Repowering the Void: Negotiating Connectivity

by

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Bachelor of Science in Architecture
Washington University in St. Louis, 2002

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARCHITECTURE

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2008

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ABSTRACT

Rejecting the conception of building as island as reflected in American obsession with detached housing, modernist planning, and as currently reinforced by Zero Energy Building, the thesis explores patterns of connectivity. The energy consumption problem in America largely results from insular development and their related transportation modes. Further, tack-on renewables that may optimize at larger scales, when used at the building scale furthers an erroneous sense of self-sufficiency, suggesting falsely that inputs and outputs of human energy consumption can be bounded by property lines. Therefore, the qualitative thesis premise is that sustainability (especially for housing) is a function of connectivity. The project explores and negotiates between connectivity principles of ecology, society, energy, and density in terms of a post-fordist shift from products to services. Using a large, empty commuter rail site in East Austin, TX, the project initiates reconnection of the east side to the city center, where the need for connectivity coalesces.

Theis Supervisor: Yung Ho Chang
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Acknowledgements

Special thanks to:

Yung Ho Chang
Shun Kanda
John Fernandez

Kevin Alter
Bruce Biewald
Naomi Sakamoto
Luke Voiland
Joe Dahmen
The MIT Advanced Japan Workshop 2007
Tom Simister
Shani Cho
Meelena Oleksiuk
Gordana Jakimovska
Paul Kassabian
Marissa Cheng
Najiyah Edun

This thesis could never have become what it is, nor would I have stayed sane during it, without the love and support of my partner, Melissa.
Jeg elsker dig, Moel.
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1 From Insularity to Connectivity
Michelle Addington in “No Building is an Island” calls for a paradigm shift in the sustainability debate from how to use insular buildings as electricity generators to how to most effectively generate and distribute energy across scales.\(^1\) Further, Ellen Dunham-Jones questions the accuracy of calculating the energy efficiency of stand-alone buildings, noting that the pursuit of isolated buildings is at odds with urban objectives to achieve self-sufficiency within a region, “the city as a place of shared density and inter-relationships has been increasingly replaced by individual self-sufficiency.”\(^2\) The heroic conception of building as island is reflected in modernism's international style, suburbia’s obsession with detachment, and is now reinforced by Zero Energy Building (ZEB) concepts. Yet the reality is that the energy consumption problem in America largely results from these insular development patterns and related transportation modes. Tack-on renewables that optimize at larger scales, when used at the building scale furthers an erroneous sense of self-sufficiency, suggesting falsely that inputs and outputs of human energy consumption can be bounded by property lines. While it may seem the complete opposite, American energy consumption will be reduced when we find ways to make individual buildings more connected, not more self-sufficient.

The detached, ZEB house prototype such as found in the US Department of Energy’s Solar Decathlon competition reinforces the notion that the energy problem lies within autonomous boundaries and can be “tweaked” by applying localized technologies. While the ZEB may have a place in rural housing in order to offset the addition of new power facilities, it does not apply to urban and urbanizing buildings which are more intrinsically connected to their surroundings.\(^3\) Since the 22 percent of US energy consumption in the residential sector\(^4\) only accounts for operating energy,

\(^1\) Michelle Addington, Harvard Design Magazine. “No Building is an Island” Spring/Summer 2007, 44.
\(^2\) Ellen Dunham-Jones. “Comment: Questioning the Stand-Alone Building.” Dimensions of Sustainability, 93.
\(^3\) Addington, 41.
\(^4\) 2007 Buildings Energy Data Book.
the number underestimates the resulting plethora of energy that the users consume due to the isolated designs. In the New Yorker article *Green Manhattan*, David Owen posits that New York is perhaps the most environmentally responsible place in America due to its physical and social density\(^5\), extreme compactness, resulting energy-efficiency per person, and an inherent connectivity. Further, the energy agenda of ZEB contributes to the house-as-object within a figure-ground relationship. This consequently degrades possibilities for outdoor social spaces and human interaction that can be structured by denser "figures" and more defined "grounds" typically found in compact cities.\(^6\) The sustainability debate should refocus towards ways of achieving urbanisms and related forms of connectivity instead of reinforcing prevailing forms of insularity.


\(^6\) The 'compact city' is also championed by Richard Rogers in *Cities for a Small Planet*. 
American obsession with detached and disconnected housing is shaped by social, infrastructural, and policy-based forces.
Density connectivity: Multi-family housing consumes half of the energy that single-family housing does.\textsuperscript{10} In multi-family housing, heating, cooling, and materials are reduced through shared enclosure systems such as walls, floors and roofs. Units within multi-family housing are often more compact, using less square footage than that of single family houses which in the US now averages 2,469 square feet.\textsuperscript{11} Low density housing commonly found in the suburbs or exurbs requires massive amounts of infrastructure such as roadways, sewage systems, electricity, gas, and telecommunication lines which are expensive and inefficient with increased distances. Therefore, density (or mass per volume) reduces the amount of energy consumption, infrastructure materials, and inefficiencies, making housing more efficient when moved closer together.

Mobility connectivity: People consume less energy when connected to public transportation options. Isolated housing requires cars to connect people to places and to other people. As a result, 88 percent of American commuters drive to work.\textsuperscript{12} While fuel efficiency and "cleaner fuel" options proliferate with the surge in oil costs, a greater number of vehicles on the road and longer distances traveled counters their benefits of less consumption and ultimate CO\textsubscript{2} reduction.\textsuperscript{13} In contrast to this low density paradigm, 82 percent of Manhattan residents travel to work by public transit, by bicycle, or on foot.\textsuperscript{14} This is possible because the city's physical compactness allows connectivity between housing and mobility options.

Urban Space connectivity: William Whyte viewed the public realm as lived space where there exists the simultaneous presence of residents and strangers. This type of human connectivity is also described by many urbanists, such as Richard Sennett, and Jan Gehl who have displayed that it is the formation of secondary relationships that provides needed passive

\textsuperscript{10} 2007 Buildings Energy Data Book.
\textsuperscript{11} 2007 Buildings Energy Data Book.
interaction with others. Gehl in *Life Between Buildings* demonstrates how at least five physical structures can inhibit or promote visual or auditory contact with other people.\(^{15}\) Spaces such as continuous networks of streets, semi-public courtyards, landscaped trails, or linked hardscapes offer people a needed experience that they cannot get in their insular homes.

**Bioclimatic connectivity:** Connection to natural processes can reduce energy consumption through passive building design. Insularity is reinforced by artificial climate control within housing interiors that disconnect from the contextual processes of sun, wind, and light. Often in suburban housing, connection occurs more to artificially-constructed open space than to natural habitats, water systems, or regional biomes. As a result, Richard Rogers advocates for "working our buildings into the cycle of nature."\(^{16}\) Instead of relying only on active generation systems, passive strategies heighten the connectivity to the flow of natural processes, thus reducing the need to cool, heat, or light buildings.

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\(^{16}\) Rogers, 98.
Precedent studies, ways of negotiating connectivity.
The 30-50% void designed into each house within a set height and width allows for negotiation under highly attached housing.
Interlocking unit volumes negotiate through a corridor and enclosure.
The exterior is negotiated through a nested enclosure and perimeter circulation corridor.
Repowering the Void: Repowering is a figurative and functional objective. The prefix re- implies that this place once had social, ecological, economic, or utility-based ‘power.’ The suffix -ing implies that the re-establishment of power is a process which takes many forms. The architectural concept for pursuing this repowering is a system of connectivity based on a spatial continuum from public surfaces to private volumes. Therefore, my intention is to integrate power or energy generation at the collective scale and use it to explore connectivity at the building scale. As argued by Addington, “If energy consumption is not inherently about the boundaries of the building, then why should energy generation be similarly tethered to the extents of private property?”

As the world’s largest producer, consumer, and importer of energy the US continues to explore various contexts for integrating solar energy, namely photovoltaic cells (PV’s) and solar hot water, among a multitude of other renewable sources. Because PV’s are comparatively non-polluting in their conversion of solar radiation to electrical energy, they can be safely integrated into the residential sphere. It follows that solar energy presents an architectural opportunity for layering of space that coal, nuclear, or gas do not because their polluting and volatile nature requires sequestration from occupied places. In the later cases, the principle of Economies of Scale (EoS) generally ensures that large centralized energy stay cheap, whereas distributed solar power has largely remained out of reach for the residential sector. Despite governmental incentives for purchasing PV’s at the single family house scale, the reality is that solar energy remains too expensive and technically complex for the average consumer to integrate into their individual property, not to mention aesthetically jarring to most designers. However, when solar layering is physically and financially shifted into the public realm, it affords the opportunity to structure a new kind of connectivity.

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17 Addington, 41.
18 From the Department of Energy website
http://www.eia.doe.gov/emeu/cabs/Usa/Profile.html
Instead of using solar power at each house, I propose integrating PV continuum "hot spots" into the surfaces of the public realm. This would simplify the interface between the built environment and solar energy to an action of conceptual "plugging" into the renewable grid. I envision this new energy system would function similarly to that of Zip Car's car sharing model where hot spots could be collectively and optionally utilized. PV's purchased in bulk would create a critical mass for the initial investment and could be owned by a collective or a private company. Just as the Zip Car model offers drivers the incentive of a new car every time, this energy system would offer various connective public spaces defined by these surfaces. With Zip Car there is no maintenance to the car, so similarly, there would be no installation, replacements or upgrades to the system required for individuals. The Zip Car model requires a community or a larger network in order to make it profitable, just as this system would need an alternative energy network that was linked to many residences for it to function. Overall, this solar energy system is a mechanism for structuring the connectivity of urban spaces, absorbing into surfaces instead of being tacked onto the volumes.

19 Robin Chase lecture at MIT, 10/30/07
minimize: products \[\rightarrow\] objects
{ FORDISM / LEVITTISM }
- mass production of homogeneous products
- distinctive spatial separation
- emphasizes division of labor and class

maximize: services \[\rightarrow\] access
{ POST-FORDISM / POST-LEVITTISM }
- dominated by information and communication technology
- emphasis on types of consumers (niche-marketing)
- rise of service and globalization of markets
- transportation options
- communication
- health care access
- diversity of people/use
- renewable energy use
- eating with others
- live music/entertainment

If Levitown was the architectural expression of fordism (meaning the paradigm of emphasizing the output of products) then the project attempts to align with post-fordist thinking, in which the emphasis is shifted to services, access, and connectivity.
Walter St., Unit 33

June 14, 2008

my monthly fee:
$36.29

Services:

Electricity Use
- renewable sources
- non-renewable sources

Water Use

Amenities Fee

Public Facilities
- fitness
- chef meals

Zip Car Use
- truck
- car

Hours worked Co-op

possible housing as services interface
2 East Austin Regenerating
Like many cities in America, racism segregated parts of Austin from its core\textsuperscript{20} and the highway 35 development physically reinforced the severing of the east side. East Austin, left sequestered but held loosely by a few over or underpasses, grew at slower rates than the rest of the city for decades. As if only realizing now that the former limb lies two minutes from downtown’s hopping Sixth Street, developers hurry to scatter high density housing throughout the district. The detachment and isolation of these new condos, apartments, and single family enclaves sharply contrast with decades of slow growth fabric that now seem authentic and entropic. Similar to the dense, fragmented residential development of commuter towns that feed into large cities such as Tokyo or New York, East Austin’s regeneration takes the character of the banal periphery. New housing is there to have access to somewhere else.

Additionally, East Austin is home to large voids that further fragment the peculiar regenerating fabric. The enormous abandoned airport land occupies nearly ten percent of the town; train yards and related industry own numerous unused blocks; cemeteries, slow moving development, and enormous parking lots scatter the fabric with low-occupancy open space. Instead of connecting the fabric these voids degenerate it. As Jane Jacobs observed, parks and open space can often reduce urban vitality by creating dead ends that prevent people from moving freely between neighborhoods and by decreasing activity along their edges.\textsuperscript{21} These voids keep the east side disconnected from itself.

An East Austin regeneration that is not of peripheral character will require reclamation and settlement of these urban voids. American cities, including Austin, grew outwards to where land remained cheap, racial segregation was possible, and the modernist vision of house with a view to nature was the dream. Despite the ubiquity of this growth trend and urban void

\textsuperscript{20} The city master plan of 1928 made East Austin a “Negro District” and forced African- and Mexican- Americans to relocate to the east side from the urban core.

\textsuperscript{21} Owen.
condition, West 8 argues than in opposition to colonizing and locating new settlements in hypothetical virgin nature, that architects make ‘new nature’ in these urban contexts, “This new wilderness should not be freed from human activity but should manifest characteristics to be used for new occupation by the next generation.”22 Reclamation of the urban voids would structure connectivity instead of divide East Austin from itself.

Despite the spatial banality and presence of voids, some of east Austin’s fabric is built around crafted layers from the historic and current composition of its varied inhabitants: Latino immigrants, African Americans, and working class artists. In order for East Austin to regenerate its connection to the city, these contextual layers should be reinforced and extended, acknowledged and incorporated into the continuum of public surfaces. Massive linear voids that cluster primarily around the old train line could become the backbone of a connected community. Further, when the sun shines in hot climates like Austin, it causes high demand for electricity in order to cool the interior through air conditioning. This is an ideal scenario because it would allow the largest possibility for selling back to the grid during the hottest periods of heavy peak summertime loads. 23 Repowering East Austin’s voids through energy generation would structure connectivity by strengthening the ties of the existing neighborhoods, evoking economic activity, and inspiring alternative housing scenarios for new constituents.

22 West 8, 12.
presence of metals, art, and recycled material on site.
site spans east and west
East Austin fabric
max density = .4 FAR
Phenomenological studies using the site and tape to explore voids and reconnection. Study inspired by artist Mel Chin's work in Austin.
3 \ S = f\{C\}
The thesis premise is that sustainability in architecture is a function of connectivity, or

\[ S = f \{C\} \]

This connectivity spans scales from urban design to architectural detailing. I take this as a qualitative premise and ask, how can we negotiate connectivity for urban housing?

Following the premise, the thesis process is organized by research in four categories of connectivity:

- Ecology
- Society
- Energy
- Density

These principles are diagrammed through the lens of the site, and then synthesized into an overall negotiation strategy.

The project attempts to simulate an "integrated design" approach in which planners, landscape architects, community representatives, architects, and engineers would all contribute to the project's concept development.
S: $f\{C\} = \text{Ecology.}$

1.0
connect different species within an area.
(diversity of species is resilient)

1.1
connect habitats.
(facilitate species migration and survival with access between habitats)

1.2
connect drainage to common location.
(protect watersheds locally with bio-swales; increase awareness through exposure)
1.3 connect building form to climate.
(reduce energy consumption for comfort through passive design)

<table>
<thead>
<tr>
<th>MONTH</th>
<th>JANUARY</th>
<th>FEBRUARY</th>
<th>MARCH</th>
<th>APRIL</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUGUST</th>
<th>SEPTEMBER</th>
<th>OCTOBER</th>
<th>NOVEMBER</th>
<th>DECEMBER</th>
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<tr>
<td>AZIMUTH SOUTHEAST 70° AM</td>
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<td>SUMMERTIME SUN AFFECTS NORTH SIDE OF BUILDING</td>
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<td>ALTITUDE SOUTHEAST 70° AM</td>
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<td>AZIMUTH SOUTHWEST 50° PM</td>
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<td>SUMMERTIME SUN AFFECTS NORTH SIDE OF BUILDING</td>
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<tr>
<td>ALTITUDE SOUTHWEST 50° PM</td>
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<td>SUMMERTIME SUN AFFECTS NORTH SIDE OF BUILDING</td>
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</table>

yearly sun angle analysis
two new connections through the site
Conceptual mapping of habitat corridor movement on the site
S: \( f(C) = \text{Society.} \)

2.0 connect people of different incomes.
mixing incomes reinforces neighborhood stability through diversity

2.1 connect private space to collective public spaces.
(public spaces create interaction opportunities and allow the added and varied space to live beyond the dwelling)

2.2 connect programs within an area.
(blending uses and programs adds vitality)
2.3
connect materials for future changes.
(shifting demographics and needs necessitates flexible connections, such as design for disassembly)
Two hypothetical clients will bring specificity and life into the project: A) The baby-boomer who has lived 30 years in the suburbs and wants to move back to the city for retirement because of its inherent connectivity to services and other people. B) Second- to Fifth- generations of Latino immigrants who have been living in East Austin for decades but are starting to acquire new wealth by selling their homes due to rising property values. These Latinos want to relocate within the neighborhood and stay connected to their community of friends and families. While I will focus on ways to negotiate connectivity for these groups individually, some economists have suggested that a mutually beneficial relationship exists between boomers and immigrants for the future of the American economy.24

A) The baby-boomer generation, who witnessed the burgeoning American highway system and participated in the sprawling growth of the suburban periphery, is the fastest growing population worldwide.25 In the United States, baby-boomers concentrate the most wealth and political power of any generation and, in the past 60 years, have instigated major social movements such as rock and roll, sexual liberation, and civil rights. However diverse in beliefs the generation is today, two values they currently share are the same for the next 20-30 years: to physically endure and to continually have an impact on the world.26 Towards this end, baby-boomers will reinvent notions of retirement, including the structures, spaces, and cities that support it.

As a generation that first came of age in the American suburbs, it is not surprising that insular and radically private domestic shells have dominated as the preferred living structure in past decades. Do It Yourself (DIY) commerce, such as Home Depot, has capitalized on boomers' spirit of ingenuity and desire for individuality as expressed through renovating their

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25 Age Lab, http://web.mit.edu/agelab/about_agelab.shtml
own unique spaces. While many boomers will decided to "age in place," some will join co-housing communities, some will retire in assisted living facilities, and many will consider moving back into cities where they can walk to a coffee shop, engage in university extension courses, or locate closer to potential support services. Yet 'connection' to boomers means less about creating a hypothetical "community" than engaging in interpersonal relationships with like-minded individuals for their own benefit, not necessarily for that of the collective good.

Structures and systems that support an active, healthy, adventurous, and learning-based lifestyle will be in high demand. Bill Mitchell in E-topia asserts that houses will adapt to boomer's working needs, "As baby boomers age without mandatory retirement to remove them from the workforce, there will be a burgeoning demand for settings that facilitate continued part-time work as consultants and contractors." Other researchers observe that boomer's DIY attitude is being replaced with a Do It For Me (DIFM) consumer demand as a result of physical aging constraints. The products targeted towards aging boomers will be livelier, more technology friendly, and sexier (think Viagra). Yet due to physical constraints such as poor eye-sight, diminished reliance on the car as primary mobilizer, and increasingly active-aging lifestyles, boomers will begin to prioritize walking connections and alternative transportation structures that are currently found within urban fabrics, making physical connectivity imperative.

Mike Davis in Magical Urbanism argues that academia's call for 'reurbanization' of cities is already occurring in the ethnic Latin districts of the southern United States, "In the most fundamental sense, the Latinos are

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28 Smith in reference to Bowling Alone phenomena.
29 Mitchell, 75.
30 Smith, 108.
struggling to reconfigure the ‘cold’ frozen geometries of the old spatial order to accommodate a ‘hotter’ more exuberant urbanism.” He backs this argument with examples where Latinos revive informal markets and where life happens in the plaza and the mercado, causing a ‘tropicalizing’ of what was once cold urban space. Latinos often create cities within cities, once seen as barrios, but now spatially assimilating into and redefining the surrounding urban core. “As emergent Latino pluralities and majorities outgrow the classic barrio, they are remaking urban space in novel ways that cannot be assimilated to the earlier experiences of either African-Americans or European immigrants.”

Texas has the second largest Latino population in the United States, and Latinos continue to have an impact on the spaces of Austin, despite a history of racism and discrimination. Of particular interest in this project is the legacy of ‘Ole Mexico,’ an East Austin community organization formed in 1992 to help organize public projects such as the Plaza Saltillo. The blocks flanking east Sixth Street were also labeled ‘Ole Mexico’ on development plans for East Austin in the late 1990s. While the layers and flavors of ‘Ole Mexico’ remain present, the Plaza Saltillo next to the light rail line currently lacks vibrancy and use, as it is an island within industrial centers and voids. This plaza, like many other spaces in East Austin, requires a reconnection with the neighborhood.

For Latino homeowners in some East Austin areas, properties are skyrocketing with the new redevelopment. The Austin Cronicle cites, “A property worth 70,000 five years ago now could be worth more than half a million dollars...if residents can work together to assemble home sites into larger tracts, which have far more value for development.” This represents a once in a lifetime opportunity for many low-income residents to make a

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32 Mike Davis. Magical Urbanism: Latinos Reinvent the US City, 65.
33 Davis, 49.
34 Davis, 5.
large profit on their home, yet causes a liability for the community with the encroaching gentrification. Overall, Latinos’ emphasis on public space and their rootedness in the neighborhood makes it important that they can remain in East Austin to structure connectivity to the community and ultimately back to the city that once rejected them.
Minimize unit size | Maximize services

1 UNIT

Size of typical gentrification house

4 UNITS - economically and demographically relevant

elongation of houses for site, climate, and combination possibility

road

15' alley

unit size aligns with contextual infrastructure
At least five physical ways that structures can connect people. 
(Source: Adapted from Jan Gehl’s *Life Between Buildings*)
S: $f\{C\} = \text{Energy.}$

3.0
connect renewable energy production with consumption.
(distributed generation at urban scale increases system stability and user awareness, yet reduces transmission losses)

3.1
connect energy types within one system.
(diversity of production increases stability and security)
3.2

connect renewable energy production with public space.

(renewable energy integrated into the public realm reduces technical and economic barriers to the individual and allows flexibility for energy changes over time)
Austin's aggressive energy policy:

- Power 100% of city facilities with renewable energy by 2012.
- Achieve 700 MW in savings through energy efficiency and conservation by 2020.
- Meet 30% of all energy needs through renewable resources by 2020, including 100 MW of solar power.
- Achieve carbon neutrality on any new generation units through low emission technologies, carbon sequestration and offsets.
- Make all new single-family homes zero net-energy capable by 2015.
- Increase energy efficiency in all other new construction by 75% by 2015.

Three scales of energy generation:

<table>
<thead>
<tr>
<th>SCALE AND INTEGRATION</th>
<th>COST</th>
<th>OWNERSHIP</th>
<th>REQUIRED KNOWLEDGE</th>
<th>DIVERSITY OVER AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>mostly renewable</td>
<td></td>
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</tr>
<tr>
<td>hyper-distributed</td>
<td>$$$</td>
<td>individually-owned</td>
<td>high</td>
<td>few types:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(pv, wind, bio-fuel, etc.)</td>
</tr>
<tr>
<td>distributed generation</td>
<td>$$</td>
<td>collectively-owned</td>
<td>moderate</td>
<td>many types:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>utility-owned</td>
<td></td>
<td>(wind, pv, solar, bio-fuel, fuel cell, co-generation, algae, etc.)</td>
</tr>
<tr>
<td>central generation</td>
<td>$</td>
<td>utility-owned</td>
<td>low</td>
<td>one type:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(coal, nuclear, natural gas, wind, etc.)</td>
</tr>
</tbody>
</table>
solar \rightarrow hot water

solar \rightarrow LED lighting

thin film pv canopy
over public space
solar \rightarrow electricity

roof canopy over courtyards
solar \rightarrow hot water

night lighting of public spaces
solar \rightarrow LED lighting
S: \( f\{C\} = \text{Density.} \)

4.0 connect building area to a smaller footprint. (compactness reduces land consumption)

4.1 connect people to collective transit. (public transportation reduces energy consumption and infrastructure needs.)

4.2 connect building volumes to smaller surface area. (less surface to volume ratio reduces exposure to heat gain or loss, yet reduces exposure to wind for cooling)

4.3 connect multiple owners to one system. (collective cooling and heating systems are more energy efficient and reduce equipment than individual ones)
4.4 connect units with courtyards.
(using planned, semi-public voids to connect private space is efficient and allows for interaction.)

4.5 connect units with other units.
(another mass can act to combine two masses together.)

4.6 connect enclosure systems.
(shared enclosure reduces material)

Maximum Allowable FAR: .4

Other Density Factors:

Services cost achieved with higher density
The extensive amount of public space and services can be financially structured through density bonuses and public-private partnerships.

Bioclimate affected by density
Solar gain is the biggest liability to surface enclosure, yet exposure to the wind is the strongest asset in hot humid climates.

Density over time
Density achieved through phasing and adaptation over time.
three areas respond to context and character of site
scale study for each area

micro-block massing with central public space spine
3 densities of courtyard housing

building area in field condition

grid lines in east-west striation
4 Negotiating Connectivity
initial connectivity concept sketch
east-west grain concept
ecology + society + energy + density

negotiation + program site plan
east - west movement
massing site plan
massing studies

overview to the east
(courtyards not represented)
sectional model
Roof integration concept with housing

Roof site plan

Cables attach to existing highway structure
Structural proposal: Tensegrity. The term "tensegrity" comes from the words tension and integrity. The goal is to utilize as much tension as possible in order to lighten the structure and lessen material use.
micro-block systems sketch
form concept development:
elongation in e-w direction integrates with site
grain and passive bioclimatic response.
perspective of major north - south connection through the site
micro block plan


