UNIVERSITY OF CINCINNATI

Date: 15 May 2007

I, ____________________________
_____________________________,
hereby submit this work as part of the requirements for the degree of:
Master of Architecture

in:
Architecture

It is entitled:

Babylon Reconsidered: Community Development through Rooftop Urban Agriculture

This work and its defense approved by:

Chair: Elizabeth Riorden
Jay Chatterjee
BABYLON RECONSIDERED:
Community Development through Rooftop Urban Agriculture

a thesis submitted to the
Division of Research and Advanced Studies
of the University of Cincinnati

in partial fulfillment of the requirements for the degree of
MASTER OF ARCHITECTURE
in the School of Architecture and Interior Design
of the College of Design, Architecture, Art and Planning

by

CHRISTOPHER DAVIS
B.S., Architecture, University of Cincinnati, June 2005

Committee Chairs:
   Elizabeth Riorden
   Jay Chatterjee
   Virginia Russell
The contemporary American city faces incredible problems. Most notable are persistent socio-economic inequality and the environmental destruction caused by urban activity. In particular, the impoverished urban neighborhood suffers greatly from environmental injustice, but also from the decay of historic structures, poor health, feeble community support systems and the pressures of gentrification.

Too often, these problems have been addressed in isolation. To truly improve the city, it is incumbent upon us to integrate the goals of many fields in order to find more effective trans-disciplinary solutions. Significant work is currently under way to explore methods by which we might integrate the goals of urban revitalization, environmentalism and historic preservation.

This thesis explores urban agriculture as a comprehensive, integrated solution to many of the crises faced by our cities. Research will culminate in a project that attempts to beautify and revitalize the impoverished urban neighborhood through the creation of a new urban realm, adapting rooftops into a network of public agricultural gardens.
2 . . . . abstract

4 . . . . list of illustrations
5 . . . . illustration credits

7 . . . . introduction
9 . . . . thesis proposition

11 . . . . nature vs. the city
          romanticism vs. urbanism

15 . . . . the integrationist perspective
          smart growth, urban villages and environmental justice

19 . . . . greening historic buildings
          new technologies and old materials

21 . . . . the economic imperative
          gentrification and community gardens

26 . . . . a global view
          urban agriculture in Zimbabwe

30 . . . . foundations and roots
          cultura

34 . . . . site history and analysis

38 . . . . program

41 . . . . precedent study

48 . . . . stochastic urbanity and the garden of forking paths

52 . . . . summary of design

55 . . . . bibliography
LIST OF ILLUSTRATIONS

fig. 01 The Garden City Plan of Ebenezer Howard
fig. 02 Public housing tower; Cabrini Green in Chicago.
fig. 03 Jane Jacob's Greenwich Village in New York City
fig. 04 Central Park, New York City
fig. 05 A typical "smart growth" community
fig. 06 Tokyo, an example of a globalized megalopolis
fig. 07 Before and after, the proposed South Bronx Greenway
fig. 08 An historic window
fig. 09 The green roof on Chicago City Hall
fig. 10 A street scene in Harlem
fig. 11 A typical ground-level community garden
fig. 12 Over-the-Rhine
fig. 13 The "Rhine", the Miami and Erie Canal
fig. 14 Music Hall, home of the historic May Festival
fig. 15 A scene from the 2001 riots
fig. 16 The new Art Academy of Cincinnati
fig. 17 Sanborn Fire map of the site
fig. 18 Findlay Market
fig. 19 Site roofscape
fig. 20 Diagram of programmatic elements
fig. 21 Diagram showing growing seasons for various vegetables
fig. 22 Civic Garden Center logo
fig. 23 Midwest Culinary Institute logo
fig. 24 A well
fig. 25 Fukuoka Prefectural International Hall
fig. 26 View from the top of the Hall's roof
fig. 27 Diagram of the Hall's roof
fig. 28 Diagram of how the trays could be separated
fig. 29 The High Line showing linear path
fig. 30 The High Line, street level and elevated activity
fig. 31 Diagram of High Line, showing possible nodes of major and minor activity, and vertical access
fig. 32 ASLA: Close-up of the south wave
fig. 33 ASLA: The north wave
fig. 34 ASLA: Extensive planting
fig. 35 ASLA: Metal grates for paths
fig. 36 ASLA: Above the elevator shaft
fig. 37 ASLA: Trellis on stair tower
fig. 38 Normal relationship: city/building on landscape
fig. 39 New relationship: landscape on city/building
fig. 40 Multiplicity of paths in a grid
fig. 41 Complexity and diversity of uses
fig. 42 A street with a rhythm of elements
fig. 43 A garden maze
fig. 44 Initial move with the new grid
fig. 45 Early rendering of the entry building
fig. 46 Full roofscape with new grid and proposed buildings
fig. 47 Roof showing intersection of new grid and existing buildings
fig. 47 Section through green roof and wall
fig. 48 Sketch of tower
fig. 49 Sketches of possible bridge and tower designs
ILLUSTRATION CREDITS

fig 01 http://history.sandiego.edu

fig 02 http://www.affordablehousinginstitute.org

fig 03 http://www.benjaminjames.com/neighborhood.php?id=8

fig 04 http://www.nyc-architecture.com/CP/CP.htm

fig 05 http://www.nrdc.org/cities/smartGrowth/contrast/contrastx.asp

fig 06 http://www слил.org.uk/geography/tokyo.htm

fig 07 http://www.ssbx.org/greenway.html

fig 08 http://www.cr.nps.gov/HPS/tps/briefs/brief09.htm

fig 09 http://www.inhabitat.com/2006/08/01/chicago-green-roof-program/

fig 10 http://www.wirednewyork.com/harlem/

fig 11 http://www.oaklandnet.com/parks/programs/communitygardening_temescal.asp

fig. 12 Photo by author

fig. 13 http://www.cincinnati-transit.net/subway.html

fig. 14 http://www.cetconnect.org

fig. 15 Copyright © Cincinnati Enquirer Steven M. Herppich

fig. 16 http://www.culture.ohio.gov/project.asp?proj=artacademy

fig. 17 Copyright © Sanborn Fire Insurance Company

fig. 18 http://www.foundaymarket.org/history.htm

fig. 19 Image by author

fig. 20 Image by author

fig. 21 Image by author

fig. 22 http://www.civicgardencenter.org/

fig. 23 http://culinary.cincinnatistate.edu/

fig. 24 Copyright © Penny Tweedie, Getty Images

fig. 25 http://www.archidose.org

fig. 26 http://www.archidose.org

fig. 27 Image by author

fig. 28 Image by author

fig. 29 http://www.thehighline.org/

fig. 30 http://www.thehighline.org/

fig. 31 Image by author

fig. 32 Photo by author

fig. 33 Photo by author

fig. 34 Photo by author

fig. 35 Photo by author

fig. 36 Photo by author

fig. 37 Photo by author

fig. 38 Image by author

fig. 39 Image by author

fig. 40 Image by author

fig. 41 Image by author

fig. 42 Copyright © Getty Images

fig. 43 Copyright © Jason Hawkes, Getty Images

fig. 44 Image by author

fig. 45 Image by author

fig. 46 Image by author

fig. 47 Image by author

fig. 48 Image by author

fig. 49 Image by author
“The Babylonians … have a citadel … On its summit are the hanging gardens, a wonder celebrated by the fables of the Greeks. They are as high as the top of the walls and owe their charm to the shade of many trees.”

Cleitarchus, *History of Alexander*, c. 300 BCE

“The galleries were roofed with stone beams 16 feet long and 4 feet wide. Above these beams there was first a layer of reeds set in great quantities of bitumen, then two courses of baked brick bounded with cement, and then a covering of lead so that moisture from the soil would not be able to sink through. On this was piled earth, deep enough to contain the roots of the largest trees, and when it was leveled over, the garden was planted with all sorts of trees which would appeal to those who saw them either by their great size or by the beauty of their appearance.”

Ctesias, *Persica*, c. 400 BCE
INTRODUCTION

This is a project about the potential of the architect inspired. It is about the architect not as a mere purveyor of aesthetic sensibility, but as a solver of problems; as one who seeks to use his or her creativity and ingenuity to address the greater issues that define and challenge our world today. We must recognize the fact that architecture indeed cannot save the world from persistent and looming crises, but we should ask why it cannot help in discovering solutions.

Architecture is a profession that, in its present state, has been rendered nearly irrelevant in contemporary society beyond marginalized debates on aesthetics. While many architects are doing good and decent work of social relevance, few in the public recognize their contributions. The lights of the media are pointed almost exclusively on those “starchitects” who receive little to no scrutiny from a media and public who infrequently see and seldom understand our circus of aesthetic jargon. But a deeper and more complex challenge persists.

The inability of architecture to comprehensively address problems of great relevance stems from the stark stratification and specialization of the profession into a field of largely independent disciplines. Programming, interior design, urban planning, landscape architecture, mechanical and electrical engineering, sustainable design and historic preservation all operate with rare exception in their own bubbles of expertise.

The buildings we create play a manifest and enduring role in the social and cultural realm, but architects are seldom able to both envision solutions to complex societal problems and understand the means to achieve them. Even more, we often fail to fully comprehend the larger ramifications of our ideas. One might then conclude that by reaching into other related disciplines and embracing their goals simultaneously, we might to discover more universal and broad-based solutions to many of society’s ills.

This thesis focuses primarily on two problems: the poverty faced by millions of urban residents in America and the environmental destruction caused by contemporary urban forms. These problems will be addressed here through a multi-disciplinary exploration of how rooftop urban agriculture can be implemented in the dense, impoverished urban neighborhood.
More than simple green roofs, these rooftop gardens will be discussed in the context of their environmental, economic, health and community development benefits. While urban agriculture has existed throughout history in small, limited forms; it will be investigated here as a tool for interdisciplinary collaboration and large-scale urban redevelopment.

This is a thesis that self-consciously challenges the very notion of what it means to be an architect. It will require as much discourse on economics, environmental justice and urban dynamics as it will on form, material and space. It does not claim to save the world, but merely to put forward a vision for one way by which society might better address and mitigate the problems facing those with the greatest need. Most importantly, this thesis is inspired simply by a genuine search for relevance in the larger world.
Cities interested in pursuing a socially progressive agenda face a daunting dilemma: is it more important to pursue aggressive strategies toward making them more environmentally friendly, or to help lift the poorest out of extreme hardship? Should funding flow toward recycling and energy efficiency, or toward social services and workforce development? One path may track the way toward clean air and water for all, while the other may achieve socio-economic equity and stability for more. This, though, is a false dichotomy. Given the right strategic integration, both can be accomplished.

When the poorest residents of a city live in a culturally significant historic district in imminent danger of further decay and potential collapse, another issue surfaces: is it possible to realize the contextual restoration and revitalization of an historic neighborhood while not severely impacting its economic fairness and potential environmental quality? Can the goals of sustainability, preservation and equitable development be merged? Can environmental justice uplift a community? This author offers a resounding “yes!”

In previous generations, those who sought to solve the problem of dangerous and unhealthy cities did so first through abandoning them and later tearing them down. This had the unforeseen consequence of both creating unsustainable development at the urban fringe while devastating many formerly vibrant urban neighborhoods. The growing attitude now is to value the inherent qualities of cities: density, diversity, walkability, and to work to make the city itself more green and healthy.

It is already well established that urban living has an environmental benefit. Decreased sprawl, greater use of clean, efficient public transportation and shared resources all lessen our consumption of non-renewable energy resources and the related destruction of natural ecosystems.

This does not mean that urban buildings themselves are necessarily green. Historic buildings in particular, which are more common in and have increasing value in urban areas, present many problems, not least of which are leaky windows, insufficient insulation and the urban heat-island effect. Research into how to make historic and aging buildings more energy
efficient is nascent and incomplete. One strategy that preservationists and green builders can agree on, when applied appropriately, is green roofs.

Green roofs provide many benefits, not least of which is that they make good use of one of cities’ most ignored and under-utilized resources: rooftops. A planted roof can increase biodiversity, reduce storm-water runoff and increase insulation for a building. Furthermore, creating valuable parkland on rooftops leaves more land available for commercial and residential development.

One cannot ignore the economics of greening historic buildings. Like other revitalization techniques, building green roofs in an historic neighborhood is likely to increase property values and spur a kind of gentrification that could put pressure on existing residents, most of whom lack both substantial income and property ownership. By introducing an agricultural component to the green roofs, though, it is possible to mitigate these potential negative effects. Urban agriculture, or community gardening, is known to have many effects, among which are providing opportunities for job skill training and making available fresh, healthy produce. An extensive urban agriculture project can provide an amenity that may be lacking in the typical inner-city neighborhood.

The project envisioned in this document is one that attempts to beautify and revitalize the impoverished urban neighborhood through the creation of a new urban realm, adapting rooftops into a network of public agricultural gardens. The research below will establish how this can be accomplished in an environmentally friendly, contextual and equitable way. The idea of creating a new urban realm in the form of rooftop parks is not unique to this thesis. It has been proposed before and will be proposed again. The goal of this thesis is to both envision an architectural manifestation for creating such a realm while exploring in depth the many complex issues that inform it.
Through most of the 20th century, and indeed going back to the inchoate Romantic Movement (including Thoreau, Jefferson, perhaps even St Francis of Assisi), a deep philosophical rift existed between cities and nature. Cities, the great centers of culture, where intellectual curiosity was commonplace, governments held dominion and the high arts flourished, were nevertheless viewed as dark, dirty and lascivious. One could only commune with the natural forces of the world and fully comprehend the fundamental meaning of life far from the din of everyday urban life. Necessary as the city may have been for trade and high culture, they were downright unhealthy.

Even though far fewer than half of humanity lived in cities during the fiery adolescence of the Industrial revolution, health officials and urban planners decided firmly that cities were less than advisable for normal human habitation. In comparison to the reasonably tame urban centers we know today in the developed world, the cities of the past were environmental disasters because of extreme residential crowding coupled with the pollution from factories and horses.

In response, many, such as hobbyist urban visionary Ebenezer Howard sought a radical re-organization of the modern metropolis. “[I]t is deeply to be deplored that the people should continue to stream into the already over-crowded cities, and should thus further deplete the country districts,” he argued. In 1898, Howard proposed a Garden City program for the densification of the urbanized population that would provide more open space, cleaner air and expansive parkland. Railroads would thread together a necklace of new towns on the urban fringe and agricultural parks would shelter homes from the detritus of industry.

Howard and his contemporaries had good intentions and a strong social agenda when these plans were first proposed, and indeed had the urban reorganization stopped with these transit-oriented
towns, few would find flaw, but the extrapolation and re-interpretation of these ideas caused great harm to the city. Over time, decentralization resulted in the decay of the city itself. Planners accepted this anti-urban approach without considering that it might be possible to green the city without destroying it in the process. In a sense, Howard and his followers did not so much solve the problem of unhealthy and unsustainable cities, but rather ignored the problem, packed up their belongings, moved to the country and took the majority of the American populous with them.

One of the first major criticisms of these schemes came from journalist, amateur economist and neighborhood activist Jane Jacobs, author of *The Death and Life of Great American Cities*. What Howard and others failed to foresee, Jacobs contended, is how great and negative an effect their ideas would have on existing cities. Not only did new suburbs depopulate urban centers; they also decreased social interaction and increased dependence on the automobile, which necessitated many and wide highways that, by federal mandate, cut right through historic urban centers.

The need for large new transportation routes provided city planners with convenient justification for bulldozing through the dense, economically depressed (and predominantly African American) neighborhoods that were so often seen as an eyesore and a nuisance. On the surface, those urban ghettos seemed a logical place for urban renewal, but on closer inspection, one found that they were in fact culturally rich, highly celebrated and close-knit social communities. Urban renewal destroyed them. It relocated poor city residents to large, inhumane housing blocks lacking both character and social cohesion.

The neighborhoods that were torn down are exactly those that Jane Jacobs insisted work best: dense, small-scale, mixed-use urban neighborhoods that foster interaction and codependency. They are, she argued, the basis for social networking and community development.
Death and Life is foremost a primer on how to make successful cities. Jacobs based her arguments and recommendations on daily observations not far from home. Her own neighborhood, Manhattan's West Village, is one of old buildings, small blocks and narrow streets. The sidewalks accommodate a pleasant mix of people, going to work, heading home or just out for a stroll; children play on the street; and shop owners stand outside watching people go by. It is a community that is friendly and welcoming, safe and active.

Using her observations as her cloth, Jacobs fashioned four principles that, if implemented, would sew the fabric of a successful city, both socially and economically. Having all four in place would not guarantee success, but leaving just one out would surely guarantee failure.

The first condition is that of mixing uses. A neighborhood must have more than one primary use. Mixture ensures that the streets are populated on different schedules by different people, helping even out the economic and density cycles.2

Condition two simply states that blocks must be short. This provides maximum street frontage for retail and creates frequent opportunities for people to turn corners and explore different paths, fostering greater social interaction.3

The third condition specifies that a district should have a mingling of buildings of varying age and condition. This creates a more visually interesting neighborhood, avoiding monotony, but also provides cheap, accessible space to smaller and less economically successful (but still necessary) businesses.4

The last, and perhaps most important condition, says that a dense concentration of people is necessary to support the variety of uses in a neighborhood. Simply put, if there are not enough people to support a business, it will not survive.5

While the fabric of most American cities has changed drastically since these
principles were first published, they are still perhaps the simplest yet most comprehensive guidelines for designing vibrant, diverse and healthy urban neighborhoods.

The natural environment was not a topic of great interest to Jane Jacobs. She was not a romantic in the traditional sense of the word. Hers was a romanticism focused on the social beauty of the urban forms she loved so greatly. And while historic preservation was not an explicit subject of her writings, her strident defense of the dense neighborhoods so evocative of historic urban America was indicative of her implicit value for historic preservation.

Indeed, Jacobs occasionally put her cities and nature against each other. In one chapter, urban parks are discussed at length, but almost as a problematic edge condition (a “border vacuum”) to which her strategies must be applied. From her perspective, a city park, for example, should approximate pure nature and be bounded by higher than average city density to make up for the lack of urban activity in the park. Neighborhoods are for urban activity; parks are for recreational activity. Blending them can diminish the quality of both. Even to Jane Jacobs and the many architects and planners who followed in her footsteps, cities and nature suffered from a stark conceptual disconnect.
Despite recent trends toward extensive urban revitalization, the desire for nature in everyday life has not diminished. Regardless, discussions about the environment are typically centered more on dry, global and politically salient issues of energy efficiency and resource conservation. As scientists and planners gain a greater understanding of the complex system that is the global environment, they are increasingly concluding that cities (along with the buildings in them) and the natural environment cannot be considered separately.¹

Just as many urbanists have criticized suburbs from social grounds, scientists are finding that the trend of suburbanization (that was initially borne of a desire for greater health and the appreciation of nature) is actually more environmentally destructive than more traditional urban forms. Larger houses, dependence on private transportation and large, redundant infrastructure all add up to massive energy consumption.

Increasing numbers of architects, planners and policy makers are working to encourage a “smart growth” that works to curb the negative effects of suburban development by creating denser, more walkable towns and cities. Those in smart growth movement “are questioning the wisdom of abandoning ‘brownfields’ in older communities, eating up the open space and prime agricultural lands at the suburban fringe, and polluting the air of an entire region by driving farther to get places.”² Whether as new, dense suburban villages or inner-city neighborhood redevelopment, this movement attempts to illustrate the many environmental benefits of urban living. Shared resources, decreased sprawl and greater accommodation of non-automobile transportation all lessen our consumption of non-renewable energy resources and the related destruction of natural ecosystems.

This approach to urban development has been codified in a new system that brings together major organizations in both environmentalism and urbanism. The United States
Green Building Council’s Leadership in Energy and Environmental Design (LEED) program is the foremost “benchmark for the design, construction, and operation of high performance green buildings”. A program released in 2007, LEED for Neighborhood Development, integrated goals from both the National Resources Defense Council and the Congress for the New Urbanism. At the same time that LEED-ND requires attention to wetland and endangered species conservation, it gives credit for compact development, walkable streets and access to public transportation.³

Those involved with smart growth and New Urbanism, in their efforts to improve the relationship between the environment and urban growth, typically critique the suburban condition. Others, such as Alberto Magnaghi, while coming to a similar conclusion as smart growth advocates, speak from a strikingly different perspective, arguing that cities are often globalized agglomerations that hinder the quality of life of residents.

Traditionally, he says, “a city is a complex cultural process with a historical identity rooted not only in economic constituent elements, but also in myths, social projects, symbolic events and the construction of public spaces.”⁴ But Magnaghi posits that this premise is currently under attack from the forces of globalization. A professor of land use planning at the University of Florence (Italy), he puts forward the idea that cities are losing their meaning, their sense of place and their relationship to “territory” and environment because of the continued unsustainable commoditization of culture wrought by a purely economic view of human relationships. Economic development, with its conception of places as functional sites and property as a market commodity, has pushed to the background other values that are not monetarily quantifiable, such as quality of life and environmental conservation. The world’s poorest, naturally, have borne the greatest hardships, closely tied, as they are, to the land and environmental fluctuations. This is a trend that is not only devastating to the vast, expanding megalopolises of the developing world (South), but is also prevalent in the established urban centers of the North.
In response, Magnaghi proposes a new form of urban restructuring that he calls the territorialist approach. He calls for a reversal of the globalized megalopolis toward a new social framework that in fact rejects hierarchy. Instead, it emphasizes the importance of place and the heritage surrounding that place. He would build new forms of communities that self-govern with participatory democracy, reconstruct the public realm and engage in ethical trade and building. The emphasis on locality and reconnecting with place is a driving force for sustainable development that can create economic systems to lift people out of poverty.

While on the surface, Magnaghi’s views might seem to echo those of the late nineteenth and early twentieth century advocates of the Garden City movement, but he insists that he does not “wish to embrace an anti-urban, ruralist, pre-modern vision.” In fact, he suggests that the metropolis form is a kind of negation of the city, “effacing the special nature of place, eliminating differences, identity and complexity,” arguably all of the things that make cities vibrant and valuable. By conceiving of localized urban villages, cities can become interconnected networks of innovation, diversity and environmentalism.

One further perspective that enlightens this discussion is that of environmental justice. Defined as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies,” environmental justice is a principle that says that no one should experience a disproportionate burden of environmental problems and that all decisions should be in an open and honest manner.

Cleared of middle class and politically connected people by mid-century, dense urban neighborhoods, home to only the most impoverished citizens, were the logical choice for the placement of waste treatment plants and other environmentally harmful facilities. Consequently, the voiceless minorities bore the greatest burden from pollution and environmental degradation.

Despite the EPAs stated commitment to addressing environmental issues in impoverished neighborhoods, activist groups are still needed to put action to those words. One such organization, led by Majora Carter, is Sustainable South Bronx. SSB’s mission is to achieve environmental justice “through innovative, economically sustainable projects that are informed
With projects to create a South Bronx Greenway and decommission an underutilized expressway, Sustainable South Bronx is working to bridge the divide between urban revitalization and environmental equity.

These various ideas (smart growth, urban villages, environmental justice), which all begin with very different perspectives, come to two common conclusions. One, that urban form has a strong effect on the overall environmental quality of a city and two, that regardless of a city’s form, much can still be done to improve environmental, health and quality of life conditions. The sharp division between nature and intense human activity that so defined previous theories can no longer be considered valid.
While it is understood that the dense urban form as a model is, on a macro scale, more sustainable than the suburban or exurban alternative, cities themselves are yet in great need of environmental improvement. Extensive decay from decades of neglect leaves many urban neighborhoods in unhealthy conditions. Furthermore, many industrial brownfield and Superfund sites present crises that are even beyond the scope of this thesis.

A more immediate issue is that buildings themselves are not energy efficient, in particular the numerous old and historic buildings that fill many existing urban neighborhoods. To the extent that it is considered culturally valuable to preserve those old buildings, it becomes incumbent on architects to consider equally the goals of preservation and sustainability.

In October 2006 a National Summit on Greening Historic Properties was convened in Pittsburgh to consider this very issue. Bringing together experts from both preservation and green building, the Summit sought to find common ground and draft proposals to augment the general understanding of how both disciplines can be better integrated. The Summit’s broad conclusion was that “it is necessary to develop flexible policies and creative approaches to new technology integration, materials use, retention of existing materials, integration of new design techniques and the development of innovative protocols.”

The greatest potential for agreement lies in understanding the fundamental relationship between the two disciplines: the principle of conservation. True sustainability is not just about energy efficiency, but also about sustaining human cultures. Preservation is most honest when it is based on understanding the original intentions of a building rather than just replicating its aesthetics. Most historic buildings were originally designed with an understanding of basic environmental strategies, such as passive cooling, thermal mass and natural ventilation.

Modern standards of living often demand greater energy usage and higher standards for indoor temperature conditions. In this case, more technologically advanced strategies are needed. Participants in the National Summit tentatively agreed that acceptable
technologies for historic buildings, when integrated well, are photovoltaic panels, geothermal systems and green roofs.

Green roofs are a promising and innovative strategy for many historic buildings, particularly those with flat roofs in urban environments. The simple replacement of standard dark roofs with lush vegetation can provide a multitude of benefits not only for the specific building, but for the entire city and the global environment.

The New York City-based organization Earth Pledge is one of the leading experts on green roofs. Their book *Green Roofs: Ecological Design and Construction* elaborates on the many benefits of green roofs and provides a great number of case studies of successful applications. The book calls green roofs an “elegant opportunity to simultaneously mitigate environmental problems and create immediate life-enhancing value.” Modern roof gardens are based on German designs from the 1970s and come in two forms: extensive, which is thin, low-impact and contains only shallow vegetation; and intensive, which is far deeper and can accommodate vegetable gardens and some trees.

Adding a layer of soil and vegetation to a roof can address a multitude of environmental problems, such as the urban heat island effect, storm water runoff, energy usage, the disappearance of native species and the very health of humans in the city. The new roof can insulate the building from the harsh mid-day sun as well as from the sound of jets overhead.

Sustainability expert William McDonough provides an introduction for the book, relating the value of green roofs to many of the points discussed earlier in this paper. He says that the “integrative design [of vegetation with building] enables the building and its inhabitants to participate in natural processes, allowing an appreciation of the relationship between human creativity and the abundance of nature.” Furthermore, he suggests that while a single green roof is an excellent addition to a neighborhood, a holistic plan for a network of gardens is of greater value. “[Its] impact grows when it is conceived as a humble first step toward a deep revitalization of urban life.”
This thesis proposes an extensive network of green roofs in an impoverished urban neighborhood as an act of environmental justice. As stated previously, green roofs have health and ecological benefits, while beautifying and revitalizing a neighborhood. Revitalization, though, always has the potential to cause gentrification, raising property values, marginalizing some residents and restricting access to those who already live in the neighborhood. For that purpose, it is necessary to make green roofs do more. They must provide a tangible economic benefit to the community to mitigate the effects of gentrification. This section will explore urban agriculture as one possible solution.

Urban agriculture is loosely defined as the practice of growing food (both vegetables and livestock) in and around cities. It can include both very urban (community gardens) and peri-urban (suburban lawn gardens) components. This thesis goes to the absolute extreme of the definition of urban by directly engaging with the intensely urbanized city itself.

Green roofs respect the vital density of the urban center and heed the principle that the ground plane should be inhabited by the highest and best use of the land. Because in no economic analysis would a community garden be of greater economic value than sustainable businesses or multi-family housing, it is assumed that inhabiting a ground lot with a garden (and in effect perpetuating a hole in the urban fabric) would be unwise. Instead, this thesis intends to explore the creation of a new public realm on the topography of roofs that exist, often unused and unseen, above the streets.

As green roofs beautify a neighborhood and create incentive for more development, it can be fairly assumed that a project of any significant magnitude would in fact stimulate gentrification. Agricultural roofs, though, are a sort that at the same time may lessen the uneven social and economic impact of revitalization.

Aid in addressing this idea can be found in the perspectives explored in There Goes the ‘Hood: views of gentrification from the ground up by Lance Freeman, an assistant professor in the Graduate School of Architecture, Planning and Preservation at Columbia University. In the book, Freeman analyzes the real effects of gentrification both through previous research and
through the eyes of those living in neighborhoods undergoing transition. Specifically, he asks, “how do people feel when gentrification comes to the ‘hood?”

He says that most published work on gentrification is either from the perspective of neighborhood activists who are squarely against it or from thinkers on economic development who mainly address the issue from the perspective of the gentry moving in. In essence, he thinks that the debate is muddled by the opposing forces of neo-Marxist researchers and development planners. His research reveals that the issue is far from black and white; that people from both sides experience and realize both positive and negative effects of gentrification. In the end, he sees neo-liberal urban policy (including TIF districts and HOPE VI) as having the potential to address the concerns of both sides.

But what benefits might urban agriculture have for an impoverished neighborhood in the context of gentrification? Freeman describes ghetto neighborhoods as “not just another type of ethnic enclave; rather, taken as a whole they are more isolated and experience greater disinvestment than perhaps any other type of neighborhood.” I have previously stated that poverty in urban America is comparable to the level of poverty seen in the third world. In real terms, this is clearly not true. Poor city dwellers can still expect the kindness of strangers and social agencies, and do not suffer the torment of nature and disease that tribal Africans often do. But in terms of economic and social isolation, there are significant similarities.

Other ethnic neighborhoods in America have resulted in rich cultural centers with commercial enterprises that represent a common world view. But in black ghettos, “this isolation … has not translated into robust economic enclaves.” Impoverished black neighborhoods lack many of the basic amenities the rest of us take for granted, like grocery stores with nutritious food, banks, clothing stores and good restaurants. As Freeman states, “in contrast [to other cultural enclaves], many inner-city black neighborhoods have lacked both the prototypical chain stores and indigenous commercial enterprises. Except for hair care and funeral parlors, black neighborhoods for the most part have not served as a base for a black entrepreneurial class.” While I cannot qualify this with research, I suspect this is partially the residue of early American slave trade, which cut off newly enslaved people from their ancestral histories. In the process, cultural knowledge (and the skills associated with it) was largely lost. Black “soul food” is more similar to the cuisine from the American South than to that of Ethiopia.
While urban agriculture will not bring back an ancestral identity and create truly “black” businesses, it can begin to address the severe lack of basic amenities from which the neighborhoods currently suffer. Not only would it provide fresh, nutritious produce, it would teach transferable skills and likely spawn other, related businesses that could begin to create a more diverse system of economic exchange.

Freeman finds that one of the biggest concerns that indigenous residents have with gentrification is the fear of displacement. As a neighborhood is revitalized and people with greater wealth move in, property values rise. Those residents fortunate enough own property before the process begins are insulated against this rise and actually stand to profit from it, but renters face the possibility of their landlords pushing them out in search of higher rents. Studies show, however, that rent prices do not rise nearly as fast as prices for housing purchases. Regardless, the fear of displacement is prevalent, not insignificantly because the rise in purchases means that fewer economically and racially similar people can move into the neighborhood once the process has started. Further, the children of long-time residents have a greater chance of finding housing in proximity to their families.

One method that Freeman suggests could be useful in easing this fear is the provision of housing tax credits for the neighborhood even after the typical average income threshold has been passed. He also believes that tax-increment financing, which is usually used to fund development projects, could be used to ensure housing credits. (Tax increment financing is a policy that uses the increased tax revenues of a successful development project to pay off the up front bonds that enable the project to proceed.) He indicates one problem with this proposal: “To be effective as a tool to address the affordable housing problems associated with gentrification, policy makers would have to anticipate the neighborhood change and implement TIF before gentrification was well under way.” In order to work, policy makers must know when
and where gentrification will happen.

In this context, if it were assumed that urban agriculture would hasten gentrification, it could be a useful way for policy makers to decide where to place TIF districts for housing assistance financing. Even before property values began to rise, agricultural production would cause the economic stimulus indicated above.

Urban agriculture has many more than just economic benefits, of course. While the practice is still relatively rare in the Western world, and indeed many cities have zoning policies that specifically outlaw urban food production, a number of progressive-minded cities have embraced the idea of city-based agriculture.

Notable among them is London, whose quasi-governmental organization, Sustain (the alliance for better food and farming), has advocated for an expanded agricultural framework in the British capital. Their lengthy report, *City Harvest: the Feasibility of Growing More Food in London*, is the work of collaboration among community groups, non-profit organizations and national and local governments.

The publication describes in detail the many reasons for expanding the practice. The benefits from urban agriculture are divided into five categories: environmental, economic, health, community development and educational.

**Environmental:** Urban gardening generates greater biodiversity of plants and animals. It also reduces the energy consumption required to transport food grown in rural areas to cities. Less waste is created, and can be used for composting in the gardens.

**Economic:** A stronger sustainable food and agriculture industry will create jobs and boost leisure and tourism businesses. Other businesses will benefit from cleaner, more attractive environments.
**Health:** More people will consume fruits and vegetables, due to their greater availability. The activity of gardening will relieve stress. Better quality of health will reduce the burden on health care services and eliminate many causes of missed workdays from sickness.

**Community Development:** Neighborhood gardens will foster greater social interaction and participation in community life. The presence of gardens will be a component in the beautification of a neighborhood, creating greater community pride.

**Educational:** As shown in Montessori and Waldorf schools, school curriculums that include gardening create opportunities for hands-on learning and vocational training.

The plan itself, while presenting many case studies of successful urban agriculture projects, establishes a number of guidelines to future application. As this thesis focuses primarily on the role of urban agriculture as an agent of social development, deciding where to implement a project is paramount. Location within the city is a foremost factor in deciding what kind of project to undertake. A map in the report shows where certain kinds of gardens are located within London. Logically, individual allotment gardens (which expanded in usage throughout the twentieth century past the initial government encouragement at the end of the nineteenth century) are located in the less dense, single-family home areas of the city, while community gardens that involve the participation of many individuals are most concentrated in the city center.

While green roofs can have incredible environmental benefits in urban neighborhoods, they do little to help the economic conditions that cause greater problems for residents. Gentrification provides amenities that impoverished neighborhoods often lack, but without intervention, existing residents can be pushed out, by both economic and social pressures. Urban agriculture is seen as a potential bridge between the environmental benefits of green roofs and the economic needs of the poor. Community gardens can also have health, community development and educational benefits. When placed on rooftops, urban agriculture can become an imaginative strategy that integrates the often divergent goals of environmentalism, urban development, historic preservation and poverty reduction.
To better understand the benefits of and issues surrounding urban agriculture, it is useful to look at it from another perspective, that of the developing world. There, where food of any kind is at a premium, urban agriculture is more often an illegal practice in the interstitial spaces of shanty towns. In almost direct contrast to the purpose of this thesis, governments of the developing world see urban agriculture as more of a nuisance and cause of environmental degradation than as a sustainable form of social benefit.

As billions of people around the world make the transition from their traditional rural homelands to the intensely urbanizing cities of the developing world, it becomes incumbent upon policy makers, community leaders, activists and international development organizations to find strategies for mitigating the negative effects that urban living might have on the environmental and economic conditions of the newly urban.

Foremost among the problems often faced by those living in the vast, sprawling slums on the edges of so many cities is the issue of food insecurity. Food security is the situation in which “all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs.” Too often, infrastructural and cultural conditions limit access to the fresh, nutritious food and clean water that is central to living a healthy life.

Urban agriculture could be a promising strategy for establishing greater food security. In developed cities, it is often seen to provide that benefit for the poor, but the perception on the ground in Africa, South America and Southeast Asia is somewhat less sanguine.

The international leader in the encouragement of urban agriculture is the Food and Agriculture Organization of the United Nations. While their involvement has mostly been with research and analysis, they provide technical implementation assistance to local groups as well. FAO’s approach is entirely objective, in that they understand the benefits local food production can provide but also recognize the conflicts agricultural gardens may have with other development efforts. Still, FAO takes the stance that urban agriculture produces a net positive effect on the conditions of urban poverty.
It is important to understand that even FAO is subject to the criticism of being an international organization that may not fully comprehend the particular local situation. As some have noted, “The ideas encouraging incorporation of urban agriculture in sustainable city development in Africa are largely driven by foreign protagonists.” Many question whether urban agriculture conforms to the common idea of what a city should be. On one hand, cities and agriculture are conceptually and necessarily distinct. Urban land use assumes that properties will be occupied by housing, commercial or industrial buildings. A garden, unless placed on rooftops, will prevent the development of that land. On the other hand, they are inextricably linked. A city cannot operate without the products of agriculture.

Urban agriculture in the developing world is less an active development technique than it is a phenomenon resulting from the natural tendencies of a rural people moving to the city. It is a reaction to the severe lack of amenities provided for those in illegal settlements. Like many activities in slums, urban agriculture is an extralegal activity in the informal economy. The response from local governments often ranges from passive acceptance to discouragement to active destruction of urban crops.

Officials in Africa primarily discourage the practice because urban cultivation often results in destruction of natural resources. In Western cities, urban agriculture is a component of larger brownfield redevelopment measures, but in many African cities, land is so developed that the only possible areas of cultivation are still in a somewhat natural state. Any undeveloped land is expected to either stay that way or accommodate future urban uses. Additionally, cultivation on stream and river banks often results in the siltation of important water sources.

Recognizing these problems, local governments are typically in the difficult position of weighing the environment and economic development against the food security provided by illegal gardens.

The city council in Harare, Zimbabwe attempted to strike the right balance. They tried to demarcate acceptable cultivation lands and indicate where food production was specifically banned. Later, they established zones owned by the council that cooperative individuals and community groups could lease for use as agricultural land. By doing this, they
were illustrating that the government was not explicitly against the gardens, but rather against uncontrolled cultivation.

In this instance, Harare took the first step in establishing a workable policy for urban agriculture that helps to solidify the importance of the practice in the urban economy while preventing the negative effects that it can cause without proper oversight. Cooperation among governments, community groups and international non-governmental organizations is critical for the creation of strategies for urban agriculture that are economically useful, environmentally sustainable and socially valuable.

The situation in Zimbabwe can also be useful in putting urban gardening into an historical context. One chapter in particular in Beacon Mibib'a's *Urban Agriculture in Zimbabwe* makes a useful comparison between the use of urban agriculture in late 19th Century United Kingdom and late 20th Century Zimbabwe.

As the industrial revolution was spurring a massive movement of working-class people from the rural countryside to factory towns, many organizations in the United Kingdom sought to establish 'allotment gardens' that would serve a number of purposes. They would provide a comprehensible transition to city life for those who had until recently been farmers and simply provide them with a meaningful and productive recreational activity.

Putting these developments in the context of the growth of organized labor exposes the double-sided encouragement of urban agriculture. The government and factory-owners wanted workers to have something better to do than revolt and the labor unions sought to make workers less dependent on the unreliable good will of their employers. Home gardening lessened the economic burden on poor factory workers by providing them with fresh fruits and vegetables that they would have otherwise necessarily purchased.

The situation in Zimbabwe, while not so organized as that in the United Kingdom, is similar. It could be posited that African nations are at this moment on a similar economic incline as Europeans were 150 years ago. As happened in Europe, the developing world is currently seeing a surge in urban population, as the rural poor move to cities in search of better employment. In Africa in particular, many families are now firmly rooted in cities, and while
some may also have rural land from their ancestors that is ripe for cultivation, they are unwilling to return to their rural lands due to familial connections. The difference between the situation in Zimbabwe and that of 19th Century Europe is that in Africa, the cause for urban agriculture is not a lack of access to rural land, but urban poverty itself.

In urban America, we see both conditions as justification for the establishment of a comprehensive urban agriculture strategy. The urban poor in America are tied to cities due to a lack of mobility and policies that direct affordable housing. Lack of access to rural land provides the reason for urban agriculture; poverty creates the need.
The idea that agriculture should be implemented in cities strikes many as odd, but when one explores their historical and etymological development, the idea seems almost obvious.

The dawn of agriculture is tied inextricably with the dawn of modern civilization. The cultivation of land transformed nomadic hunter-gatherer societies into stationary ones capable of developing mature governments, complex economic systems and higher learning professions. Since the beginning of both, they have moved ever further apart geographically, culturally and conceptually. Agricultural lands are increasingly consolidated, environmentally intensive operations on the fringes of modern society. At the same time, cities are complex, man-made systems almost entirely removed from mankind’s primitive connection with nature. Economically, cities and farms are closely tied, but spatially and conceptually, they could not be more distinct.

In the Latin roots of the words agriculture and urban, one can see both contradiction and similarity. First and foremost, the root, *agri*, derives from *ager*, meaning, “field”. A field seems, in our perspective, to be fundamentally inconsistent with the idea of a city. A city is a dense, man-made structure that, for all intents and purposes, obliterates a field. Indeed, the modern capitalist notion of “the highest and best use of the land” more often than not leads to the conclusion that a field by itself is of very low use and worth. Further, contemporary technologies that enable the production of food in water and bins (i.e. not in a field) raise the question of whether it is legitimately agriculture at all.

More important, though, is the second part of the word: “culture”. Putting aside for a moment the obvious associations to the sociological sense of the word “culture”, it is necessary to explore the word’s root as well. The root *cultura* comes to us, again, from Latin, meaning “cultivation”. Cultivate and culture, though, both derive from the Latin *colere*, meaning, “to till.” Thus, we can see that “agriculture” simply means to till a field. This exploration, though, belies the relationship between agriculture and the city, if we accept the idea that the city is the center for culture.

Further strengthening this link is the root of urban: *urbs*, which simply meant
“city” in Latin. The root of “city” is more revealing. It comes to us, via Old French, from the Latin *civis*, meaning “citizen.” A citizen, in the most primitive form of the word, is simply “A resident of a city or town, especially one entitled to vote and enjoy other privileges there.” In most ancient societies, one had to own land in order to enjoy the privileges of citizenry. Owning land in those times most often meant owning and using land, that is, tilling it. We can see then, that the earliest citizens were in fact farmers.

This enhances the notion that cities did not develop until the invention, as it were, of agriculture. Primitive societies were sustained mostly by hunting and gathering and lead largely nomadic lifestyles. Not until the domestication of animals and cultivation of the land did these people settle down and create urban forms. Initially, those farms were for family sustenance, but the growth of technology allowed fewer and fewer farmers to produce food for more and more people. Complex governmental and legal systems, arts and sciences would not have developed to the degree they were able to without farms of high output that supplied food for those who spent their time in other pursuits. Those societies with the greatest agricultural production (the Fertile Crescent, Egypt, China, Western Europe and, today, the United States) were able to develop the most advanced cultural institutions.

It of course does not immediately follow that reintroducing agriculture into the immediate life experience of urban residents would greatly enhance their lives or their ability to be at home in the world. It is clear, though, that the people most divorced from nature in most American cities are also those most economically depressed and isolated; namely, the residents of ghetto neighborhoods. For those people, the introduction of agriculture as both an economic stimulant and a tool for beautification and ecological restoration could have a great impact indeed.
Nature vs. the City
3. Jacobs 233
4. Jacobs 244
5. Jacobs 261
6. Jacobs 336

The Integrationist Perspective
5. Magnaghi 117

Greening Historic Buildings
4. McDonough 14
The Economic Imperative

3. Freeman 158
4. Freeman 158
5. Freeman 159
7. Freeman 174

A Global View

3. Mbiba 143

Foundations and Roots

SITE ANALYSIS

The chosen site for this project is one both unique in its city and the nation, but also one that reflects broad patterns of history that illuminate the cultural and political vicissitudes of the United States in the 20th Century.

In the core of Cincinnati, Ohio, just north of the central business district, Over-the-Rhine is a neighborhood rich with history, from its founding by German immigrants in the late 19th Century to its status in the late 20th Century as a slum for African Americans, those from the Appalachian region and drug addicts.

Over-the-Rhine derived its name from the Miami and Erie Canal that flowed between the neighborhood and downtown. The German residents nicknamed the canal after the most important river in their native country and when one had to get to the neighborhood from the downtown business center, one would literally travel “over the Rhine.”

It was a neighborhood rich in German culture, from the many breweries and beer halls, to the German-language newspapers printed there, to the lively choral May Festival. As the World Wars came, though, anti-German sentiment took its toll on Over-the-Rhine. Those with German heritage were vilified, old street names were switched to new English ones (Bremen Street became Republic Street, for example). Many of the long-time residents moved out in disgrace, fastened by the national exodus to new suburban towns.

From its high of 45,000 residents in 1900,
the population of Over-the-Rhine steadily declined through the century and fell to little more than 7,000 residents by the year 2000. Suburban growth, inner city disinvestment and the extreme concentration of subsidized housing all contributed to the decline of the neighborhood. Mid-century urban renewal failed to reach Over-the-Rhine, though. Most of the original historic building stock remained and by the 1970s, a major fight was underway to list the neighborhood on the National Register of Historic Places.

Advocates for the poor resisted, arguing that listing would result in the expulsion of low-income housing, but preservationists won out and Over-the-Rhine became an official historic district in 1983. Regardless, low-income activists were successful in passing legislation that would maintain the affordability of the neighborhood. The expected gentrification never came.

In April of 2001, after the fatal shooting by a white police officer of young, African American male (the 15th such incident in 10 years), days of intense rioting shocked the neighborhood and brought Cincinnati’s racial struggles to international attention.

Six years later, Cincinnati has its first directly-elected African American mayor and Over-the-Rhine is trending toward revitalization. Significant investment is flowing into the neighborhood, resulting in a number of important building renovations. The Art Academy of Cincinnati has moved into a new building, the historic Findlay Market has been renovated, Music Hall, home to the oldest chamber orchestra in the nation, is slated to be renovated in the coming years, and dozens of new apartments and condominiums are opening.

The neighborhood is in the throes of gentrification, and while changes in federal housing policy have allowed low-income residents to take their housing vouchers to other parts of the city, most social services for the poor and homeless are still located in Over-the-Rhine.
The specific site for this thesis is an area in the northwestern part of the neighborhood bounded by Findlay Street, Elm Street, Liberty Street, and Central Parkway. It is roughly bisected by West Elder Street, which runs directly into Findlay Market to the east. Findlay Market, a long, low building, is the oldest public farmers’ market in Ohio.

This area of the neighborhood retains a substantial amount of its historical fabric, with a fine grain of Italianate buildings ranging from two to five stories. Most of the area lies within the Over-the-Rhine historic district. The blocks between Central Parkway and Logan Street, though, are more similar to the larger-scaled buildings of the West End across the Parkway. These blocks were altered from their original texture when the Miami and Erie Canal was filled in to create a now-defunct subway and the Parkway.

While most of the area is built-up, demolition has put large holes in a few sections. Most notable are the parking lots flanking West Elder Street, one to the north between Central Parkway and Logan Street, the other to the south between Logan and Campbell Streets. The parcels to the north across from this second parking lot were replaced in the mid-1980s by a one-story, windowless brick building that is much larger than most of the surrounding buildings. The blocks south of Green Street between Logan and Elm Streets are perhaps the most problematic. A handful of original buildings remain, but most of the area was demolished, leaving untended lots of overgrown weeds.

Despite the demolitions, a great deal of the neighborhood still reflects its historic character. Most importantly, the buildings facing Elm Street and the Findlay Market complex are largely original and retain integrity. Within the chosen site, the buildings facing Elm (shown in figure 12) are the most important for conservation and...
preservation efforts.

The street walls along West Elder, which was once a major entrance corridor for Findlay Market, have been most damaged and are a prime target for in-fill and restoration, as indicated in the Over-the-Rhine Comprehensive Plan of 2002.

The thesis project, as previously indicated, will primarily use the rooftops of buildings as the site of intervention. The roof plane for this area is typical of the buildings one would find in a neighborhood of this time period and texture. Most of the roofs are more or less flat, while a good number of others have a fairly minor slope. Stair towers emerge from some of the larger buildings, but many have either cast iron fire escapes that go to the roof or internal hatch doors. Chimneys and mechanical equipment from later renovations occupy a small area of most roofs.

The most striking characteristic of the entire roofscape is its variability. Most of the buildings are between 30 and 40 feet tall, but some dip to a mere 15 feet and others rise to over 50 feet. The rooftops form the geometrically abstracted rolling hills and valleys (and occasional cliffs) of a very rugged landscape.

The chosen site is one with great architectural significance and historical character. It is riddled with the many issues on which this thesis is focused: decaying historic structures, the struggles of poverty and economic equity, pressures to become part of greater environmental sustainability and the demands of urban revitalization.
The program for this thesis consists of three primary elements: the agricultural park that spans all rooftops and the path that connects them; the new building at the head of the main path that will house gardening preparation; and the new building at the end of the main path that will house harvesting and kitchen functions.

First and foremost is the agricultural park itself. It will serve the dual purpose of adding greenspace to the neighborhood as a public park and allowing community groups to grow and harvest fresh vegetables in individual garden plots. The park will consist of public gathering areas closer to the major circulation path, semi-public community gardens further from the path and quieter, secluded spaces for relaxation and contemplation.

There are a few important considerations to support the creation of a rooftop park. First, green roofs must be appropriately designed for both new and existing buildings. Based on structural requirements, greater depths of soil will be placed on new buildings, while...
more shallow soil will be used on the existing buildings. In the same vein, a wide range of vegetable types, which require different soil depths, must be used to ensure occupation of the park year-round. Most vegetables follow the expected spring planting/autumn harvesting cycle, but a number of leafy greens such as lettuce, spinach and kale, can be grown through the winter.

Support functions, such as the provision of water to the gardens and locations for the storage of tools will also be necessary. In addition to the specific community gardens, other more traditional park elements are necessary, including flower gardens, benches and lighting.

The other two major parts of the program will function as the “before” and “after” of agricultural production. On the beginning end, a new satellite building for the Cincinnati Civic Garden Center is planned. As their Rooftop Agriculture Center, this building will house offices for the management of the community gardens in the park, meeting rooms for various events, exhibit space to educate the public about gardening and green roofs, and a joint
hydroponics lab and green house for the preparation of plants for the roofs. This building will not only be the administrative headquarters for the park, it will be its public gateway, providing the primary access from the street to the roof plane.

At the other end of the path harvested crops will be taken for processing, storage, sale and consumption. Classrooms will be provided to educate groups and individuals about methods for preserving and cooking the fresh produce. The major component of this end building will be a community kitchen operated by the Cincinnati State Midwest Culinary Institute. Conceived as a street level cafe, the kitchen will provide a service to the community while activating the street, destigmatizing the traditional soup kitchen.
A well

Old, rustic and equipped with little more than a hand pump, pulley or bucket, the traditional water well has two principal purposes. It is a source of nourishment for a people; it supplies a body with health and vitality. Equally, it is a source of social vitality in a community. Often subsequently surrounded by a public square, the well is a common gathering place, where (mainly) women come with their children to collect the water they require for cooking and cleaning. While there, they socialize with each other, tell stories, gossip, laugh and generally enjoy the company of others while they are toiling away at one of the most difficult tasks of their day: trekking a great distance with a large bucket of heavy water.

This idea of community building as a component of meaningful work is one of the many benefits of urban agriculture. A community garden is a public space that fosters neighborhood pride, but it also requires community members to work in order to use their produce. Self-motivated employment, whether paid or not, gives a person a sense of self-worth and social purpose, which is paramount in lifting people out of the cycle of poverty.

A well is about creating a place of prominence in the community. Over time, the plaza around the well may become a place where farmers come to sell their goods. Other merchants may follow and the well may become the center of a public market, aiding the creation of a micro economy. Similarly, this thesis intends to use an urban agricultural park as a destination point in the neighborhood where the community comes for healthy food, employment, socializing and the related emergent activities that will develop over time.

Though a modest well has no inherent properties that support these extended goals, neither does a simple tomato plant on a rooftop. Society is a complex system and one can speculate, without absolute certainty, about desired outcomes that can never be assumed.
Fukuoka Prefectural International Hall

From the front, the Fukuoka Prefectural International Hall is a massive, imposing structure in the center of downtown Fukuoka. Designed by Italian architect Emilio Ambasz to house functions of the city government, it occupies a prominent site in the city adjacent to the largest park in the downtown area. Large and domineering as it is on one side, a walk to the backside (the park side) reveals a much softer, calmer façade: a totally enveloping system of garden terraces rising to the very top of the building. It appears, perhaps, as though the nearby vegetation in the park has uprooted en masse and taken to mountaineering, aiming to post a flag on the summit of the prefectural hall. The building steps back leisurely as it rises, accepting the ascent of the trees.

This project, like all of Ambasz’s work, is a dynamic integration of building and nature. One might even say that he designs landscapes on an angle. Many of his projects feature hanging gardens, or plantings climbing lattices or buildings submerged below a park, but this work demonstrates best how he creates useful, occupiable space out of otherwise bland, useless rooftops. If the Modernists’ curtain wall broke down the barrier between interior and exterior by providing a continuous view out, Ambasz obliterates that barrier by literally bringing the outside in and on to the building.

The Fukuoka project, as an individual building, is on a far greater scale than the project proposed in this thesis, but both have similarly urban contexts with many similar issues. Ambasz’s building can incorporate winding paths that expand into rooftop plazas or tree groves. It is an attempt to restore a natural habitat that was destroyed when the city was built. It has particular structural requirements relating to the weight of the soil and plantings. Bulkier structural members affect the appearance and experience of the building at street level. One must ask if the rooftops are public spaces for the
masses to lounge or climb upon and explore, or if they are the private domains of the residents of the building alone; a secret refuge of peace and tranquility away from the bustle of the street.

Additionally, Ambasz’s building does not, as it appears, incorporate edible plantings. This exposes an extra level of scrutiny that this project will have to face. There are certain ideal native plants that can be incorporated into a green roof that create the requisite biodiversity for ecological utility, but adding that extra expectation of agricultural output may interrupt the prime biological composition. With agriculture, no matter how limited, comes also gardening supplies and harvest storage, which will necessarily be accommodated somewhere proximate to the roof.
The High Line

Few projects have captured the attention, and indeed the imagination, of New Yorkers as the High Line. Built in 1929 the High Line is an elevated rail line that once carried freight down the West Side of Manhattan to factories in Chelsea and the Meatpacking District. Abandoned since 1980, the old CSX railroad line has fallen into disrepair and consequently received many threats of demolition. Hidden above the rusting columns and leaky planks, squeezed mid-block between countless residential and industrial buildings, is a vast linear wilderness. It is a ruin in the most picturesque sense of the word; a testament to the overpowering persistence of nature to find its place. Weeds and field grasses carpet the tracks and frail saplings congregate in awkward copses between buildings.

In recent years, community activists and a handful of business owners have lobbied to protect the High Line, requesting (and receiving a good deal of political and business support) to turn the elevated rail line into some kind of linear park in the sky. The so-called Friends of the High Line have hosted design competitions to gather ideas for its conversion. In October 2004, they selected the design developed by Field Operations with Diller, Scofidio + Renfro to be built.

The chosen design preserves (at least in appearance) much of the existing overgrowth. The natural is blended (and contrasted) with the constructed. The new surface will be in the form of long, narrow strips that mimic tracks. These strips, sometimes planted, sometimes hard, walkable surfaces will run the length of the High Line, occasionally lifting up into further elevated paths, benches, podia or an amphitheater and occasionally dipping down to create pools or stairs to the street.

A number of contrasts make the High Line aesthetically compelling: nature and man-made; soft and
hard; recreation and industry; new and historic. It is a palimpsest in a very real sense, an early 20th Century infrastructure, overlaid with late-20th Century decay, overlaid again by early-21st Century eco-tourist and recreational culture.

The High Line brings rural land into the city in a way different from that of a traditional park. Central Park, being on the same plane as the rest of the city, eliminates a vast area of land that would otherwise be used for commercial and residential development. By rising up two floors, the High Line has a separated and uncompetitive relationship with the city. Indeed, the High Line will act somewhat like a limited access highway, providing different types of accessibility at specific points along its length. These points (slow stairs, fast stairs and elevators) will be nodes of development. As points of demand, they will bring a higher density of people, which will in turn benefit the adjacent properties.

Issues of access will be significant in the design of a rooftop park over many buildings. In the same way that access points to the High Line will target population intensity on the street, so too will entrances to a rooftop park be important nodes within a neighborhood.
The ASLA Green Roof

The green roof topping the headquarters of the American Society of Landscape Architects is one of a surprising few in Washington, DC. This writer had the opportunity to visit the roof one afternoon and meet with Jennifer Collins, Special Assistant to the Executive Vice President, who is in charge of introducing visitors to the project.

The ASLA green roof is a particularly informative example because it incorporates approximately 5 different kinds of green roof techniques. When dealing with a variety of building and roof types, as this thesis proposes, one is faced with multiple construction conditions and questions of applicability. A common issue is how successful a green roof can be on a sloped roof.

The green roof here is intended not only to make their own building more environmentally efficient, but also to serve as a testing ground for further research and understanding. It is, in a way, a service to others interested in implementing green roof projects.

This roof consists mainly of an entry deck flanked by two “waves” facing each other. The waves are built-up structures supporting soil, each with a different depth. The south wave (figure 32) supports 3 to 4 inches of soil and the north wave (figure 33) supports 6 inches. Both are generally referred to as extensive plots, meaning they can only support plants with fairly shallow roof depths.

The remainder of the roof that is not occupied by mechanical equipment is covered with a shallow, 3 inch growing medium in which a range of small vegetation is planted (figure 34). In order to plant as large an area as possible, they have employed a
metal grate-like system for the walking paths (figure 35). The holes let light, rain and air through, allowing plants to grow underneath, and eventually through, the paths.

Above the stair tower and elevator shafts are much deeper, intensive plots (figure 36). Their depths of between 12 and 21 inches allow for larger plants and even small trees. One can also see that the under sides of the waves are essentially empty except for a pair of small mechanical units. If this kind of system were being used for agricultural purposes, this space could be better used as storage for tools or rainwater collection.

Finally, a modest trellis was placed on the stair tower above the entrance onto the central deck (figure 37). Nothing is growing on the trellis yet, indicating the relative nascenten of the entire roof garden. Though this wasn't indicated to me, it appears that plants growing on top of the stair tower will be allowed to drape over the edge and onto the trellis.

In the lower left corner of Figure 37, one can also see that the plants on the south wave are not growing well yet. This is likely due both to the lesser sunlight that this wave gets in comparison to the north, and to the different plants being used there. They have chosen a variety of plants with many different characteristics in an effort to test what plants work best for certain applications. As mentioned earlier, this project is as much for research as it is for the building’s own use.

More than anything, the ASLA green roof provides a good starting point for understanding the methods of green roof application and their limits. Coupled with the study of other systems, this roof establishes a context for how the technology can be applied on the roofs of Over-the-Rhine.
The goal of this thesis project, as previously indicated, is to create a network of agricultural parks on rooftops in a dense urban neighborhood. But what precisely does this mean? What methodology might inform the understanding and creation of such a project?

First, it means that the project is larger than a single building. It is a park that connects many and disparate parts of a city together well above the neighborhood’s streets and alleys, removed from the activity of everyday urban life. It is a special place that not only includes space for peace and reflection as a park, but programmatically includes ideals of social equity and respect across cultures.

Conceptually, the project turns the typical relationship of city and landscape on its head. In most situations, the city is built onto or into the landscape. It becomes a parasite on the land and often derives its form from that land. Urban patterns and building forms are created and inspired by the landscape on and into which they sit. Try to imagine an Italian hill town, the Arabic casbah, the Inuit igloo, a Prairie house or San Francisco without a site. It is strange if not impossible. Not only does the landscape grant a city or building its sense of place, it often grants it a sense of self.

In the situation proposed by this thesis, the landscape is placed on the city. The park is no longer connected to the earth, but rather, the ground plane becomes the rooftops themselves. Here a landscape is built on the undulating topography of many different rooftops. Can the landscape then become a parasite on the city and derive its form from the city? Can this landscape derive its sense of place and self from the city much the same way that a building can when placed on a landscape?

A process for doing just that is what will
inform the design of this project. At a general level, the process is as simple as reversing the typical relationship, and making the landscape learn from the forms and ideas of the city. By concretizing and abstracting the city, based on its geometries, scales, hierarchies, textures, materials and articulations, then translating those into the language of landscape, a solution might be found.

In order to start this process, the specific city and its conditions must be well understood. The site discussed earlier, Over-the-Rhine, has particular characteristic that are fascinating for this methodology. It exhibits many the characteristics triumphed by Jane Jacobs: small scale, density, mixed uses and a mixture of old and new buildings. These blocks have not been touched in recent years by the omnipotent hand of a city planner. Rather, the buildings are experiencing the gradual evolution of individual modification. It is a neighborhood that exhibits what this writer calls “stochastic urbanity.” This thesis will accept this as an ideal form from which to take inspiration.

This term, stochastic urbanity, is informed by processes in statistics, computer technology, science and music. Stochastic itself refers to a process based on conjecture and guesswork. Such processes are characterized by random variables and chance. The writer attributes this term to a kind of urbanism because of the particularities of urban design.

Urban design as well is based on conjecture about the effects it will produce; the city is a complex system outside the realm of accurate prediction. The gritty, chaotic continuity of urban space will always be modified by the events of those living, working, and experiencing the city. Urban dwellers themselves are the random variables that create that vibrant complexity; they have freedom of movement, action and experience. Cities are an assemblage of inter-related parts that work both independently and in support of each other. In the city, order is preserved through the mutual understanding that all parts play a role in securing it, rather than through a hierarchical structure of control and enforcement.

More importantly, a city is defined by the experience of wandering through it, discovering the unexpected, juxtapositions
of form and use and culture. The smallness of scale, the sidewalk objects, other wandering people, create a rhythm and complexity. Small blocks and many streets create many paths for movement and exploration, enabling a diversified experience; a journey of randomness and conjecture.

The task then is discovering a landscape form that exhibits (or can be made to exhibit) these same qualities. If the experience of wandering, choice, contemplation, the journey, is most important, then success may be found in the form of the labyrinth, or as Argentinean author Jorge Luis Borges calls it, “the Garden of Forking Paths.” Historically and culturally rich, the labyrinth is a typology that is decidedly one of gardens, of contemplation and of communing with one’s inner connection to nature and the world. It is based on both the multiplicity of choice and the continuity of a journeyed path.

Is the labyrinth then the most appropriate form for a garden network on rooftops? Questions arise about how paths are articulated and how the park connects both between buildings and to the ground below. Connections to the street, the beginnings and ends of the labyrinth can also learn from the city below. Highway off-ramps and subway station exits provide a guide as nodes of high impact and future development.

There are many things to be said about creating a labyrinthine network of bridges that crisscross a city high above the street. What would these bridges look like from the pedestrian experience above and from below? In the same way that a building at best does not harm the landscape into which it is place, this park must not harm the vital urbanity below, in the sense that it cannot be seen as a more desirable path for getting from one part of the city to another. The labyrinth, as a wandering, inefficient path, accomplishes this goal. Would these parks in the sky not literally form a Garden of Forking Paths?
As Borges writes, “Everyone imagined two works; to no one did it occur that the book and the maze were one and the same thing.” Here the goal is to imagine not a book and a maze, but that the landscape and maze; the city and landscape, are one and the same thing. It is this idea of seamless integration; of achieving multiple goals at once; of making one seem like the other, that stands at the center of this thesis.

fig. 43 A garden maze
The initial design concepts came from a search for a strategy to organize the garden plots. Given the pattern of most agricultural land, I concluded that a simple grid would suffice, but would also allow for an interesting analysis of the methodological concepts. That is, making the agricultural landscape a grid made it learn from the city below, which is also on a strict grid.

I then decided to skew that grid from the city’s orientation to an exact cardinal direction orientation. This accomplishes two goals. It calls attention to the fact (that most people don’t realize) that the city does not have a north-south orientation, while making the raised park a more special space removed from the street below.

The next step in the design process was to lay a main circulation path among the rooftops, conforming to the new grid. This was done in a way that wanders somewhat aimlessly from building to building, while extending the path to allow the entire length of it to be ADA accessible. Towers were then added in certain places to help span long distances and provide greater connection to the street. The towers include stairs and elevators, but also greater space for vegetation as both green walls and hydroponic systems.
Having already ascertained appropriate locations for the beginning and end buildings, the next iterative step was to make those buildings conform with the new grid. This heightens the relationship between the two elements while allowing the new buildings to line up most efficiently with beneficial solar orientations for passive heating, cooling and ventilation. To conform with the existing fabric of the neighborhood, the street setbacks are maintained with a terra-cotta screen. The screen mitigates temperature while creating useful outdoor spaces for entry, bike storage and seating.

The final major iterative step was to rethink the importance of the strict grid. This was seen as too constricting, in that it limited variation of experience and created less efficient garden plots at the edges of buildings. I then decided to enhance the interaction between the new grid and the existing building orientations. The new grid emanates from the path while plots further from the path conform to building edges. This both increases the efficiency of plots at the edge while making more dynamic spaces throughout. Places where the two orientations intersect allow the path to expand into plazas, seating areas and sheltered outdoor rooms.
fig. 47 Roof showing intersection of new grid and existing buildings

fig. 48 Sketch of tower

fig. 49 Sketches of possible bridge and tower designs


“Urban and Peri-urban Agriculture.” Report by the Committee on Agriculture, Food and Agriculture Organization. 1999.