LIRR Long Island Radically Rezoned: A Regenerative Vision for a Living Island

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INTRODUCTION

This paper presents the author's design research on suburban sustainability developed over the past years and tested through a series of competition entries in collaboration with Ana Serra, Katelyn Mulry and Sven Peters. The entry was selected as one of 7 winners for the Long Island Index' 'Build a Better Burb' ideas competition to retrofit Long Island's downtowns[1] and it was awarded first place in the d3 Natural Systems competition.[2]

A REGENERATIVE VISION FOR A LIVING ISLAND

Current paradigms of sustainability such as efficiency and conservation are merely slowing down but not preventing the process of resource depletion and environmental degradation. A more radical approach is required: Regenerative Design integrates processes that are conducive to renewing sources of energy and materials, creating closed loop systems that fulfill the needs of society while

Fig. 1. Aerial View of LIRR Long Island Radically Rezoned

preserving the integrity of nature. Regenerative Design is the biomimicry of ecosystems aiming to create optimized, holistic frameworks for systems that are absolutely waste-free.

Applying these principles on a regional level in the US will result in a fundamental restructuring of our predominantly suburban territories.

We have studied the aging suburban fabric of Nassau and Suffolk Counties on Long Island, NY for its potential to become a regenerative region. Sixty years after William Levitt built his first subdivision on the potato fields of the Hempstead Plains, Long Island once again will serve as a testing ground for new settlement patterns (Fig.1).

Long Island's most unique and defining condition is that of containment and the island itself – a spatial entity unable to expand beyond its own footprint. By conceptually capitalizing on this 'insular' condition we imagined Long Island as a 'Living Island', applying closed loop principles on a macro scale: water, energy and waste neutral and 100% local food production – a completely self sufficient and waste free island.

SUBURBAN SELF SUFFICIENCY

The concept of self sufficiency is indeed a radical notion for suburbia, a settlement typology that was never meant to stand on its own, but rather was conceived as a mere extension or supplement to the metropolitan condition. Enabled by increasing advances in transportation infrastructure (first horse carriages, then trains, then freeways) people could work in the big city but where able to live outside its overcrowded neighborhoods, in romanticized versions of the cabin in the woods with the luxury of space.

Contemporary suburbia however can no longer be understood as the antidote to the metropolis. Today Long Island, like many other suburban regions, is facing several pressing social and environmental issues. Increasing traffic congestion, urban sprawl, depleted aquifers and storm water runoff are just some of the environmental problems, threatening both the balance of the eco systems as well as the health of its inhabitants and the socioeconomic structure of the communities. The lack of walkable communities with affordable housing options, diminished viability of small businesses due to higher

taxes as well as increased social inequity started to erode the social fabric and created blighted conditions more commonly associated with urban inner city neighborhoods. The concept of increased quality of life by living in close contact with nature with ample access to light and clean air has long been lost since most of the natural landscape has disappeared under a sea of asphalt for roadways and parking lots. Suburbia's last vestige of nature, the infamous front lawn, consists of non-native vegetation requiring regular input of chemical pesticides and large quantities of water to be maintained.[3]

Some of the answers to these problems can be found by looking into the past, at Long Island's prewar landscape of compact small towns connected by mass transit, a settlement pattern that has been largely ignored since the postwar boom. Unlike other, more recently developed suburbs, Long Island is blessed with the existing mass transit infrastructure of the Long Island Railroad, already the busiest commuter railroad in the country[4] with the potential to once again become the infrastructural backbone of the island.

Many of the social and environmental issues of suburbia are linked to the excessive land use of suburban sprawl. Long Island's density is 30 times lower than that of Manhattan. Suburbia can no longer be understood simply as a residential extension of the city and therefore needs to generate its own economic viability. This will most likely be achieved by creatively retrofitting its downtowns and introducing urban characteristics such as density, proximity to services, programmatic diversity and efficient mass transit. Long Island will be learning from Manhattan.

Lastly, Long Island has the opportunity to fundamentally rethink or rather rediscover its relationship with nature. The relatively low density of suburbia coupled with the densification potential of the downtowns present a unique opportunity to reintroduce large amounts of open space to the island and yet increase its overall population capacity.

LAND USE AND DENSITY PROPOSAL

50% Open Space

Currently only 11% of Long Island is designated as protected public open space while the rest is cov-
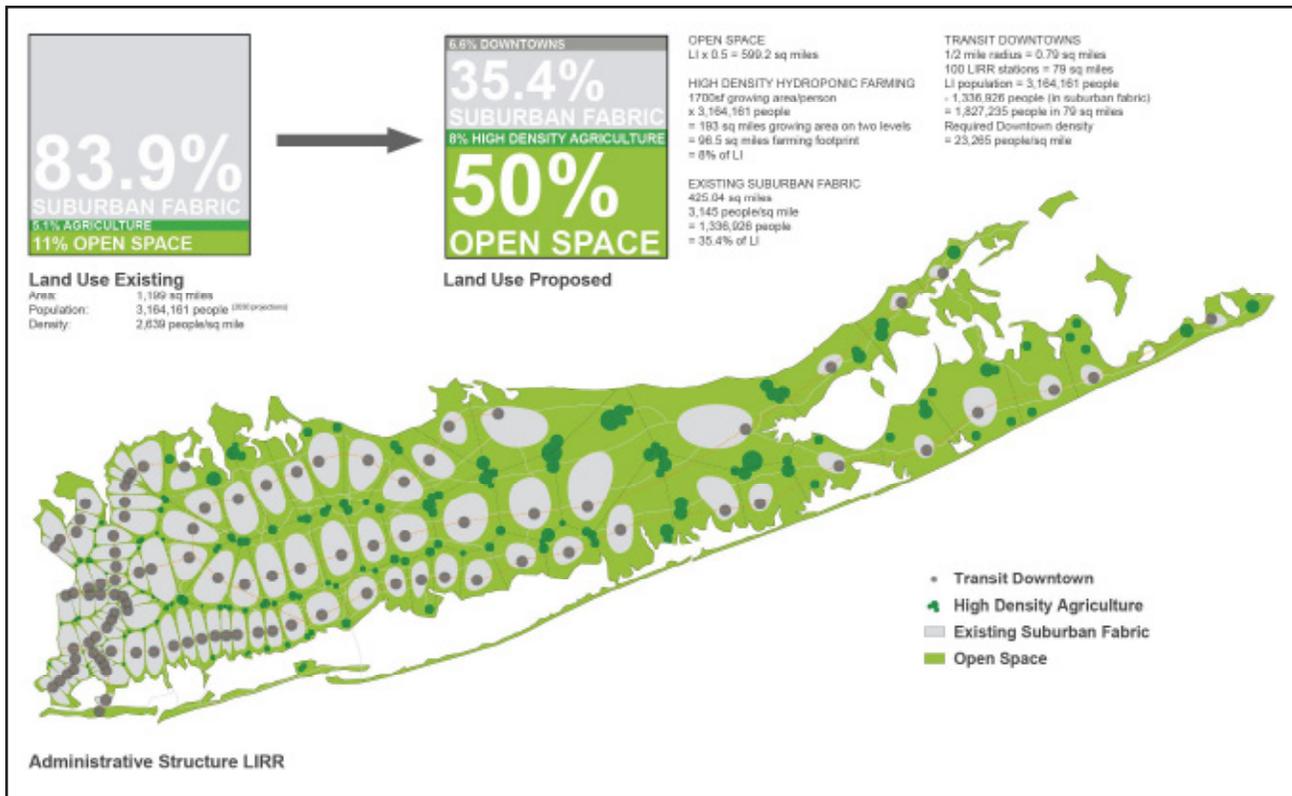
Fig. 2. Land Use and Density Proposal

ered in a continuous suburban fabric. Over the past years Long Island has continuously fallen short of the open space preservation goals outlined by the Department of Environmental Conservation[5] and final build out of the island is expected to take place within the next decade.[6]

In order to create a balance between manmade and natural systems, which have the potential to offset the human footprint, we propose a radical rezoning of Long Island by assuming that for each unit of developed land we would set aside an equal amount of open space for habitat restoration and ecosystem services, creating 600 square miles of re- naturalized open space, bringing back long- lost local ecosystems such as the native grasslands of the Hempstead Plains – once one of the few true prairie landscapes on the East Coast[7] (Fig.2).

8% Local Agriculture

There is a long history of farming on Long Island and this can be optimized; we propose 95 square miles of high density hydroponic farming on two level structures which would enable us to grow all food for all Long Islanders locally.[8] Food would be grown in indoor farms under light weight, ETFE plastic covered dome structures - we have named them Bucky Farms - which would be distributed across the island, clustered within the re-naturalized open space areas alongside green utilities such as waste and water treatment facilities. The farms double as 'digesters' of organic waste (the majority of household waste) which can be used as soil amendment and compost, solving part of the growing waste problem as well.

7% Mixed-use Downtowns

Absorbing the population from the re- naturalized areas into the downtowns requires a downtown density of approx. 23,000 people per square mile.[9] Even though this is almost 10 times the existing overall LI density, it is only about 60% of the average density of Brooklyn.[10]
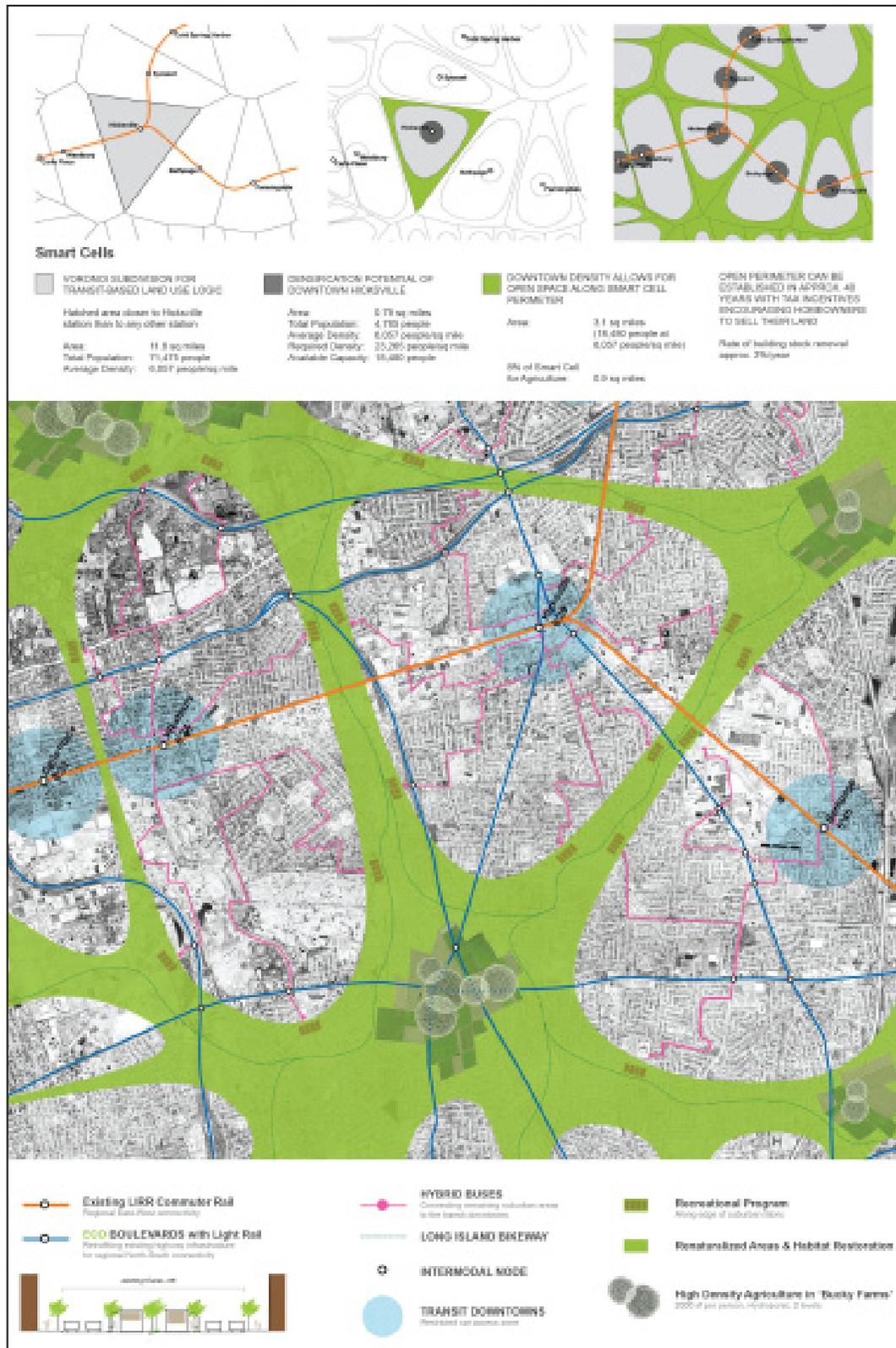
Fig. 3. Smart Cells and Transportation Infrastructure

35% Existing Suburban Fabric

We further assumed that the remaining suburban fabric outside the downtown areas would not be densified, in order to maintain the existing suburban lifestyle for those not willing to live in higher density.

RESTRUCTURING

Smart Cells – Transit-based Land Use Logic

The organizing and restructuring of the proposed land use is based on the Smart Cell logic. While the existing spatial organization of Long Island is largely based on the automobile, we imagine the Radically Rezoned Long Island as one that is based on transit infrastructure. By appropriating a geometric logic found in nature and defined by the Voronoi diagram (Fig.3) the locations of the 100 existing Long Island Railroad stations within Nassau and Suffolk Counties are used to generate a new polygonal subdivision pattern based on proximity to mass transit – the Smart Cells. The perimeter of each Smart Cell – the areas furthest away from a train station - will be re-naturalized overtime as residents, encouraged through tax incentives and a healthier, more social lifestyle, will move into the newly developed downtowns. Over time this process will create a restorative connective fabric for habitat, recreation and agriculture, a 50/50 balance between nature and

man-made. Variations in existing population density and location of train stations create a very organic and supremely functional pattern. More than just a new land use logic we imagine the Smart Cells as a new transit-based administrative structure for the island, replacing the fragmented and inefficient jurisdictions of today.

Transportation: Towards 100% clean energy

The existing network of the Long Island Railroad was designed as a spoke and hub system, providing excellent East-West connectivity between Long Island and New York City, but providing no North-South connections within the island. This is symptomatic of the view of suburbia as an extension of the city and a different understanding of suburbia will require a different transportation model. To provide the required north south connectivity we propose to repurpose some of the island's existing car- based infrastructure into 'EcoBoulevards' with reduced car lanes, light rail and a system of bio swales for storm water management and natural treatment. Along with a hybrid bus system to connect the remaining suburban fabric to the downtowns and an extensive bike trail network within the re-naturalized areas, a transport infrastructure based on 85% clean fuel can be implemented, with the remaining 15% from cars likely transitioning towards clean and hybrid vehicles through new,
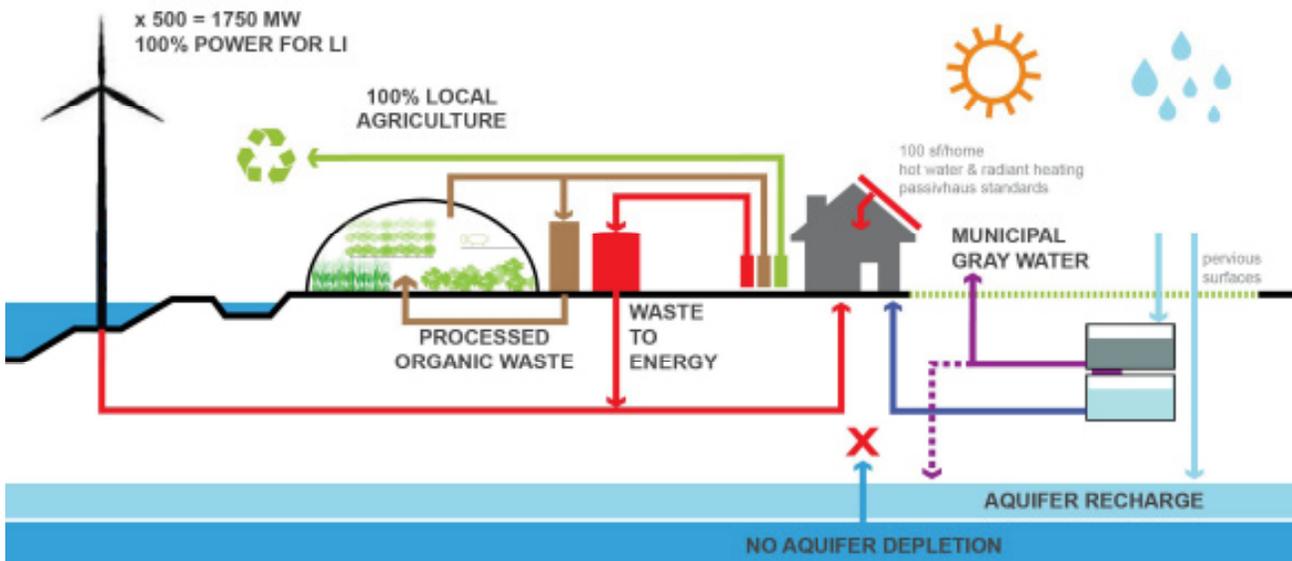

Fig. 4. Regenerative Strategies Diagram

increasingly affordable technologies, incentives or tax benefits (Fig.3).

Renewable Energy

Through implementation of rigorous retrofitting energy efficiency standards to first significantly reduce existing demand and solar thermal technology for all existing and new buildings the electricity demand will be reduced to the extent that an array of 500 offshore wind turbines along the Long Island's south shore will create enough electricity to supply all of Long Island (Fig.4). Though ambitious in scale this would be an extension of a project already under way.[11]

Zero Waste to Landfills

A closed waste stream loop would be implemented in which glass and metals would be recycled, organic waste (including paper and plastics) would be turned into energy in a waste-to-energy plants or soil amendments and compost for agriculture.

Water neutral

A significant amount of LI's water is used for irrigation. After significantly reducing demand through smart irrigation technologies and use of native or adapted grasses and vegetation we will be able to meet all water demand by capturing only 6% of the rainwater that falls on Long Island[12] [13]. Long Island's stressed aquifer will not only not be further depleted but recharged by significantly reducing the amount of pervious surfaces. Waste water will be treated and reused as grey water, for irrigation, distributed through a public grey water network.

DOWNTOWN REVITALIZATION STRATEGIES

In order to achieve the required density of the downtowns and to revitalize vacant areas, we developed several urban typologies and tested them on the example of Hicksville's downtown, a hamlet located within the Town of Oyster Bay in Nassau County (Fig.5). Rather than creating density by imposing

Fig. 5. Urban Typologies for Downtown Revitalization

an urban model of high rise apartment buildings we were looking for ways to achieve density while maintaining essential suburban qualities. On the most basic level we believe that this means primarily four things: low rise construction with a maximum of three stories, individuality (for example in the form of a ground floor entrance directly off the sidewalk), privacy (especially a private outdoor space directly attached to the residence) and access to light and nature. Successful built examples such as Siedlung Halen in Switzerland[14] or Borneo Sporenburg in the Netherlands[15] demonstrate that substantial density can be achieved while observing these parameters.

Fix A Block

Even though Hicksville downtown has a street grid and block structure it is virtually non- existent spatially, since the majority of the downtown blocks are given over to surface parking for LIRR commuters. This lack of public space definition along with the absence of civic and commercial programs to generate activity makes for a pretty dead public life. Our first strategy "Fix A Block" aims to remedy this condition: the blocks are being wrapped with a one story liner of public and retail program built to the lot line, parking continues to be provided in form of a covered parking structure in the center of the block and a carpet of low-rise, high-density housing with private outdoor spaces is layered on top.

Mall Chopper

The same typological approach is employed on the large underutilized surface parking areas surrounding shopping malls which are subdivided into small blocks that echo the small grain of the surrounding context.

Resi-Dense

In order to densify the existing residential fabric within the downtown area, additional units are inserted around existing single family homes, carefully negotiating the requirements of privacy, individuality and access to light and nature of both the existing as well as the new residences.

Re-Center

We believe a central civic space is an important ingredient for a successful downtown revitaliza-tion. In our proposal this new vibrant downtown 'piazza' is centered around the train station, celebrating transit and creating an extension of the public space of the Eco Boulevard thus connecting the train station to civic life. The surrounding buildings would have a slightly higher density and consist of more urban residential typologies that could be used as college dorms and for intergenerational or assisted living.

THE TIME FOR CAUTIOUS THINKING IS OVER

Even though this proposal to radically rezone Long Island may seem utopian in its scope, it is completely feasible from a technological point of view and we believe that it would significantly improve the quality of life for all Long Islanders.

ENDNOTES

1   *'Build a Better Burb' ideas competition*, Long Island Index, accessed August 19, 2010, http://www. buildabetterburb.org/
2   'd3 Natural Systems Competition Winners Announced' on Archdaily Blog, by Sebastian Jordana, Sept 1, 2010, http://www.archdaily.com/75598/d3-natural- systems-competition-winners-announced/
3   Georges Teyssot. *The American Lawn*. New York: Princeton Architectural Press, 1999.
4   *Public Transportation for the New York Region*, Metropolitan Transportation Authority, accessed August 19, 2010, http://www.mta.info/mta/network.htm
5   *2009 New York State Open Space Conservation Plan*, NYS Department of Environmental Conservation, accessed August 19, 2010, http://www.dec.ny.gov/docs/lands_forests_pdf/osp 09complete.pdf
6   *2010 Land Preservation*, Long Island Index, accessed August 19, 2010, http://longislandindex.org/land_preservation0.html
7   *Hempstead Plains*, Wikipedia, accessed August 19, 2010, http://en.wikipedia.org/wiki/Hempstead_ Plains
8   Calculations are based on 1700sf growing area/person and 3,164,161 people (2030 population projections) = 193 sq miles growing area on two levels = 96.5 sq miles farming footprint = 8% of Long Island
9   *Land Use in Nassau and Suffolk Counties*, Long Island Index, accessed August 19, 2010, http://longislandindex.org/fileadmin/pdf/LandUseAn alysis.pdf Transit Downtowns: 1/2 mile radius = 0.79 sq miles 100 LIRR stations = 79 sq miles LI population = 3,164,161 people - 1,336,926 people (in suburban fabric) = 1,827,235 people in 79 sq miles Required Downtown density = 23,265 people/sq mile
10   *Population, Housing Units, Area, and Density*, 2000 Census Summary, U.S. Census Bureau, accessed August 19, 2010, http://www.census.gov/
11   The Long Island Power Authority's proposed Long Island offshore wind park consists of 40 turbines capable of generating approximately 140 MW, enough to power 44,000 homes: http://www.lioffshorewindenergy.org/

12   Three quarters of the captured precipitation will be treated to non-potable levels and be used for irrigation, toilets and laundry, the remainder will be treated to potable levels and be used for bathing, cooking and domestic hot water.

13   *Annual Precipitation Pattern over Long Island Based on Radar Data*, Lisha Zhou & Gilbert N. Hanson, Department of Geosciences, Stony Brook University, accessed August 19, 2010 http://www.geo.sunysb.edu/lig/Conferences/abstra cts-08/Lisha-zhou.pdf

14   *Siedlung Halen*, near Bern, Switzerland, 1961, Architects: Atelier 5

15   *Borneo Sporenburg Harbor Redevelopment*, Amsterdam, The Netherlands, 1996, Architects: West 8