung, Berlin

Leno Solid Construction
Lenotec Material + Construction
Finnforst MERK GmbH, 2004

Additional resources: www.finnforst.de
www.merk.de
www.bkwk.de
www.obom.org
www.obom.org/PAGES/Concepts2.html
www.bsu.edu/web/capweb/bfi
www.habraken.org/html/open-building.htm
www.concepthouse.bk.tudelft.nl
www.uni-weimar.de
http:\\dcoz.dc.gov/main.shtm
http:\\dcoz.dc.gov/info/district.shtm
http:\\dcoz.dc.gov/info/map.shtm
http:\\etd.vt.edu

REFERENCES
<table>
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EDUCATION

2007
Master of Architecture (Summer 2007)

2005-2007
Master of Architecture II Program
Virginia Polytechnic Institute and State University
Washington-Alexandria-Architecture-Consortium, Virginia

2005-2006
Graduate Assistantship

2004
5-year Professional Degree (Dipl.-Ing.) in Architecture

1998-2004
Architecture Program
Bauhaus University Weimar, Germany

1997-1998
Alternative National Service

1997
Allgemeine Hochschulreife (A-Levels)
August-Dicke Schule Solingen, Germany

WORK EXPERIENCE

2006
5 months professional practice (full-time) at
Demian+St.Leger architecture, planning in Alexandria/ Virginia

2005
5 months professional practice (full-time) at
MAP-Metropolitan Architects & Planners in Alexandria/ Virginia

2004
4 months part-time work experience at
MAP-Metropolitan Architects & Planners in Alexandria/ Virginia

4 months professional practice at
WITTIG landscape architects - town planners - engineers in Weimar/ Thuringia
practical training at
WITTIG landscape architects - town planners - engineers in Weimar/ Thuringia

2001
site measurement of a castle in Weitersroda/ Thuringia
practical training at the architecture and engineering firm
KAUFMANN GbR in Solingen/ North Rhine-Westphalia

1998-2000
work experience in the carpenter’s and joiner’s business,
in a roofer’s company, at a gas fitter’s/ heating engineers