LIVABLE CITY:
FILLING IN THE GAPS OF INSTANT URBANISM

by

Behsheed Darvish-Zargar

Submitted in partial fulfilment of the requirements
for the degree of Master of Architecture

at

Dalhousie University
Halifax, Nova Scotia
November 2010

DALHOUSIE UNIVERSITY

SCHOOL OF ARCHITECTURE

The undersigned hereby certify that they have read and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled “Livable City: Filling in the Gaps of Instant Urbanism” by Behsheed Darvish-Zargar in partial fulfilment of the requirements for the degree of Master of Architecture.

Dated: November 25, 2010

Supervisor: _____

Advisor: _____

External Examiner: _____

DALHOUSIE UNIVERSITY

Date: November 25, 2010

AUTHOR: Behsheed Darvish-Zargar

TITLE: Livable City: Filling in the Gaps of Instant Urbanism

DEPARTMENT OR SCHOOL: School of Architecture

DEGREE: MArch CONVOCATION: May YEAR: 2011

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Signature of Author

DEDICATION

For my father, whose parallel ruler, electric eraser, and markers first sparked my interest in architecture, and whose passion continues to inspire me today.

CONTENTS

ABSTRACT

A living city must exist at every scale - from the urban to the pedestrian; the development of the 21st century Instant City, however, does not allow for this multiplicity of scales. These cities emerge instead in a type of hyper-reality, driven by the pursuit of capital and power. In the frenzy to grow, the resulting urban condition is alienating - one devoid of human scale. Looking to modern Dubai as an example of the dehumanized city, this thesis explores the reinterpretation of a traditional bazaar as a tool to challenge this existing form of urbanism. By way of an intervention that exploits the connective potential of pedestrian infrastructure, the project seeks to add a layer of social and physical complexity to a ‘dead’ city.

ACKNOWLEDGEMENTS

Thank you.

To my family, for your continued love and support.

To Richard Kroeker, for your words of wisdom and unwavering faith in this project.

To Susan Molesky, for your insight.

To Kimberly Fuller, for our walks home and your constant encouragement.

To my friends and studio mates, for your inspired and inspiring work.

Without you, I would be extending eternally.

INTRODUCTION

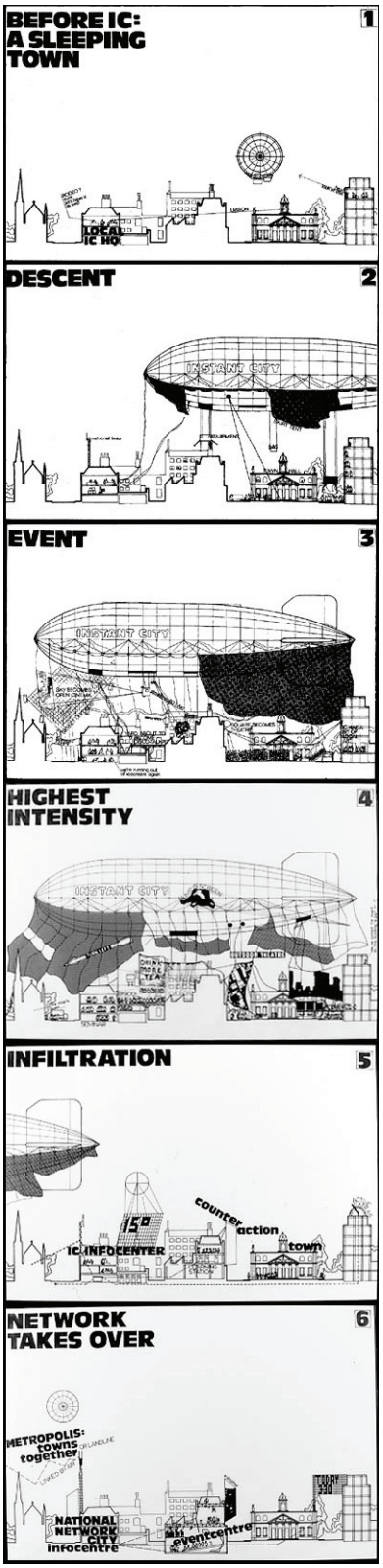
> *Can we study it as a 'normal city'? Can we study it in terms of its basic human activities? Can we investigate how the city functions by looking at how people live, work, and move through the city?*
>
> ETH Yearbook (2008)

In *The Generic City,* Rem Koolhaas presents observations on the city of the future based on the condition of the contemporary city, including "6.3. The street is dead" (OMA, Koolhaas and Mau 1995, 1253). If, as Jane Jacobs insisted, the street is the most elemental public space in the city, a dead street implies a dead city.

In the urban environment, we familiarize ourselves through a process of exploration, using the street as our primary tool. How, then, do you experience a city that does not allow you to walk its streets? As a result of its single-minded development, Dubai's streets are rendered uninhabitable; as Koolhaas predicted, the street is dead.

The death of the street in Dubai has resulted in a "generic city [amounting] to no more than the coexistence of a number of apparently unconnected buildings that, by virtue of proximity, happen to form an urban condition" (Katodrytis 2006). The city, therefore, is not a city we know, nor is it a city that we can know by any conventional means: it is not a city built to be experienced. Instead, it is a backdrop to localized destinations that exist in isolation, lacking connectivity.

If the public domain is the means by which we read a city, we must seek to develop new forms of public space



Archigram, Instant City (unbuilt project, 1969). From Cook, *Archigram*.

to facilitate legibility in the absence of a coherent urban fabric.

Thesis Question

How can a reinterpretation of the traditional bazaar help remediate the dehumanized urban condition of modern Dubai?

Instant City

When you get there, there isn't any there there.
Gertrude Stein (quoted in Tibbalds 2001)

The Instant City imagined by Archigram in 1969 was an apparatus facilitating the exportation of metropolitan culture to provincial towns. Today, the instant city (also referred to as the Generic City, the global city, the emerging city,) is a contemporary boomtown – a product of globalization and a post-modern fear of falling behind.

Rather than following the traditional, orthogenetic pattern of urban growth, an iterative process of building upon a local cultural base, this city grows heterogenetically, reflecting the influence of foreign values over the local, with priority assigned to economic growth and expansion of power (Haggag 2003, 804).

The instant city arrives at a state of hyper-capitalism by way of the 'dialectic of uneven and combined development' (Davis 2006) in which a society bypasses the process of 'development', importing foreign constructs (or rather their ideal forms) in disregard for their evolution.

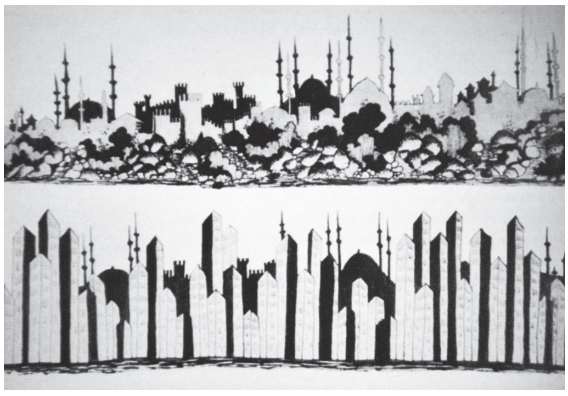
In the language of *The Development Dictionary*, the city jumps from a status of ‘underdeveloped/developing’ to a state of ‘progress’, only to result in a collaged landscape seemingly more developed than the developed countries it draws upon.

Dubai serves as a prime example of a global city that has developed as a pastiche of buildings disconnected from their site as well as from each other. It has merely become a collection of buildings competing for image, rather than a network of structures forming an urban centre.

> A fundamental problem with twentieth-century urbanization is that it has led to the multiplication of objects and the neglect of fabrics.
>
> Pierre von Meiss (1990)

The binary of urban fabric and monument (or object-building) is rooted in a concept of hierarchy in which the value of a particular urban element over another is reflected in its scale and image. In a connective urban network, the distinction of certain buildings, as places of civic and cultural value, is physically manifested in their

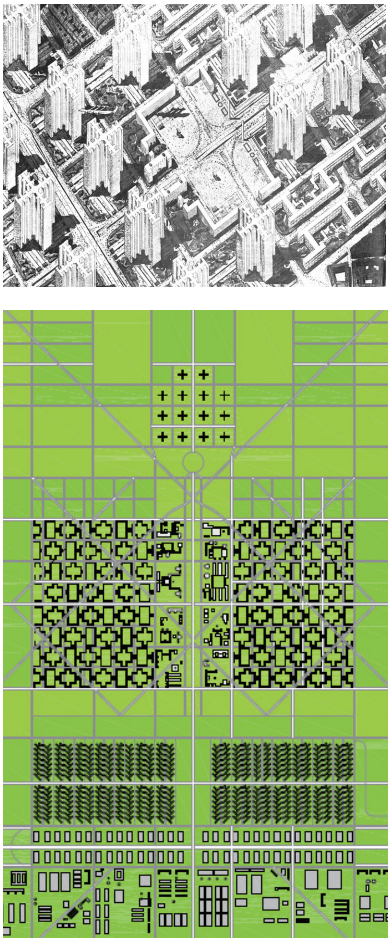
The urban fabric of Esfahan, Iran. From Google Maps.



A depiction of Istanbul, highlighting the difference between fabric and monument, from The Impact of Modern Architecture on the Islamic World, *Back from Utopia: The Challenge of the Modern Movement.*

architecture and immediately recognizable; when every building strives to be a monument, however, this value is lost.

Complexity / The Complex City

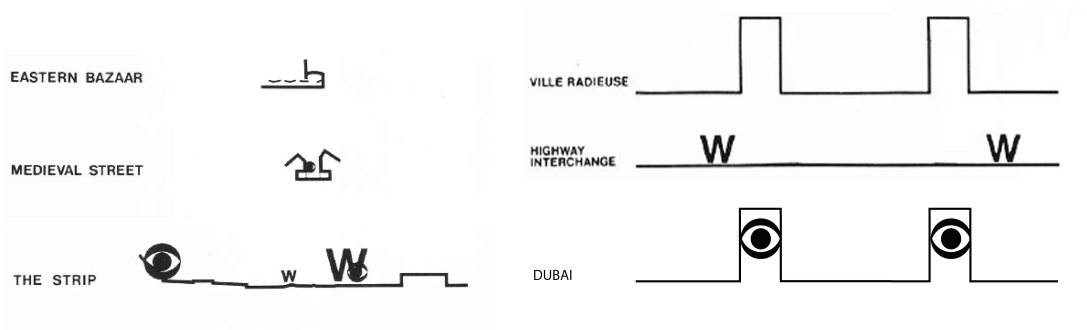


Le Corbusier, Radiant City (unbuilt project, 1935). From WORKac, 49 Cities.

A city that has developed orthogenetically is, by nature, a living city of complex connectivity. Traditional urban forms develop incrementally, starting from the human scale and accumulating necessary layers over time; these developments are not only layered, but interconnected. By foregoing the slow, iterative process of traditional urban development, the instant city lacks this subtlety and nuance in its urban form.

The modernist conception of urbanity, epitomized by Le Corbusier's Radiant City, addresses primarily the building scale, missing "the necessity of all the smaller scales in a living city" (Salingaros 2003). The morphology of the instant city follows effectively the same formula.

In their analysis of the Las Vegas Strip as a new urban form, Venturi, Scott-Brown and Izenour devised diagrams that begin to address fundamental design values and their translation into urban structure. The bazaar and the medieval street share many of these values, and by extension, spatial qualities. These forms reflect the value attributed to notions of gathering, living, producing and exchanging, all in close proximity. The resulting arterial spaces allowed for economic as well as social interaction, respecting the idea that individuals make up the collective, and therefore require integration and interconnectedness in their built environment.



Diagrams of urban form adapted from Venturi, Scott-Brown and Izenour, *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*.

In contrast, the urban form that Dubai has taken might look something like a blend of the Strip and Radiant City: composed of what Venturi, Scott-Brown and Izenour would refer to as 'proto-megastructures', and embodying the concept of the 'duck building', or building as sign. By neglecting anything smaller than a building scale, the city destroys the relationship between urban form and the body.

Dubai

> *The people of Chicago have ceased to be impressed by the rapid growth or the great size of the city. What they insist [on] asking is, how are we living?*
>
> Daniel Burnham, Plan for Chicago (1909)

In the 19th century, Dubai was a relatively insignificant port within the former Trucial States of the Gulf, the defence and foreign affairs of which were controlled by England. The discovery of oil in the region in 1966, however, marked a major economic and developmental milestone.

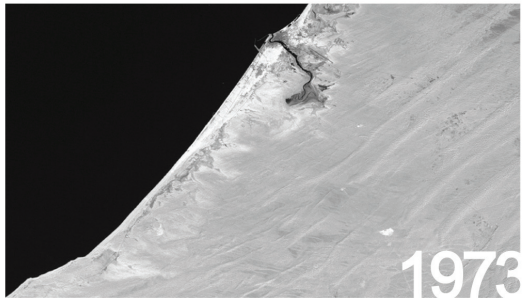
> Dubai … was long a transit point for caravans on the trade route from Iraq to Oman, and for ships plying the waters between India, East Africa and the Northern Gulf … As the economic rise of the region came about, Dubai was well situated to become an international

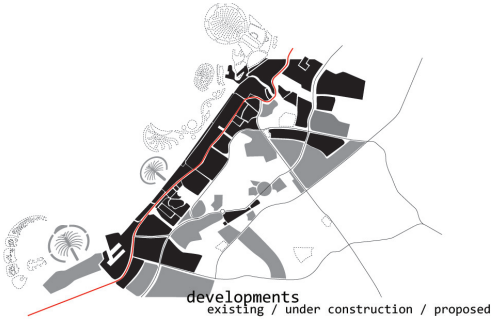
> center of commerce where different cultures mixed (Jodidio 2007, 8).

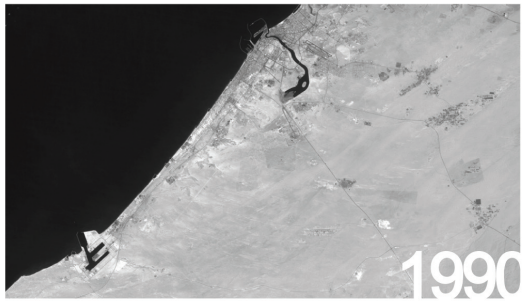
By 1971, when England pulled out, and Dubai, Abu Dhabi, ‘Ajman, Fujairah, Sharjah, and Umm al-Quwain (and Ras al-Khaimah, come 1972) created the federation known as the United Arab Emirates, Dubai had already instigated intensive infrastructural development.

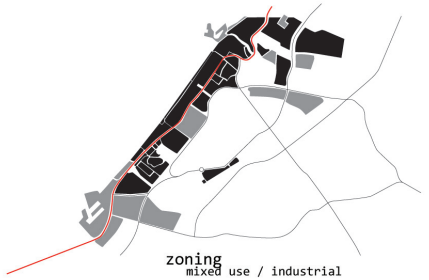
Following a strict formula of aggressive leadership, intensive infrastructure, the establishment of tax free zones, and low import duties, Dubai has grown from a pre-industrial to an industrial to a post-industrial society in less than forty years. This hyperbole of a developing state, an “emerging dream-world of conspicuous consumption and… supreme lifestyles,” continues to be one of the world’s largest building sites (Bagaeen 2007, 176).

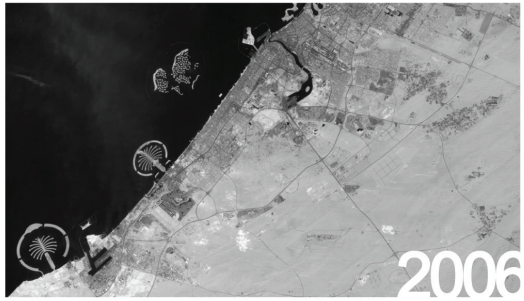
The ruling vision for the city-state has always been anchored in a deep devotion to and belief in the power of commercial exchange as a driving force in the development of a society. Recognizing the modesty of Dubai’s oil reserves relative to its neighbouring states, the government launched a plan to develop the industries of business and tourism, which would outlast the oil boom upon which the Gulf states are so economically dependent; as a result, oil revenue presently comprises less than five percent of the emirate’s GDP (Zacks 2007). Dubai’s success is attributed to an aggressive state-led entrepreneurial drive: a hybrid of state control and liberalism resulting in accelerated economic and urban development. As noted by Mike Davis, “the state [of Dubai] is indistinguishable from private enterprise,” – an idea epitomized by Sheikh Mohammad al-Maktoum’s

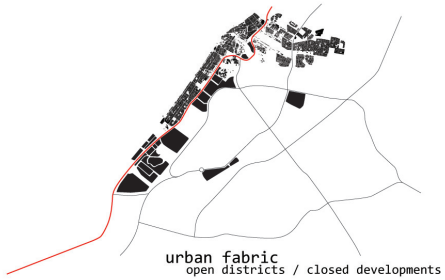












The drastic development of Dubai. Adapted from Dubai is Nuts.

Urbanization of Dubai, United Arab Emirates. Adapted from Earth Observatory, NASA.

Analysis of urban development in Dubai.

reputation as the ‘CEO of Dubai Inc.’ (Davis 2006).

While most cities are dealing with issues of urban regeneration, Dubai is conducting urban generation. As a result of this thrust, the government has essentially established a situation of self-imposed neo-colonialism. From the point of view of foreign developers, Dubai is a *tabula rasa* upon which anything could take place – a notion supported not only by the physically barren context so detached from the familiar, but by the seemingly limitless potential of wealth and its exuberant displays. This city of imported values does little more than support Orientalism in its attempts to live up to the foreign construct of Arab exoticism through a display of decadence devoid of any meaningful cultural connection. As Edward Said argued, “the Orient was Orientalized not only because it was discovered to be ‘Oriental’ ... but also because it *could* be – that is, submitted to being – *made* Oriental” (Said 1979, 6). The majority of contemporary architecture in Dubai reflects a superficial understanding of the vernacular rather than an analytical and critical approach to regionalism. The city has thus become an architectural playground, its skyline comprised of monumental works, each more ostentatious than the last.

It is questionable, however, to what degree these developments can be considered architecture. Hassan Fathy once noted that, “architecture deals with human beings and buildings, not just buildings,” (Fathy 1992, 57) and by extension, cannot be devoid of site and context. How can there be architecture in a city that has “lost its site, for it tends to be… everywhere and nowhere at the same time, because it has no urban center or core”

(Katodrytis 2006). If Dubai has mutated the concept of a city into one existing only in a type of hyper-reality, it follows that its architecture would be equally mutated. This mutation has altered the mandate of architecture from the service and benefit of human beings to the creation of an image to attract global attention and consolidate the "successful Dubai brand" (Bagaeen 2007, 177).

Dehumanized Space / Suburban Dubai

> *… alone in this forgotten world whose furthest shores were defined only by the roars of automobile engines…*
>
> J.G. Ballard, *Concrete Island* (1974)

A current view of Sheikh Zayed Road, highway interchanges, metro stations and pedways. Photograph by Imre Solt, from Dubai Construction Update.

Historically, the measure of the urban environment was the human being, as human proportions determined the scale of streets and buildings, as well as their relationships; with the Industrial Revolution, however, came the advent of machines, which not only made the process of manufacturing quicker and more efficient, but on an urban scale, rendered the proportions, and thus limitations, of the human body irrelevant. While we no longer live in an industrial society, we not only live in industrial cities, but continue to build them as well. If we are justified in questioning why we are still building industrial cities in a post-industrial era, we must also question why we are still facing the problems of industrial cities in our newest emerging cities. Our response to issues such as a population boom is still frantic development at the expense of fundamental urban design values.

Rather than re-introducing the human scale as the basis for the urban environment, emerging cities strive for built hyperboles, competing for the tallest, biggest, strangest,

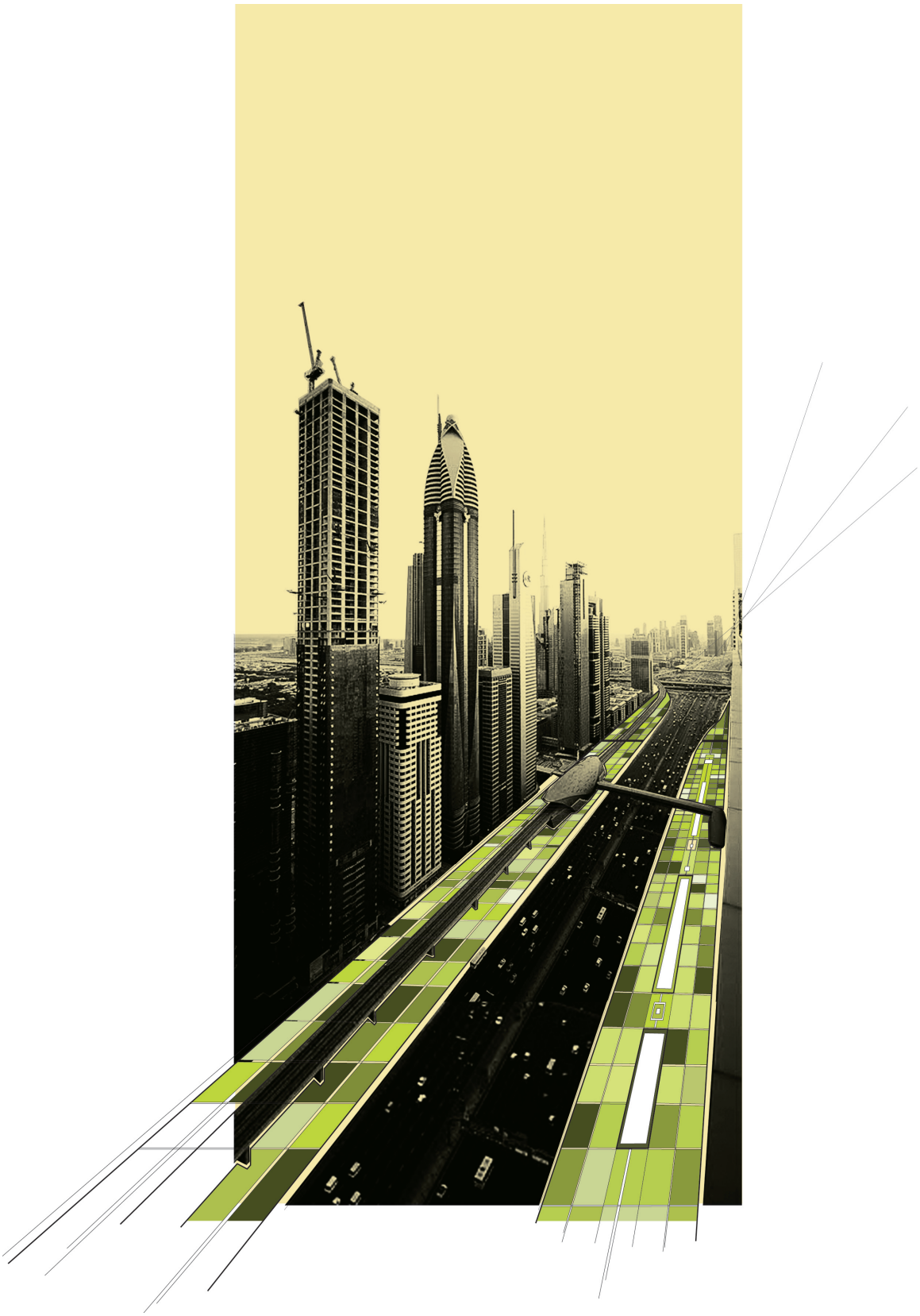
newest. This approach results in building-centric rather than people-centric cities, which according to Koolhaas' neo-modernist view, is the city of the future.

This dehumanization of space is not only a question of design and scale, but of intent. Dubai's accelerated urban development has followed narrow economic parameters, which did not include the concept of livability; thus, streets and buildings are built for one another, but not for the human being. In this context, where every building is hyperbolic, all sense of scale is lost, leaving no place for people. Walking along Sheikh Zayed Road, Dubai's main thoroughfare, the pedestrian feels out of place in a setting lacking both appropriate scale and facilities. The street itself, with its twelve lanes of highway traffic, discourages pedestrian use.

> The car is like our mother in-law. We have a good relationship with her, but we cannot let her conduct our lives. In other words, if the only woman in your life is your mother in-law, then you have a problem.
> Jaime Lerner (quoted in Sokol 2008)

Windshield view of Sheikh Zayed Road.

A healthy contemporary city supports both a car network and a pedestrian network, distinct, but connected; the morphology of the instant city, however, has allowed the first to erase the second, "severing human beings from their immediate environment" (Salingaros 2003). Just as Le Corbusier dreamt of one 'superpath' to replace all urban pathways, the highway acts as Dubai's urban spine, off of which branch isolated districts and developments. Not unlike North American suburbia, the city's polycentric urban form demands a dependence on the car, and the urban experience is mostly limited to the windshield of a vehicle.



Early conceptual collage exploring the concept of the garden as an affront to the extreme scale and vehicle-centric urban condition of Sheikh Zayed Road.

Shopping Mall Urbanism

We have become confused by the CIAM thinking embodying disconnectedness and segregation…
Nikos Salingaros (2003)

The evolution of suburbia in reaction to the industrial city is directly linked to the creation of the shopping mall: the disconnected sprawl of the suburbs required an anchor. Victor Gruen spoke of the mall as a 'crystallization point' in the residential suburban landscape, and the earliest regional shopping centres strived to create a sense of community through the inclusion of chapels, community rooms, space for temporary public activities and the integration of outdoor space. In the emerging post-war suburbs, this new form of pseudo-public space attempted to "recreate the complexity and vitality of urban experience without the noise, dirt and confusion" of the city (Crawford 2002, 24).

The suburbs were born of a desire to escape the urbanism of industrial cities, and an attempt at recapturing the idea of neighbourhood and community; instead, they created mono-cultured districts. Robert Fishman claims that the success of the shopping center, "comes out of the single-minded removal of the shopping function from the dense multi-functional downtown, and the substitution of this relatively simple fragment for what had been a complex whole," (Fishman 2002, 11) yet, it is precisely this isolation that is at the core of its failure.

In 1956, Gruen designed what would become one of the most ubiquitous and insular building types: the enclosed shopping mall. The notion of control is fundamental to the

function of this building type – from the control of climate to activities, the shopping mall “uses secession from the larger common society… to secure a gated world of placid safety” (Barber, 32).

The urban form of modern Dubai is comprised of destinations based on the same ideas of isolation, exclusivity, and detachment from the urban continuum that inspired Gruen’s shopping mall. These private urban destinations include mega-malls, elaborate resort complexes, and gated residential communities that promote physical segregation, destroying urban connectivity and denying the city of true public space.

The gated and guarded main entrance to the Madinat Jumeirah shopping and resort complex.

Madinat Jumeirah, a shopping and resort complex mimetic of an ancient Arabian citadel, exemplifies Dubai’s urban destination, ‘private city’ or ‘city within a city’. It “provides a contrived, theater-like urban setting that can be stimulating, exciting, and enjoyable… [but] ideologically charged” (Rifki and Moustafa 2007, 27). As with urban villages or New Urbanist projects, this approach to city building favours “the creation of distinctive, small-scale developments in the middle of a sea of apparently undifferentiated urban space” (Madanipour 2003, 139). Ultimately, a collection of well-designed, isolated destinations constitutes not a city, but a form of theme park urbanism.

Urban disconnect is promoted through isolated destination-driven development; the solution, therefore, cannot lie in projects encouraging further isolation, but must instead be rooted in the establishment of interconnections.

Public Space and Pseudo-Public Space

> *A city's life comes from its connectivity. All the geometry does is to facilitate the support of a connective web so that human interactions can occur.*
>
> Nikos Salingaros (2003)

> *Pub-lic \'pə-blik\ of or pertaining to the people as a whole; belonging to, affecting, or concerning the community or nation; not restricted to private use; open to general observation, sight, or knowledge.*
>
> Ali Madanipour (2003)

The physical public realm is the setting for collective urban experiences, and a basic element of any livable city. Public space allows not only for interpersonal contact, but the interaction between a person, society and the city. "Great cities have always provided the space for their citizens to *be* in public, to register an individual presence in a collective environment," but the artifice of most public space in Dubai does not allow this freedom, forcing people to be consumers rather than simply citizens (Robbins 2002, 7). The pseudo-public spaces of private urban destination developments fail to meet the most basic requirement of public space – that they be "accessible to the public… [affording] people, all people, the rights of assembly, self-expression, association" (Rifki, and Moustafa 2007, 24).

In fact, the only true public spaces in Dubai developed when no one was looking. In response to the city's fractured demographic, a type of fractured urbanism has emerged. In a society where half of the population is comprised of low-income migrant workers, there are clear urban manifestations of this polarization. In response, an ad-hoc appropriation of space occurs within certain parts the city: Baniyas Square in Deira, Sabkha and Ghubeiba

in Bur Dubai, and al-Satwa, for instance, have emerged as points of social concentration within the old urban fabric.

Baniyas Square in Deira, informally appropriated as public space. Photograph by Yasser Elsheshtawy, from “Transitory Sites: Mapping Dubai’s forgotten urban spaces.”

Pedestrian-filled streets in the neighbourood of al-Satwa.

These pockets of humanized space succeed largely due to a public desire to congregate rather than an explicit design of the built environment. Though disallowed, seemingly mundane left-over spaces within the city are appropriated as sites for gathering and social interaction.

DESIGN

No city can be imagined without a bazaar.
Mir Saeed Moosavi (2004)

Bazaar

The bazaar in Esfahan, Iran, integrated within the city's dense urban fabric. Adapted from Google Maps.

The bazaar, or the souk, defined the major artery within the urban fabric of most historic Islamic cities, and as a primary thoroughfare, it was by nature an inclusive space that encouraged interaction and interchange between people of varying cultural and socio-economic backgrounds. Providing an eclectic centre to the city, it was usually located "between neighbourhoods with social and economic differences, sometimes with hostile attitudes toward eachother … [the] bazaar was generally the neutral zone" (Saremi 1976, 62) .

As urban elements, bazaars acted as backbones, urban spines connecting significant civic nodes, but as places for shopping, walking, social interaction and cultural interchange, they were the ultimate public spaces themselves. In addition to its nature as a place of commerce, the economic significance of the bazaar is complemented by the social, political, cultural and civic activities that make it a vibrant urban space.

Revisiting the concept of monument versus fabric, a single building or destination is an insular, closed system, whereas the urban fabric is an open system that can grow, change, and adapt in response to different forces. The bazaar, much like the fabric of the city itself, is an adaptable system that responds to urban forces to become a dynamic pedestrian system (Saremi 1976,70).

A study of the bazaar in Esfahan, exploring fixed elements (civic spaces) and the adaptable structure of the main bazaar corridor.

> Translating souk to 'market' misses an urban nuance, because market implies a distinct space – like an agora. Whereas agora implies the 'gathering, assembling' of unused space into a definable void or center, souk's mercantile roots come from 'narrow' and 'street', an attenuated alternative to a Western version of the market – easily inhabiting portions of the city not 'gathered' but 'squeezing' into underused space. Agora is destination; souk is more like city – it streams out and occupies the ground level of a city… (Reisz 2007, 238)

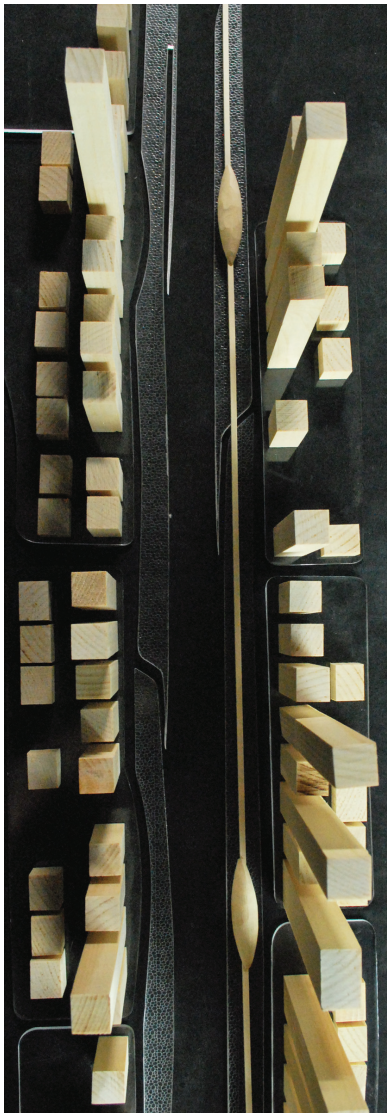
Adjoining buildings dictate the form and movement of the bazaar, as it fills the interstitial spaces of the city; thus, in the absence of connective tissue, the bazaar can begin filling in underused urban spaces.

In this project, which seeks complexity by increasing urban connectivity, this conception of the bazaar is the basis of the design. Rather than adding yet another destination to a city composed of isolated developments, this scheme suggests the creation of pedestrian infrastructure that will act as connective tissue within the urban environment. In his essay *The City is not a Tree*, Christopher Alexander speaks of a city as "a large collection of many small systems [that go] to make up a large and complex system" (Alexander 1965, 3). Alison Smithson sought to create urban connectivity through the singular structure of a Mat-Building; this scheme, in contrast, is comprised of a series of separate elements, or small systems, that together create a connective public infrastructure.

Site

As one of Dubai's oldest large roadways, Sheikh Zayed Road is a twelve-lane highway that cuts through the city, providing a backbone from which isolated districts

branch off. One of the earliest developed sections of the highway is lined with mixed-used skyscrapers that average approximately 200 metres, or over 650 feet, in height. This corridor of extreme high-rise buildings is comprised of a combination of hotels, residential buildings and office towers.



Site model representing the extreme heights of the bordering skyscrapers.

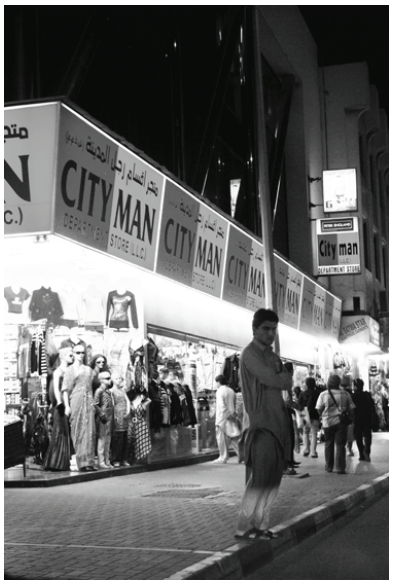
This section of the highway is bordered by the locality of al-Satwa on one side, and the Dubai International Financial District (DIFC) on the other. Al-Satwa, the tight-knit, low-lying neighbourhood west of the highway, was developed during the 1960s, and is currently considered a low-income, but culturally rich area of the Dubai, much like the rest of the old city, including Bur Dubai and Deira. As part of the city's masterplan, the neighbourhood will be razed, displacing an estimated 200 000 people, in order to build Jumeirah Garden City, a high-end residential community. This projected development is only further evidence of Dubai's approach to manicured, isolationist urbanism through the destruction of one of the few fragments of accessible public space in the city.

The informal appropriation of public space in older parts of the city is contingent on two main factors: access to public transportation and scale of space. As of September 2009, the Dubai Roads and Transportation Authority launched the first line of an extended metro system. The Red Line runs along Sheikh Zayed Road as an elevated viaduct, periodically punctuated with metro stops. These stops are sited on a strip of land between the highway and a service road adjacent to the existing buildings. In between the metro stops and on the opposite side of the highway, however, this significant strip of land is underused. The

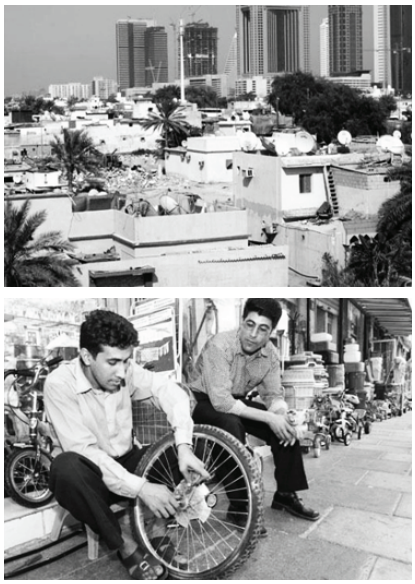
Identifying the proposed site within its urban and immediate context, showing its relationship with both the highway and the metro line.

current use of this site as urban green space is inefficient as, “inaccessible lawn and trees, either because they are in the private domain, or because they are adjacent to a highway, do not form part of the urban fabric,” and cannot be inhabited as public space (Salingaros 2003).

This underused site, therefore, is rich with potential for a design intervention. Its adjacency to Sheikh Zayed Road provides an opportunity to appropriate and humanize the urban spine, much like the bazaars of traditional Islamic cities. Its proximity to public transportation makes it an accessible site, within which the metro stations act as nodes. As it sits on the cusp of old and new urban form, and by extension, low- and high-income districts, the site can provide a place of overlap and the potential for true public space. Finally, the extreme disparity of scale on the site represents the epitome of the city’s dehumanized urban condition.

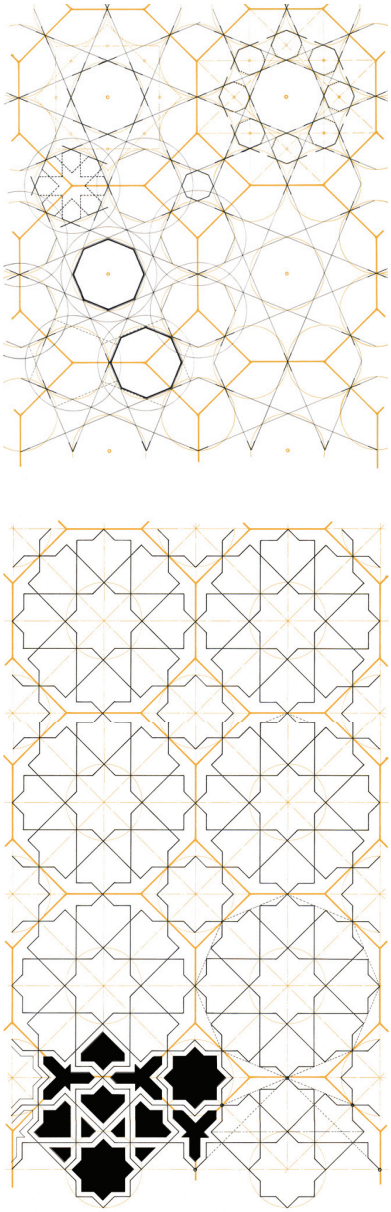


Street life at night in al-Satwa.


Snapshots of al-Satwa. From “Last Goodbye to Satwa”, Gulf News.

Pattern

The Potential of Pattern



A study of the traditional Islamic patterns, adapted from Kenneth Critchlow.

Islamic architecture is indelibly linked with its art, both of which are rooted in mathematics and spirituality. The strict geometrical patterns that define both Islamic art and architecture are not mere ornament, but are cosmologically significant. These intricate patterns are used as the basis for the design of small scale works such as tiles and screens, as well as large buildings and vast gardens. This ability of pattern to transcend scale is exploited to express the Principle of Unity, a fundamental Islamic belief in the essential oneness of all things.

> The use of rigorously defined geometric spaces, precise mathematical proportions, clearly defined lines and volumes relating to exact mathematical laws were means whereby the space of Islamic architecture, as well as its surfaces, were integrated (Nasr 1987, 48).

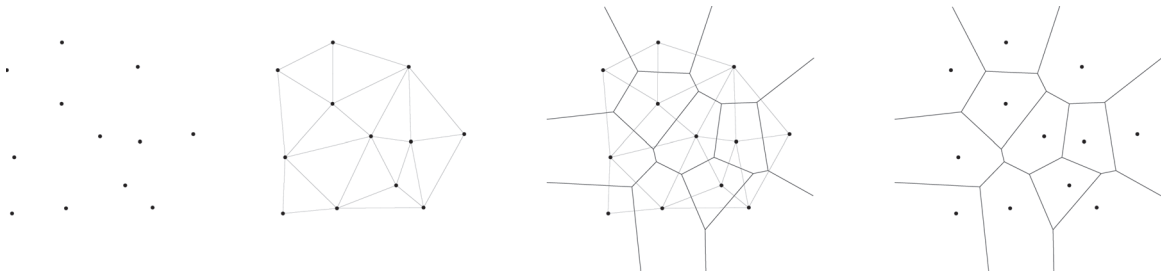
Only recently has the use of pattern experienced widespread resurgence in contemporary architecture; although, it should be recognized that the Modernist grid, too, is a pattern. And just as with the sophisticated application of pattern in Islamic art and architecture, the grid's scale-less quality has long been exploited for everything from graphic to building to urban design.

Alexander attributes the failure of the artificial designed city to its hierarchical tree structure; in contrast, he presents the idea of the semi-lattice as an urban structure based on concepts of overlap and complexity. Through its inherent intricacy and adaptability, a pattern has the potential to be used as a tool to attain complexity in the

city's built form by "[switching] back and forth between performing one task and another – moving seamlessly between very different scales, materials, functions and project types" (Andersen and Salomon 2009, 132).

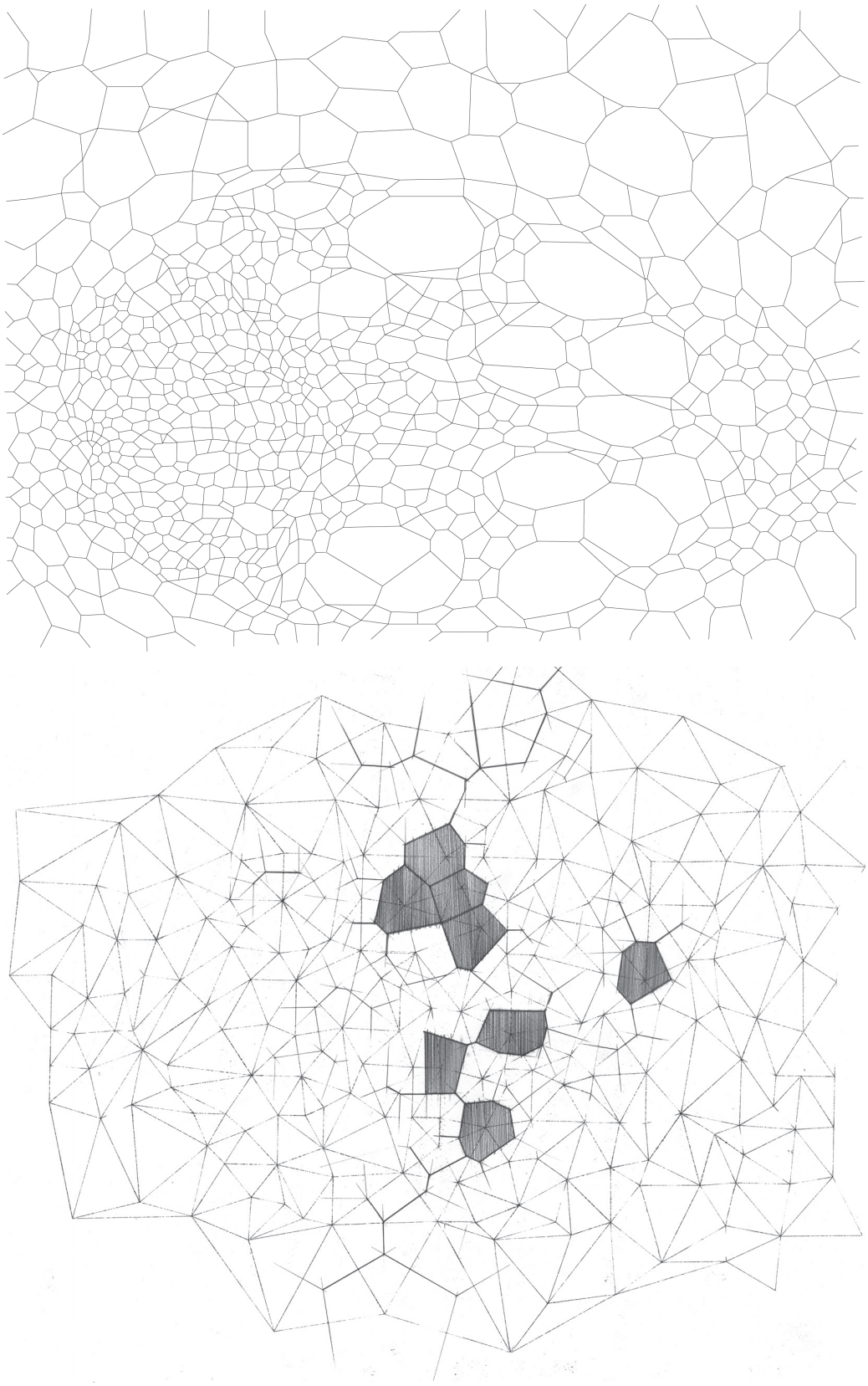
Voronoi Diagram

The use of strict geometric patterning in Islamic architecture lends a rationale to the resulting designs; surpassing ornament, these patterns are used as tools. The Voronoi diagram, though not a traditional Islamic pattern, is similarly rooted in mathematics and can serve as a strong generative design tool. Simply put, the Voronoi diagram is a cellular pattern generated from a series of points, and represents the most efficient partitioning of space based on the proximity of one point to another. The diagram has been studied extensively in the fields of science and engineering for its potential in modelling processes of growth, and is starting to be applied in design fields as well.



A visual explanation of the Voronoi diagram, adapted from Craig S. Kaplan.

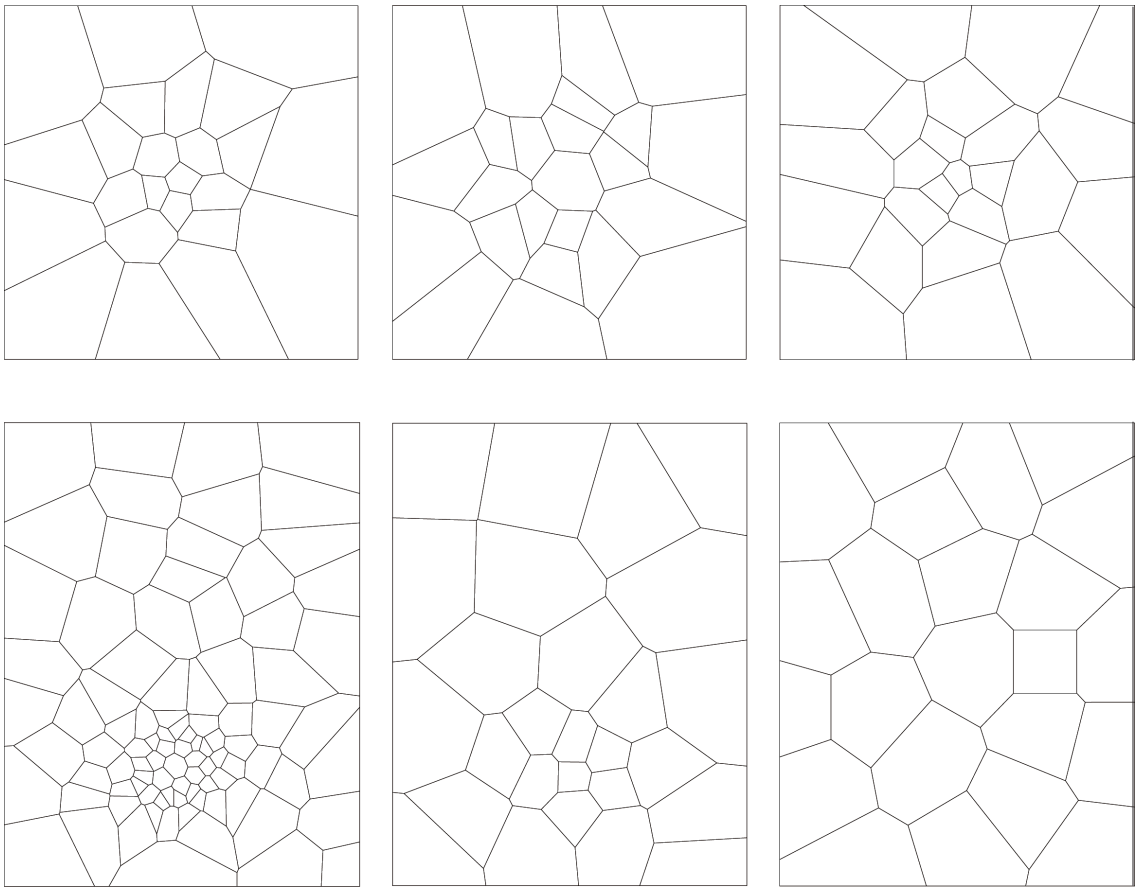
The choice to explore the Voronoi diagram in this project stems from the conception of the city as a complex organism. This diagram not only describes cellular growth, and thus lends itself to be studied in terms of



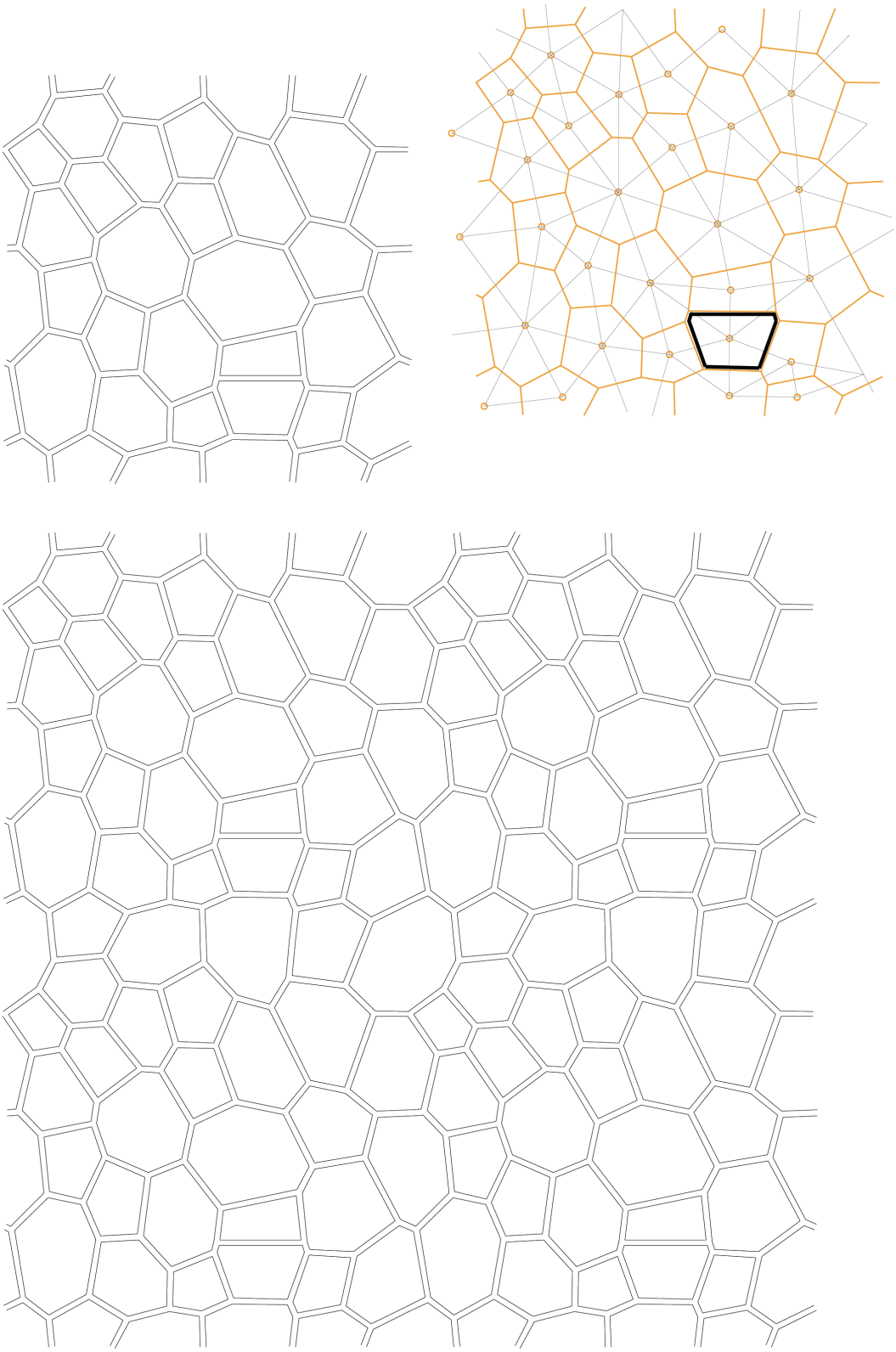
A comparison of plant cell structure and an early exploration in generating a Voronoi diagram.

spatial organization, but on an aesthetic level, produces an intricate pattern that can be explored in both two and three dimensions to produce complex and interesting forms. As with any pattern, the scalability of the Voronoi diagram allows for its application from site strategy to small scale design.

For its application on a smaller scale, the Voronoi diagram provides the basis for the development of a pattern, from which the design of many of the elements, including the wind towers, market stalls, and screen, are derived. The pattern is the product of a tile module, resulting from a number of design iterations.



A number of early studies, exploring how the Voronoi diagram might be used to develop a pattern module.



The final module, and a section of the resulting pattern, generated from a Voronoi diagram.

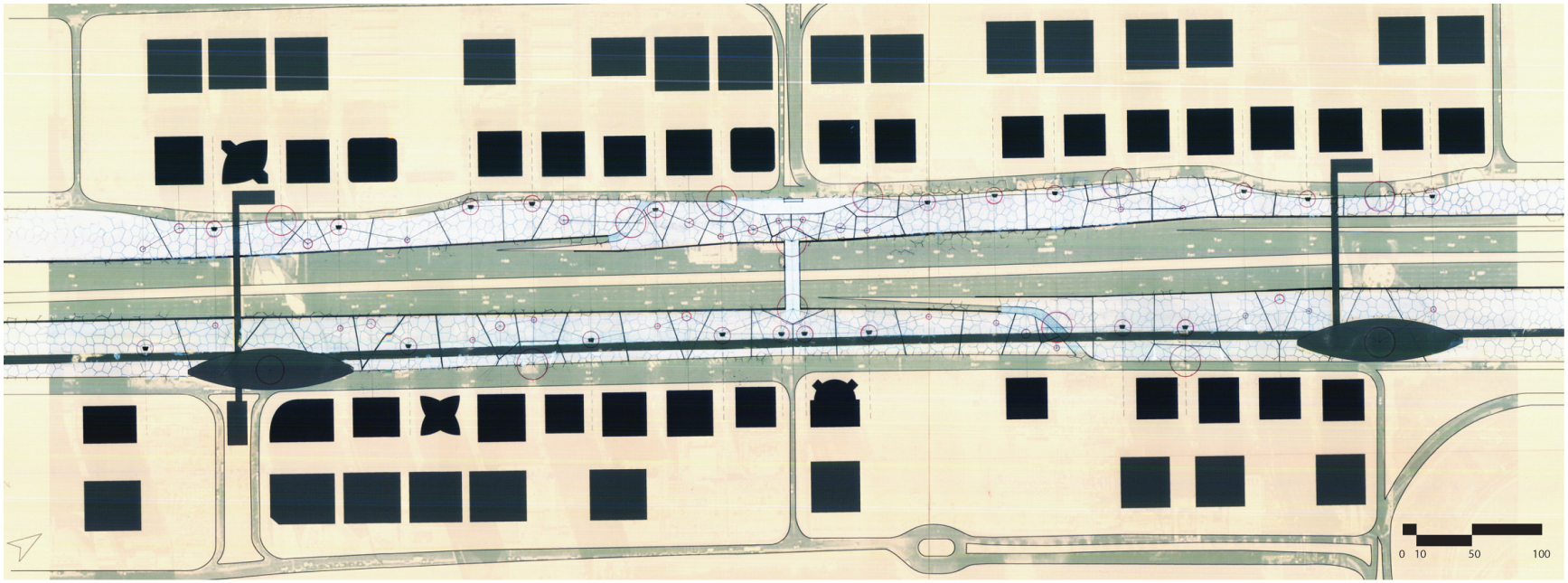
Site Strategy

With a design approach rooted in connectivity rather than isolation, this project is composed of a series of elements, or simple systems, that together, create a habitable pedestrian infrastructure.

In studying the existing site conditions, it is clear that much of the pedestrian circulation is limited to the space between buildings and their associated parking garages. As per Salingaros' analysis of urban systems, the metro is considered an extension of the pedestrian network; as such, the design is based on a reading of the site that considers the existing metro and elevated pedways as two successful pedestrian nodes. The space between, thus, becomes the site of intervention.

In the spirit of activating existing underused space, the design generally takes the site as-is; the significant exception, however, is the designation of a new taxi hub and at-grade pedestrian overpass. Together, these elements establish an intermediate node between the metro stops, while allowing for increased circulation and connectivity on the site. Taxis are a popular method of transportation in Dubai, and are, in a sense, a form of public transport. The existing service roads that run parallel to the highway are presently filled with taxis, and the designation of a hub provides a central location to congregate while waiting for passengers. Just as the metro's pedways provide access across the highway, the taxi hub is designed with a pedestrian overpass that crosses the site at grade, forcing the highway to dip down beneath it; unlike the elevated pedways, this allows for

Diagrams depicting existing and altered circulation on the site.



Site plan depicting the distribution of the elements on the site.

continuous pedestrian access on the ground surface.

Given that the site is almost a kilometre long and the design is comprised of separate components, the project demands a rationale to its organization. The strategy is a response to the rhythm of existing structures on the site – these provide the basis for generating a pattern to organize the elements on the site.

Elements

> *The design process proves to be… an unremitting exploration of the ways to connect various parts of the* programma*, a gradual development of relevant patterns that eventually coalesce into a balanced, non-hierarchical organism.*
>
> Francis Strauven on Aldo van Eyck (2007)

Market

The market is a fundamental element of the bazaar and its role as the site of commercial exchange and social interaction. The distribution of the market stalls is based on the location of thresholds to the site. As seen with the appropriation of public space in other parts of the city, gathering and informal markets develop naturally around transportation nodes, such as bus stops; the scheme draws on this phenomenon by concentrating clusters of market stalls around the metro stations and pedway access stairs, the existing nodes or major thresholds on the site. The market stalls are also concentrated around the third node on the site – the proposed taxi hub and pedestrian overpass.

The form of the market stalls is derived from an extrusion of the Voronoi cells, resulting in tall, tapered masses.

Navigating the market stalls, with the wind tower in the background, and the skycrapers of Sheikh Zayed beyond.

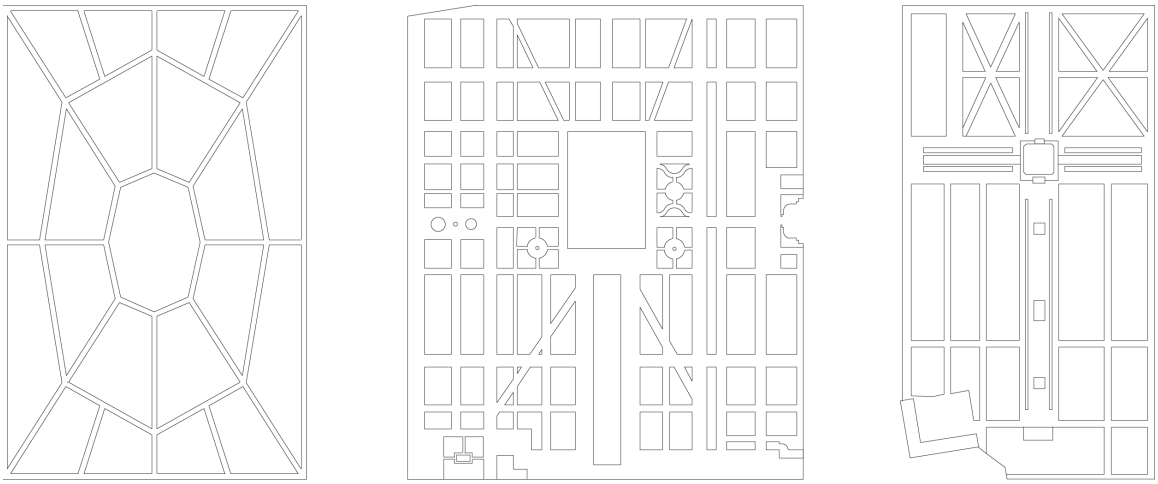
They are not isolated objects in the urban landscape, but clustered together, introduce an understandable scale to an otherwise alienating built environment. The experience of navigating these markets recalls the narrows of the souk, a welcome respite from the open expanse of the site.

Concept model, which inspired the form of the clustered market stalls.

Garden

The formal garden is ubiquitous in the Muslim world; symbolically, gardens are considered terrestrial manifestations of paradise, but they are also a practical response to an ecological condition. As most Islamic cultures stem from arid lands in which oases provided the only natural relief from the formless and hostile environment, the highly formalized garden became an art form. In Persian gardens, in particular, the concept of the *chahar bagh* “became a powerful metaphor for the organization and domestication of the landscape” (Ruggles 2008). Taken literally, the *chahar bagh* describes a garden,

divided in four sectors by crossing water channels, but more figuratively, it provides the fundamental elements of Islamic gardens: water, vegetation and walkways.



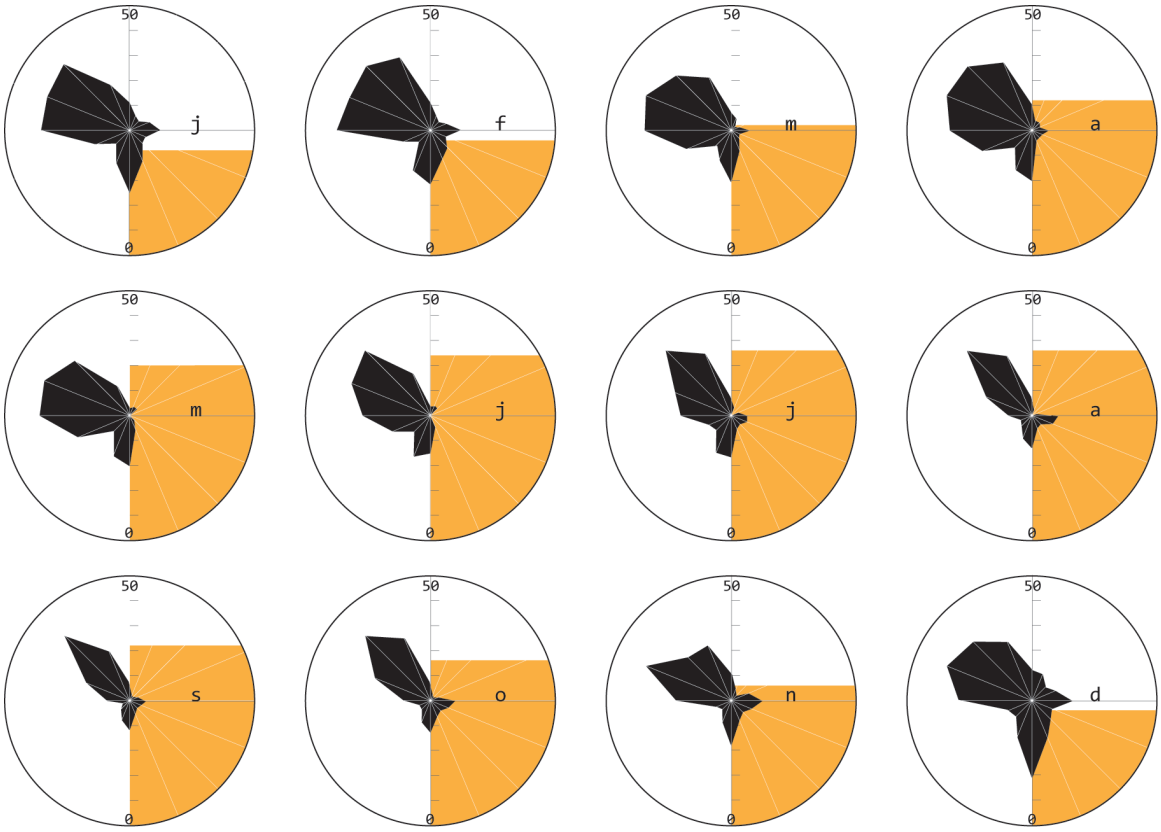
Representations of various traditional garden designs. Adapted from MacDougall.

In this project, the garden provides one of the main methods of humanizing the site. Large garden plots dominate the landscape, creating a new micro-climate for the pedestrian experience. Given the scarcity of fresh water in the region and the ecological strain resulting from extensive water desalination processes, the gardens would only be a viable design solution if self-sustaining. Thus, the garden plots double as small-scale, self-maintaining, no-energy wastewater treatment systems by performing as constructed wetlands. The gardens are connected to the buildings bordering the site, making use of their greywater to run the system. Within a network of garden plots, connected underground piping, each is a step in the water treatment process, and the resulting treated water is collected in pools on the site.

In an environment with an annual average temperature

A view within the space, showing the garden plots, water pools and the connective piping which allows them to act as a grey-water treatment system.

of 30 degrees centigrade, and a mean high of almost 40 degrees in its hottest summer months, the gardens and pools transform the site and create inhabitable public space.

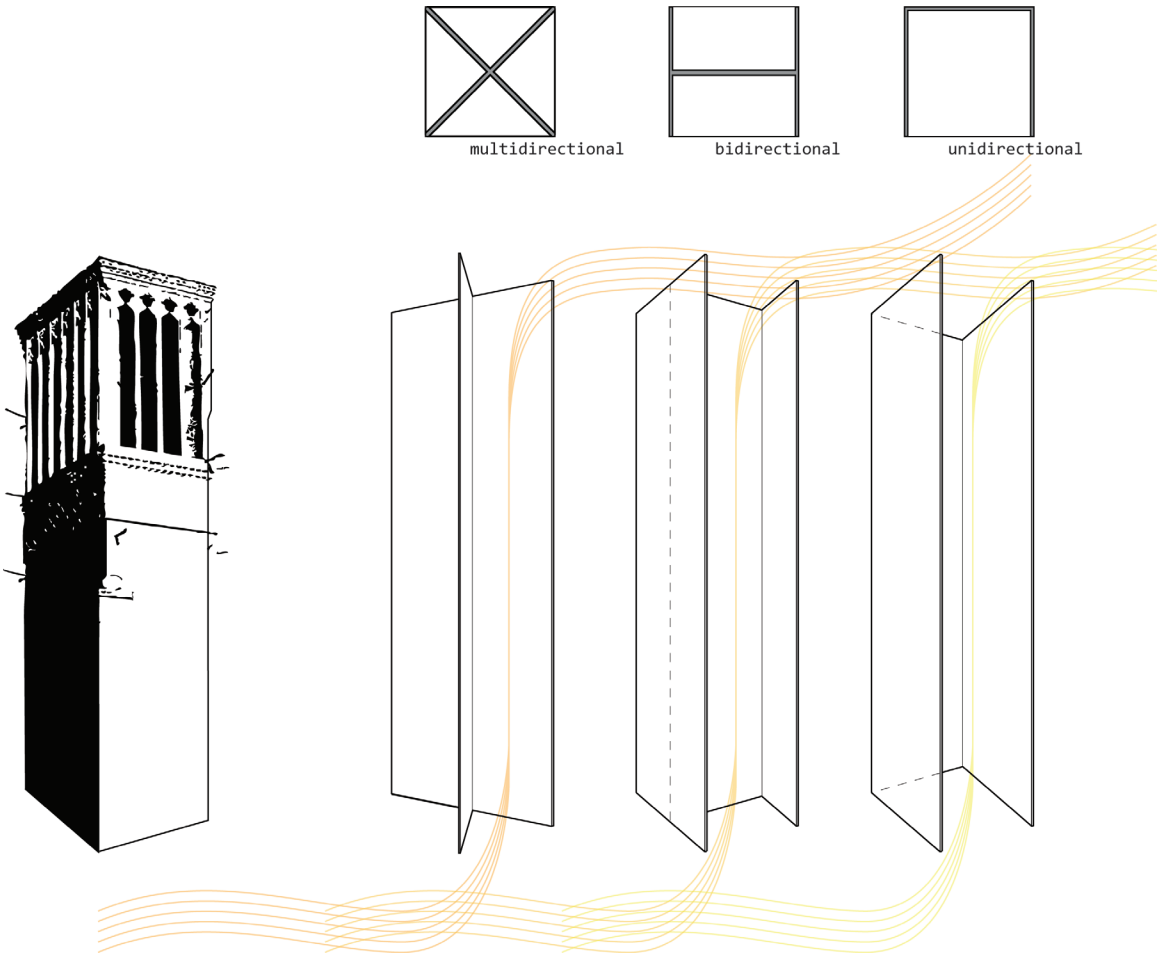


Seasonal climate data for Dubai, representing average monthly temperatures and winds, adapted from http://www.windfinder.com/forecast/dubai.

Wind tower

The wind tower, together with the garden plots and pools, is a move towards creating a new micro-climate within the site. Wind towers, also known as wind catchers or *badgirs*, are common structures for passive ventilation in the vernacular of Islamic architecture. Depending on the region and specific climatic conditions, the form of the wind tower is adapted to fulfill its function. Most often,

the structure is a vertical appendage on a dwelling, but has also been adapted to water cisterns, mosques, and caravanserais. There are notable examples in the cities of Bam and Kerman in Iran, where the wind tower is detached from the building, “built away from the house, and an additional underground tunnel links the base of the *badgir* to the basement” (Mahyari 1996, 54).



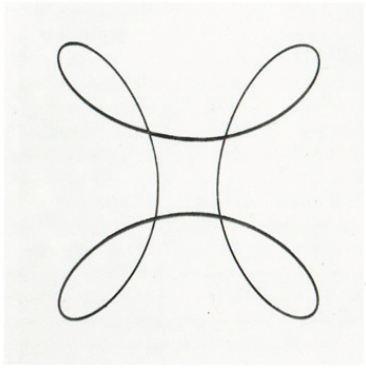
Study of traditional wind tower types.

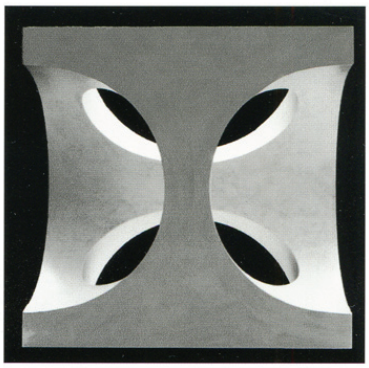
Due to its location along the Persian Gulf, Dubai receives a significant sea breeze throughout the year, though most consistently in its hottest months. This prevailing wind is north-westerly, and thus perpendicular to the site of the project, which provides an ideal condition to harness and exploit the wind for the purpose of ventilation.

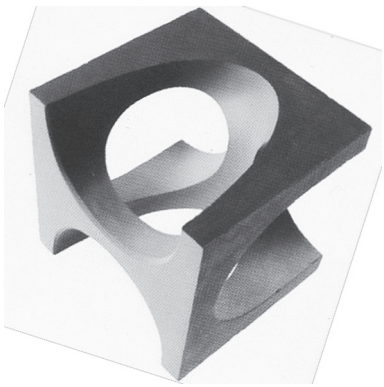
A series of wind towers are positioned on the site as free standing monuments in the landscape. These 30 metre concrete towers are connected via ground-tubes to vents on the opposite side of the highway. The vents release air, which is not only in motion, but having travelled underground, is cooler than the ambient air temperature. The soil in Dubai is classified as hyperthermic, with a ground temperature of 26 degrees centigrade; according to this data, the ground temperature is almost 14 degrees cooler than the city's average highs, and would thus have a significant cooling effect on the air funneled through the wind tower.

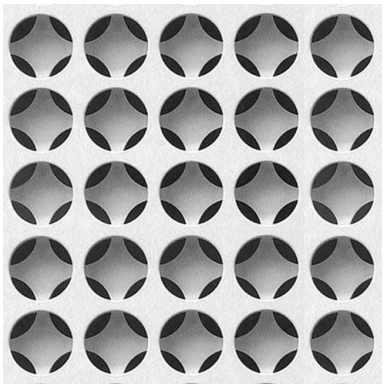
The wind tower and the vent work as part of a single system, but have a very different presence on the site. Whereas the vents create cooled micro-climates, and thus points of gathering, the monumental wind towers serve as landmarks on the site. Like the market stalls, their form is derived from a Voronoi cell, extruded from a small footprint to an extreme height. At ground level, they become anchors on the site, while mediating between the tangible human scale and the impossible verticality of the surrounding skyscrapers.

Diagrammatic representation of the wind tower in its context - with relation to the surrounding skyscrapers, and its relationship with the highway.









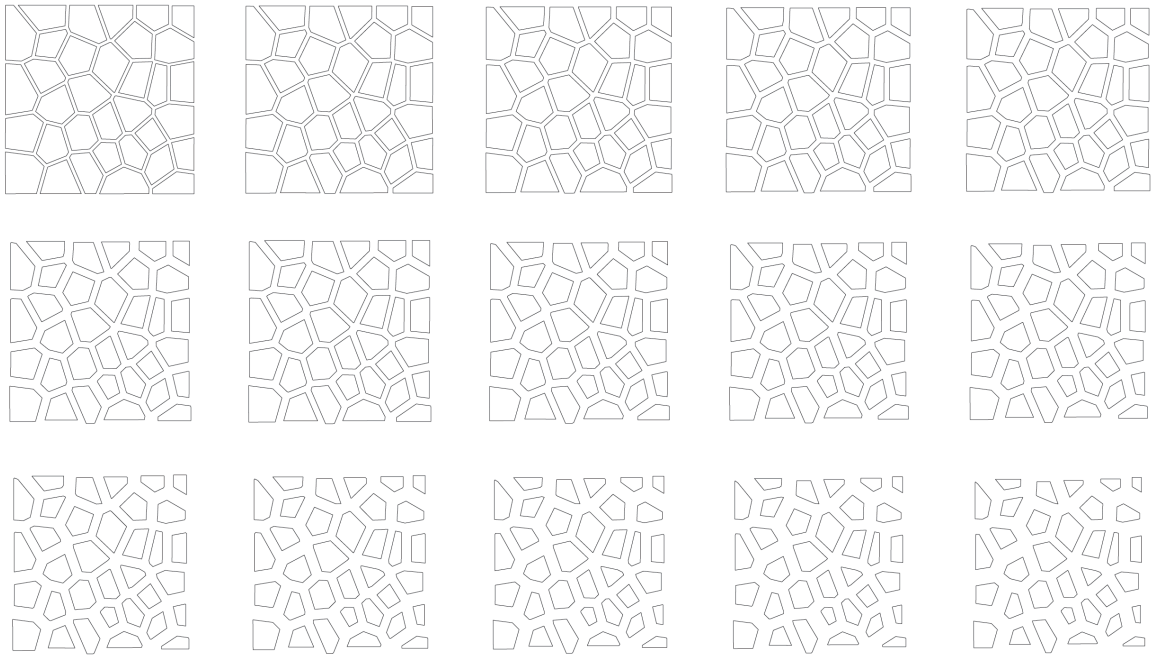
Erwin Hauer, Design 4 (1954). From Hauer, "Continua: Architectural Screens and Walls"

Screen

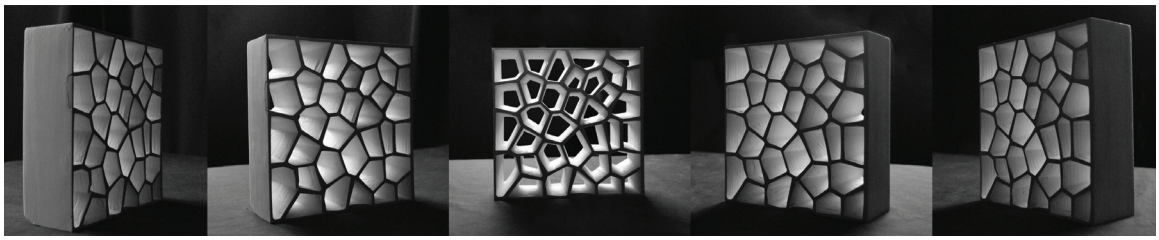
The idea of introversion is prominent in Islamic architecture, and manifests itself in the form of walled gardens, insular courtyard houses and *mashrabiya*; these screens, most often incorporated into the architecture of a building, are intricate carvings of wood or stone that provide separation and privacy, while allowing the filtering of light and a limited visual connection. In all of these cases, the architectural element acts to protect its users from external forces. Similarly, the screen wall in the scheme is a response to the highway – the linear rhythm of the road is reflected in the continuous linearity of the buffer, in order to create a protected, habitable public space. The buffer is not meant to block out the highway condition entirely, but to mediate it. The depth and the tapering apertures allow for a dynamic visual and acoustic experience as one walks alongside the screen.

The screen wall draws inspiration from the works of Erwin Hauer. Continua consists of sculptural explorations that began in 1950, "walls composed of intricately woven or looping forms that, when repeated across a plane, created a visual taste of infinity" (Currey 2006). Within the depth of these architectural screens, Hauer explored form in the space between shifted patterns and the effect of light on the resulting surfaces. The screen wall in the scheme is analogous to Hauer's work in its exploration of changing form – in particular, shifting, offsetting, and transforming pattern. A three-dimensional extrusion of the pattern creates the screen within which these manipulations occur.

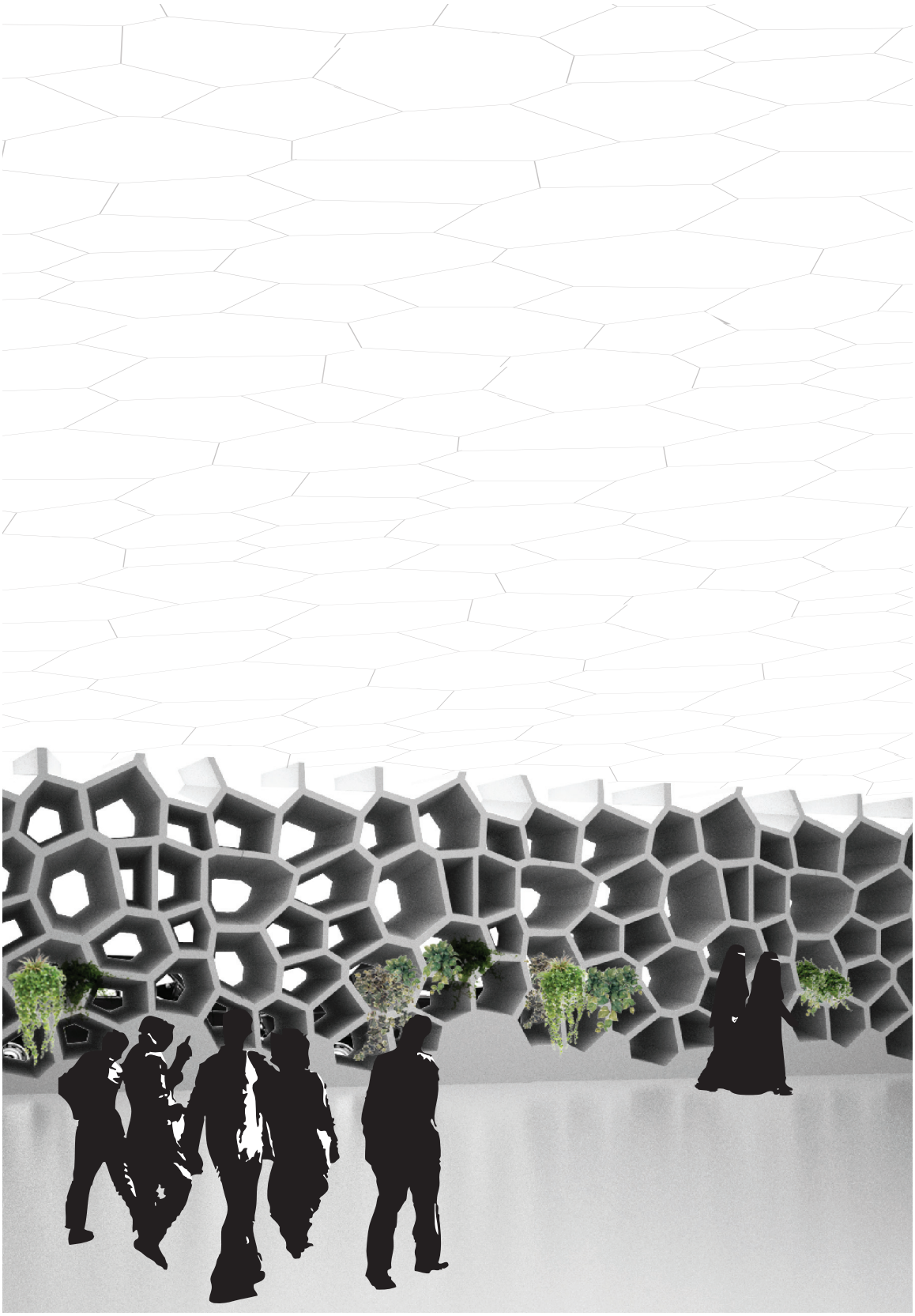
Unlike carved *mashrabiya*, Hauer's screens are comprised of cast concrete modules, which, when fitted together, produce a continuous surface. Similarly, the buffer wall is based on the module designed to create a continuous Voronoi pattern. This allows the screen to be pre-cast in modular sections and assembled on-site.



Pattern study, depicting the change in apertures from one side of the screen to the other.



Screen study model, representing the effect of the depth and changing apertures.

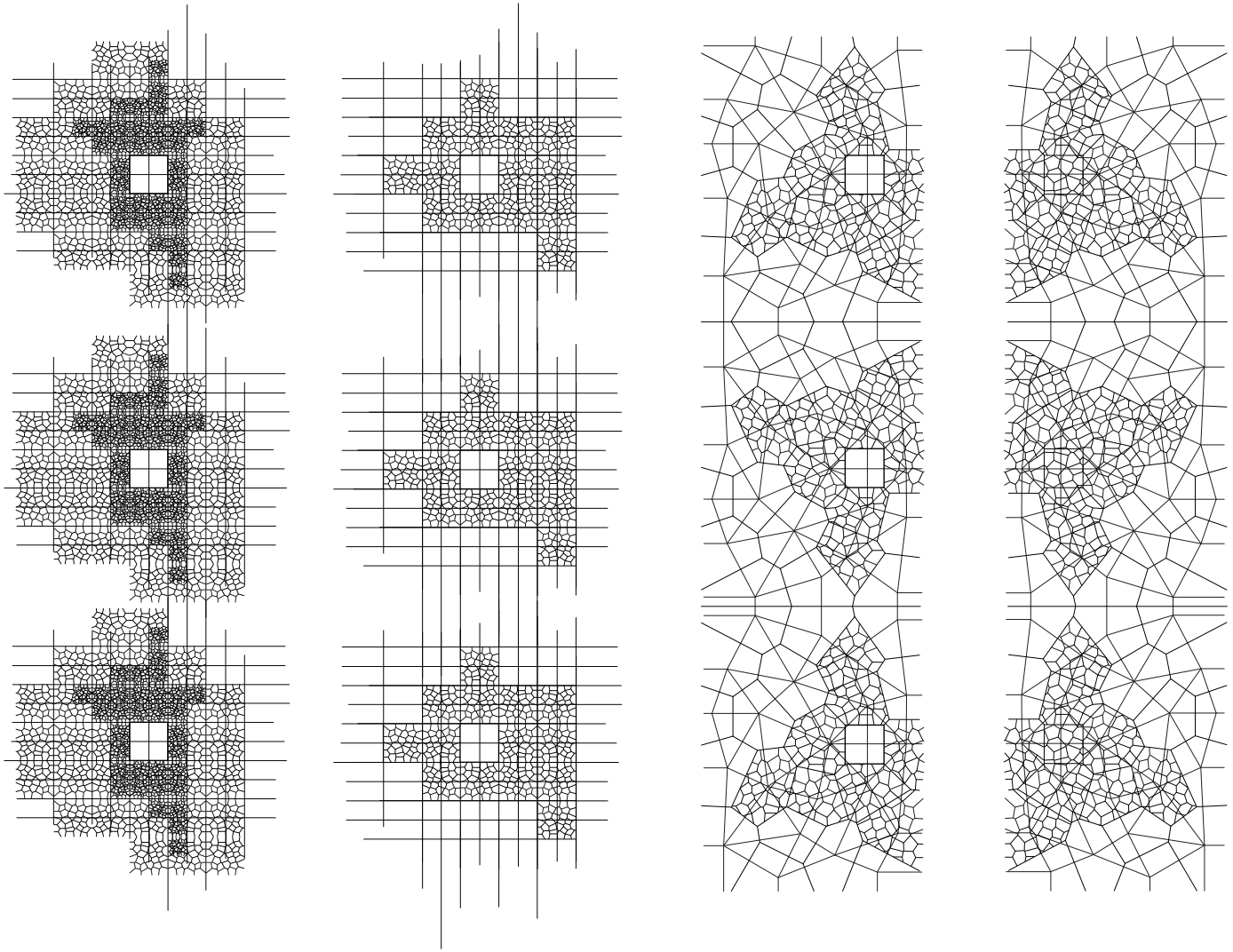


A view within the space, showing the screen wall buffering the site from the highway.

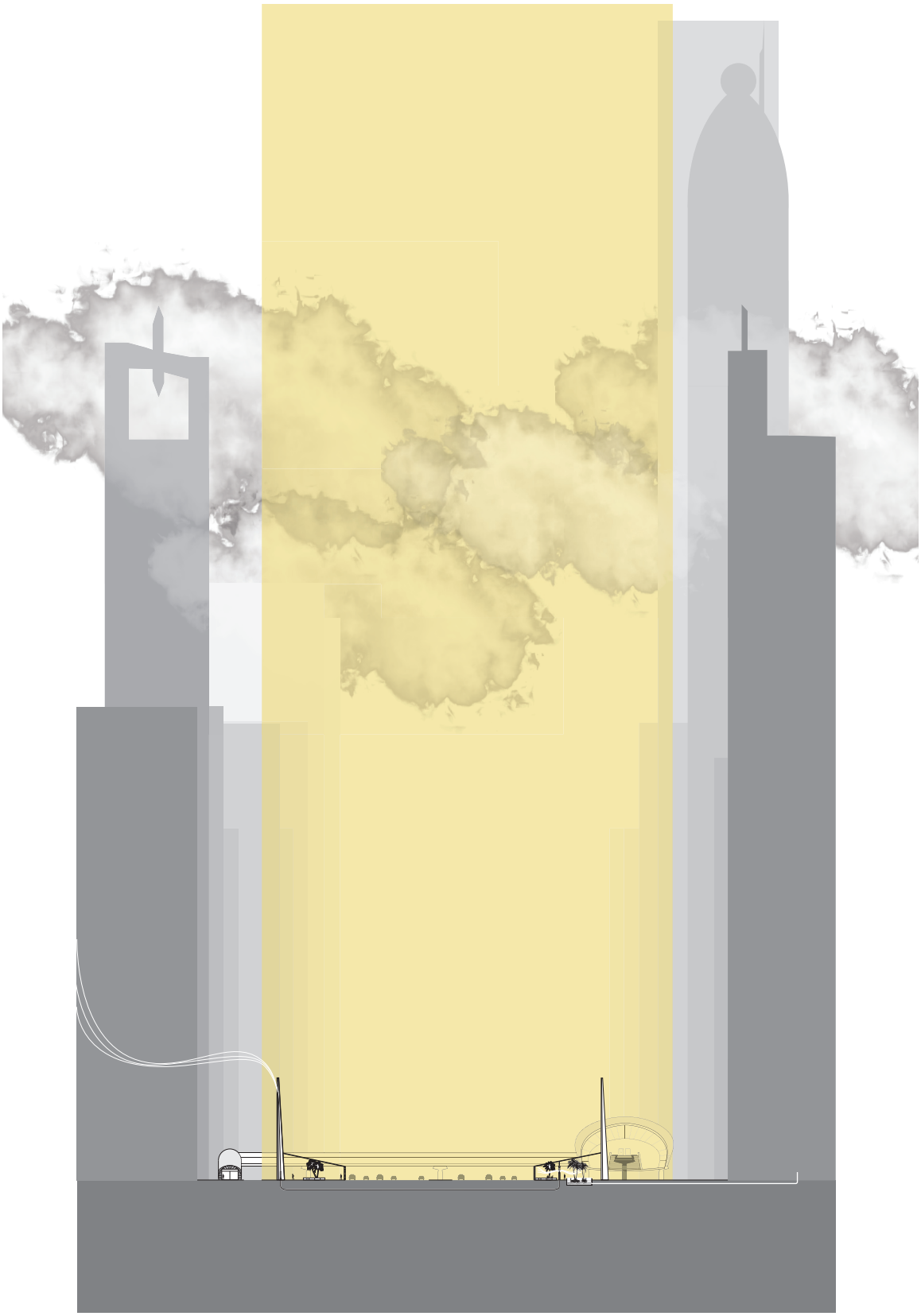
Canopy

The canopy fulfills three main roles in the scheme. Most functionally, it provides shade. In combination with the garden plots, the pools of water and the vents, the shade of the canopy helps create micro-climates which allow the public to inhabit outdoor space, even under the hot Dubai sun. The canopy also acts as the connective tissue within the project, joining the elements into a singular, readable space. Finally, the canopy is the most important element in breaking down the scale of the site. An overhead canopy, no matter how delicate, defines a vertical boundary for the site. It implies a roof condition, while maintaining the lightness and openness of an outdoor space. A light cable structure, the canopy is anchored by the elements that define the edge conditions of the site: the screen wall on one side, and the wind towers on the other. It is also supported by intermediated structures such as the market stalls and the vents.

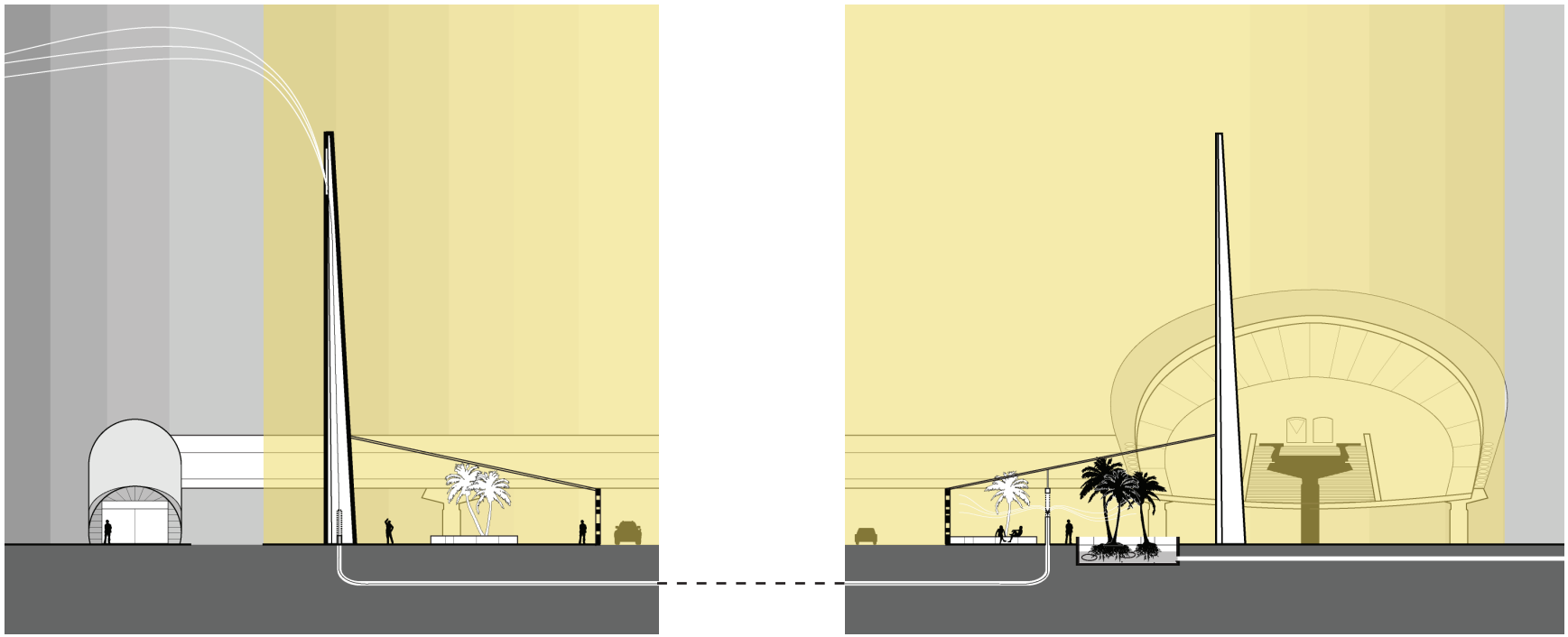
Collage exploring the use of fabric canopies in informal markets and traditional souks.



Studies on the possible configurations of the canopy, using on a Voronoi-based pattern. These studies explored the idea of relating the densification or overlap of the canopy around programmatic elements such as the wind towers.



Cross-section through the highway, depicting the design intervention in its context, flanked by the towering skyscrapers of Sheikh Zayed Road.



Cross-section details.

SUMMARY

Chastened after an extravagance-fueled debt crisis last year at Dubai World, the state-run investment giant, Dubai is getting back to basics.

Liz Alderman (2010)

This project began as a critique of the urban condition resulting from the development of the contemporary instant city, with particular interest in Dubai. This ubiquitous urban issue, facilitated by globalization, is fundamentally a cultural concern. As noted by Koolhaas, this type of city is, at its core, generic and lacking in identity. Any solution, or attempt at remediation, must therefore be local. Unlike Archigram's Instant City, the solution is not universally applicable, and cannot be imported; instead, it must develop as a direct response to its context – cultural, social and environmental. It is with this outlook that the thesis sought to explore the potential of the traditional bazaar as an approach to this urban issue.

The design scheme aspires to become the city's connective tissue with a dynamic pedestrian infrastructure. While the design developed as a complex interplay of systems, every aspect of the scheme is a simple response to a specific condition on the site, as well as a contemporary interpretation of a vernacular architectural element.

This project is an affront to the attitude towards development in Dubai. It suggests open-air markets as opposed to isolated mega-malls, and eclectic social interaction as opposed to segregation. It does, however, recognize and build upon existing potentials.

The metro system, for instance, is one such potential: the establishment of the metro, as an extension of the pedestrian network within the city, is in itself a recognition that people are living, working and moving through the city. In the spirit of connectivity and adding an urban layer, this project builds upon the potential of the metro and its stations as nodes, or generators of public space and gathering.

Whether the design is interpreted as a kit of parts or as an example to inspire a similar mentality in future developments, this project attempts to provide a conscientious local response to an urban issue in a place overrun with superficiality.

Considering the rate at which it has developed in past four decades, it is perhaps not inconceivable that given another 40 years and a strong nudge in the right direction, Dubai may ultimately become a livable city.

REFERENCES

Alderman, Liz. 2010, September 29. “After Crisis, Dubai Keeps Building, but Soberly,” *The New York Times*. http://www.nytimes.com/2010/09/30/business/global/30dubai.html (accessed 2 December 2010).

Alexander, Christopher. 1965. “A City is Not a Tree. Part I,” *Architectural Forum* 122, no.1: 58-62.

Alexander, Christopher. 1965. “A City is Not a Tree. Part II,” *Architectural Forum* 122, no.2: 58-62.

Andersen, Paul and David Salomon. 2009. “Promiscuous Patterns, Synthetic Architecture,” *Harvard Design Magazine*, 31: 128-134.

Avermaete, Tom. 2003. “Mat Building: Alison Smithson’s Concept of Two-Dimensional Density,” in *Inside Density*, ed. David Vanderburgh and Hilde Heynan. Brussels: The Network for Theory, History and Criticism in Architecture.

Bagaeen, Samer. 2007. “Brand Dubai: The Instant City; or the Instantly Recognizable City,” *International Planning Studies* 12, no. 2: 173-197.

Ballard, J.G. 1974. *Concrete Island*. London: Jonathan Cape Ltd.

Barber, Benjamin R. 2002. “Civic Space,” in *Sprawl and Public Space: Redressing the Mall*, ed. David J. Smiley, 31-36. New York: Princeton Architectural Press.

Bouchard, Nikole. 2009, June 3. Day 143: Fes. Flickr. http://www.flickr.com/photos/nikolebouchard/sets/72157621801465771/with/3782165907/ (accessed 23 November 2010).

Burnham, Daniel. “The Plan of Chicago,” Encyclopedia of Chicago. http://www.encyclopedia.chicagohistory.org/pages/10537.html (accessed 15 November 2010).

Cook, Peter, and Archigram (Group). 1999. *Archigram*. New York: Princeton Architectural Press.

Crawford, Margaret. 2002. “Suburban Life and Public Space,” in *Sprawl and Public Space: Redressing the Mall*, ed. David J. Smiley, 21-30. New York: Princeton Architectural Press.

Critchlow, Keith. 1976. *Islamic Patterns: An Analytical and Cosmological Approach*. London: Thames and Hudson Ltd.

Currey, Mason. 2006, October 11. “Sculpting Infinity,” *Metropolis Magazine*. http://www.metropolismag.com/story/20061011/sculpting-infinity (accessed 12 December 2010).

Davis, Mike. 2006. “Fear and Money in Dubai,” *New Left Review* 41. http://www.newleftreview.org/?view=2635 (accessed 14 November 2010).

Dubai is Nuts. http://sites.google.com/site/dubaiisnuts/ (accessed 23 November 2010).

Elsheshtawy, Yasser. “Transitory Sites: Mapping Dubai’s forgotten urban spaces,” *International Journal of Urban and Regional Research* 2, no. 4: 968-988.

ETH Zurich. 2008. *Yearbook: Faculty of Architecture*. Zurich: Gta Verlag.

Fathy, Hassan. 1992. “Contemporaneity in the City,” in *Architecture for a Changing World*, ed. James Steele. London: Academy Editions.

Fishman, Robert. 2002. “Towards an Open-Minded Space,” in *Sprawl and Public Space: Redressing the Mall*, ed. David J. Smiley, 9-11. New York: Princeton Architectural Press.

Google Maps. Esfahan, Iran (map). http://maps.google.ca/ (accessed 2 December 2010).

Haggag, M.A. 2003. “The Western influence on traditional Arab cities: with particular reference to Dubai, UAE,” in *Sustainable Planning & Development*, ed. E. Beriatos, C.A. Brebbia, H. Coccossis, A. Kungolos, 801-811. Boston: WIT Press.

Hauer, Erwin. 2007. *Continua: Architectural Screens and Walls*. New York: Princeton Architectural Press.

Jacobs, Jane. 1961. *The Death and Life of Great American Cities*. New York: Random House.

Jodidio, Philip. 2007. *Architecture in the Emirates*. Koln: Taschen.

Kaplan, Craig S. 1999. “Voronoi Diagrams and Ornamental Design,” in *Proceedings of ISMA ‘99, the first annual symposium of the International Society for the Arts, Mathematics, and Architecture.* San Sebastian, Spain, June 7-11.

Katodrytis, George. February 2006. “Dubai: Tourism and the End of Public Space,” unpublished paper presented at The Gulf First Urban Planning and Development Conference & Exhibition, Kuwait. http://www.kfupm.edu.sa/crp/Kuwaitconference/Papers/595-paper_katodrytis_fulltext.pdf (accessed 15 November 2010).

Khan, Hassan-Uddin. 2002. “The Impact of Modern Architecture on the Islamic World,” in *Back from Utopia: The Challenge of the Modern Movement*, ed. Hubert-Jan Henket, Hilde Heynen. Rotterdam: 010 Publishers.

MacDougall, Elisabeth Blair, ed. 1974. *The Islamic Garden: Conference Proceedings*. Dumbarton Oaks Colloquium on the History of Landscape Architecture, Vol. 4. Cambridge: Harvard University Press.

Madanipour, Ali. 2003. *Public and Private Spaces of the City*. New York: Routledge.

Mahyari, Ali. 1996. *The Wind Catcher: A passive cooling device for hot, arid climate*. Diss. University of Sydney. Print.

Map Middle East: Soil Thematic Geo Database for Dubai Emirate. GIS Development. http://www.gisdevelopment.net/magazine/middleeast/2006/nov-dec/28_3.htm (accessed 2 December 2010).

Moosavi, Mir Saeed. July 2004. "Bazaar and its Role in the Development of Traditional Iranian Cities," unpublished paper presented at The 11th International Planning History Conference: Planning Models and the Culture of Cities, Barcelona. http://www.etsav.upc.es/personals/iphs2004/pdf/145_p.pdf (accessed 15 November 2010).

Nasr, Seyyed Hossein. 1987. *Islamic Art and Spirituality*. Albany: State University of New York Press.

Old Tarsus Street (photograph). Voyage Anatolia. http://voyageanatolia.blogspot.com/2010/08/old-tarsus-street.html (accessed 23 November 2010).

OMA, Rem Koolhaas, and Bruce Mau. 1995. *S, M, L, XL*. ed. Jennifer Sigler. New York: The Monacelli Press.

Paradkar, Shalaka. 2008, June 25. "Last Goodbye to Satwa," *Gulf News*. http://gulfnews.com/about-gulf-news/al-nisr-portfolio/tabloid/articles/last-goodbye-to-satwa-1.113484 (accessed 15 November 2010).

Reisz, Todd. 2007. "Market Narrows: A Visit to the Souk," in *Al Manakh*, ed. Koolhaas, Rem, Ole Bouman, and Mark Wigley, 238-247. Amsterdam: Stichting Archis.

Rifki, Fatih A., and Amer A. Moustafa. 2007. "Madinat Jumeirah and the Urban Experience in the Private City," in *Al Manakh*, ed. Rem Koolhaas, Ole Bouman, and Mark Wigley, 23-29. Amsterdam: Stichting Archis.

Robbins, Mark. 2002. "Redressing the Mall," in *Sprawl and Public Space: Redressing the Mall*, ed. David J. Smiley, 3-7. New York: Princeton Architectural Press.

Ruggles, D. Fairchild. 2008. *Islamic Gardens and Landscapes*. Philadelphia: University of Pennsylvania Press.

Sachs, Wolfgang. 1992. *Development Dictionary: A Guide to Knowledge and Power*. New York: Palgrave.

Said, Edward. 1979. *Orientalism*. Toronto: Random House of Canada.

Salingaros, Nikos. April 2003. “Connecting the Fractal City,” unpublished paper presented at The 5th Biennale of Towns and Town Planners in Europe, Barcelona. http://www.fractal.org/Samenhang-Industrieel-Ontwerpen/Connecting-the-Fractal-City.htm (accessed 15 November 2010).

Saremi, Ali Akbar. 1976. *Exploring the Nature of the Square Plan*. Diss. University of Pennsylvania. Print.

Sokol, David. 2008, May 29. “Learning from Lerner,” *Metropolis Magazine*. http://www.metropolismag.com/story/20080529/learning-from-lerner (accessed 14 November 2010).

Solt, Imre. 2009. Dubai metro, Sheikh Zayed Road (photograph). Dubai Construction Update. http://imresolt.blogspot.com/2009/11/dubai-metro-photos-sheikh-zayed-road.html (accessed 15 November 2010).

Strauven, Francis. May 2007. “Aldo van Eyck – Shaping the New Reality From the In-between to the Aesthetics of Number,” paper presented at CCA Mellon Lectures, Montreal.

Tibbalds, Francis. 2001. *Making People-Friendly Towns: Improving the public environment in towns and cities.* New York: Spon Press.

Urbanization of Dubai, United Arab Emirates. Earth Observatory. NASA. http://earthobservatory.nasa.gov/IOTD/view.php?id=7153 (accessed 20 February 2010).

Venturi, R., Brown, D. S., Izenour, S. 1977. *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*. Cambridge: MIT Press.

Von Miess, Pierre. 1990. *Elements of Architecture*. New York: Spon Press.

Wind & weather forecast Dubai Airport. Windfinder. http://www.windfinder.com/forecast/dubai (accessed 28 October 2010).

WORKac. 2009. *49 Cities*. New York: Storefront for Art and Architecture.

Zacks, Stephen. 2007, November 21. “Beyond the Spectacle,” *Metropolis Magazine*. http://www.metropolismag.com/cda/story.php?artid=3047 (accessed 14 November 2010)