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Niche Life

by

Matthew Radune

A THESIS SUBMITTED

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

Master of Architecture

APPROVED, THESIS COMMITTEE:

Christopher Hight, Assistant Professor
Architecture

Lars Lerup, Dean
Architecture

Jessica Young,
Director, Publications and Exhibitions
Architecture

HOUSTON, TEXAS

MAY, 2005

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ABSTRACT

Niche Life

by

Matthew Radune

This design project attempts to enlarge the role of urban codes to deal with issues relevant to the condition of the metropolis as a type of ecological niche. It is my view that urban codes are the most useful design mechanism for post-environmental relations between humans and the urban fields they reside within. These codes must be written not to designate that which cannot be done, but to provoke successful innovation by those following them. This is especially the case in a metropolis without zoning such as this. The project is a master planned community in an urban instead of ex-urban context as is typical, formed on a brownfields site, which is currently the oil services company Halliburton's mostly vacant headquarters just Northeast of downtown Houston.

Coding of this site to be used by developers of the site must take into account parameters inherent in the site itself, in this case a polluted parking lot lying in a floodplain. To a certain extent these conditions pervade the landscape of Houston itself, and so this is in a sense a case study for a wider field of operation.

Acknowledgements

My mother and father for everything.

Sky Lanigan for some last minute words.

Logan Billingham for some last minute graphic design and catering services.

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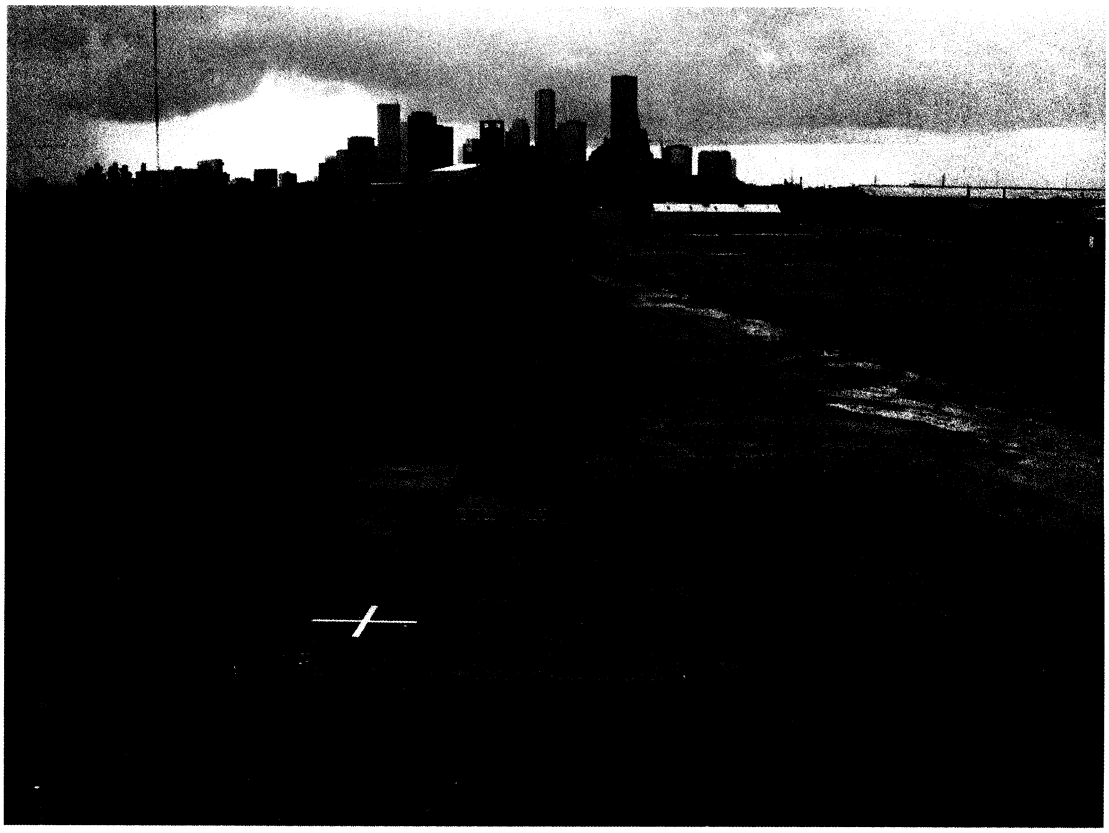
Preface

The Halliburton Site Northeast of Downtown functions as the site of exchange for this thesis. The cyclical dynamic in America between oil exploration and oil company based funding of ex-urban developments sets the stage for thinking about the future of urban development on new terms.



Houston has more master-planned communities than any other metropolitan area.

It also has the largest refinery complex in the country, and the second largest in the world.

All of the largest Master Planned Communities (+ 10,000 Acres) are financed by these same oil companies.

Houston's Master Planned Communities

202 Square Miles

Houston's Inner Loop

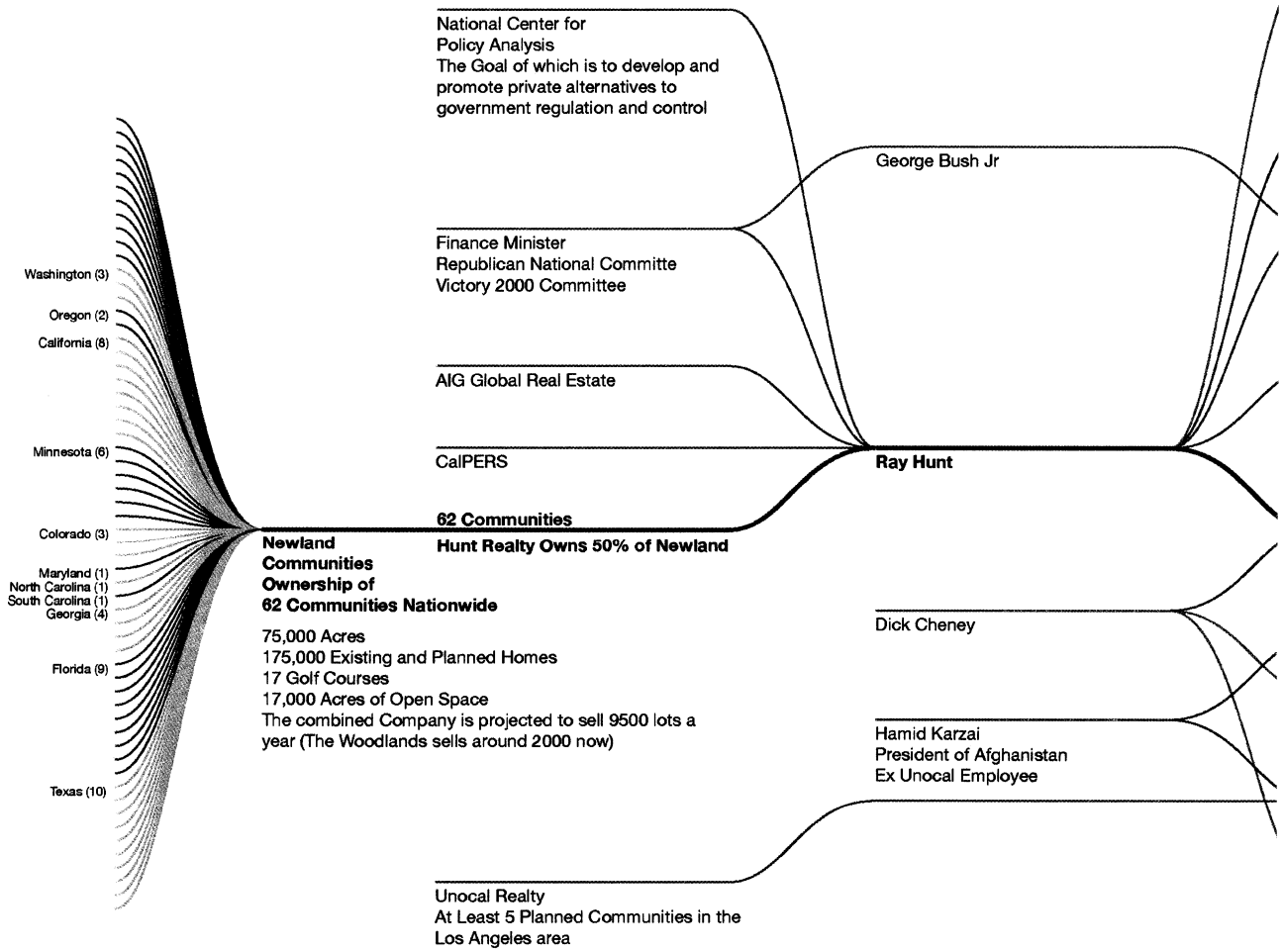
110 Square Miles

The amount of the population living in MPC's in Houston will more than double within the next 10-15 years, going from 7 to 15% of the total population.

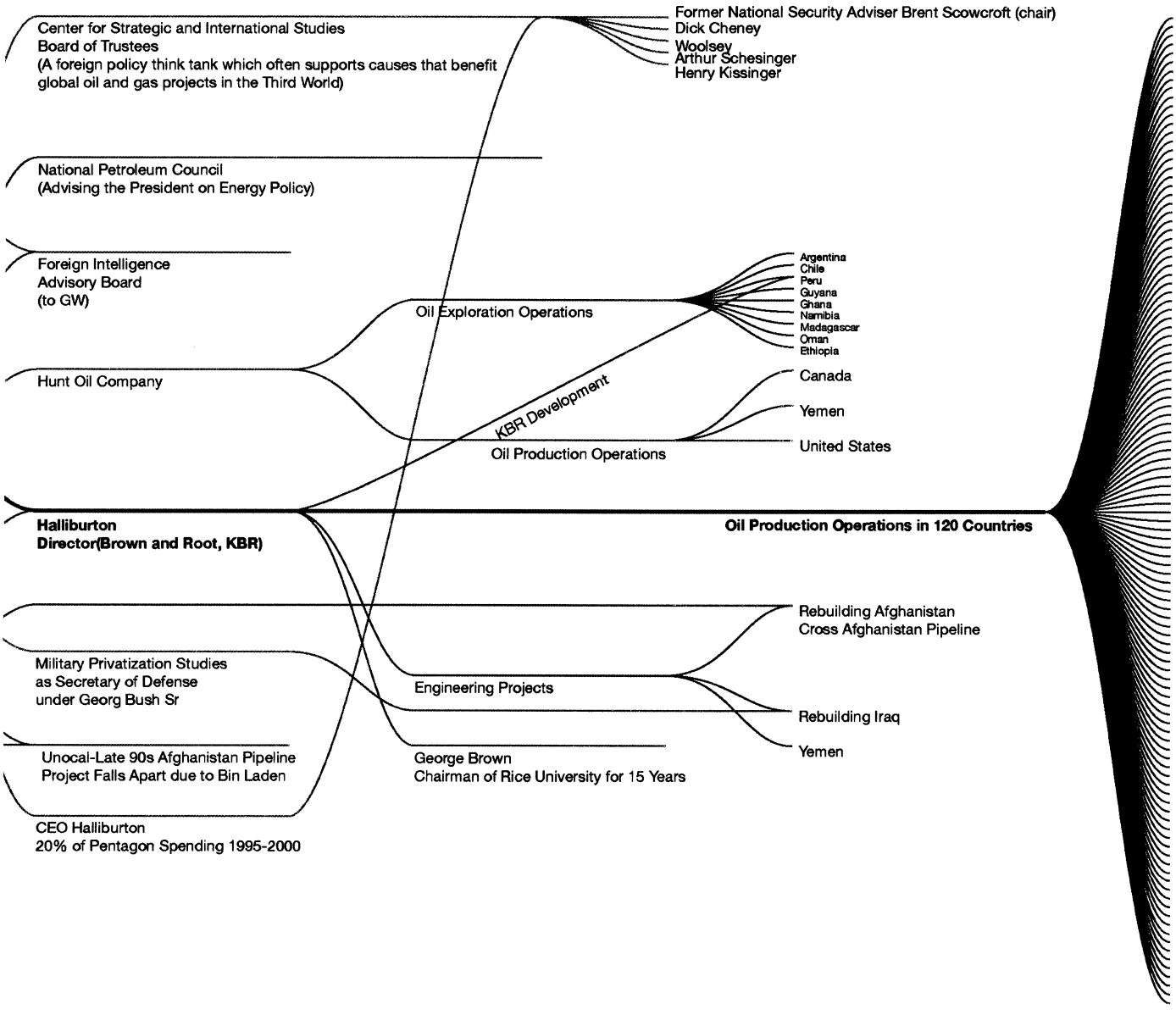
MPC's are currently 1/3 of all home starts in Houston

Master Planned Communities in Green
Third Loop
FM 1960
Second Loop: Route 8
610 Loop

A study of the connections relating the largest development corporation of master planned communities in America to the largest oil exploration company in the world.

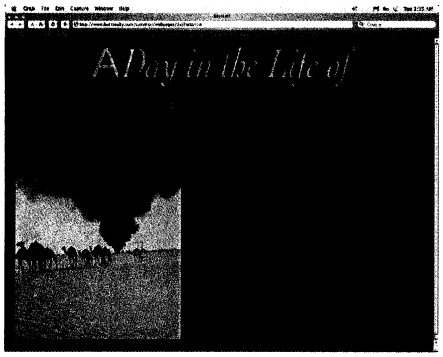


The Largest Master Planned Community Developer in the Country



Two of the Largest Oil Services Companies in the World

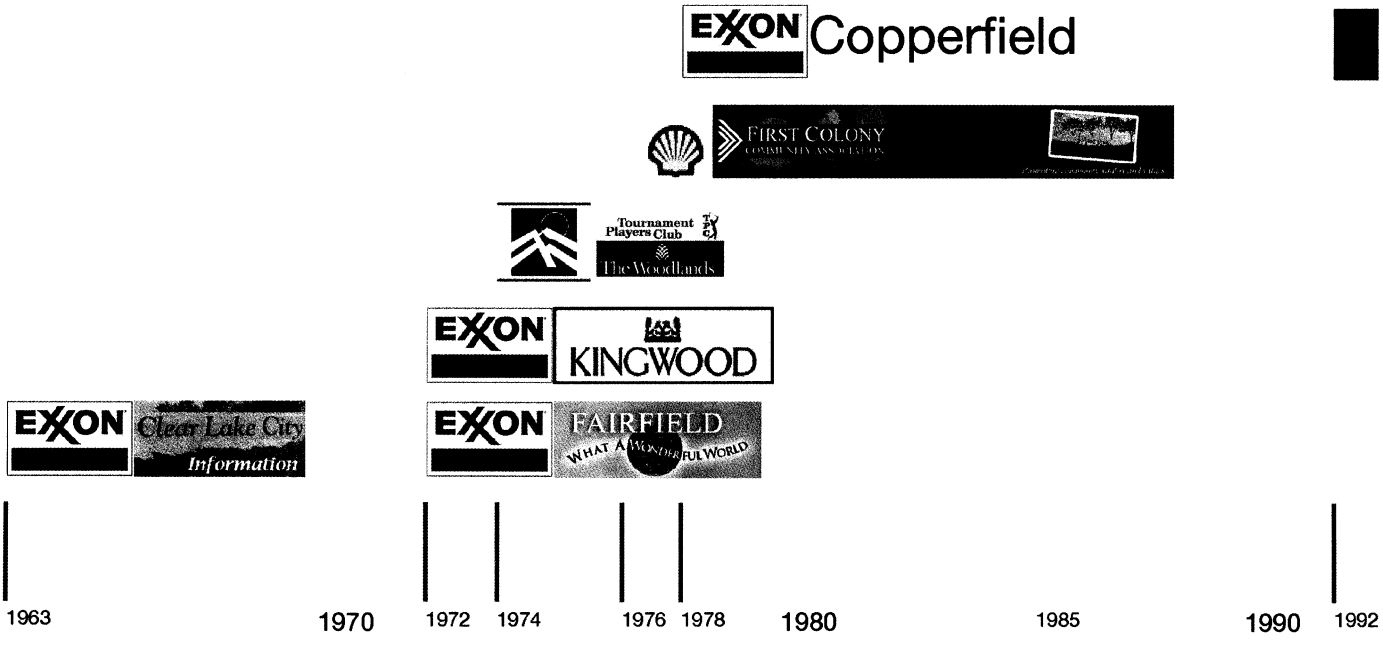
The largest master planned communities in the greater Houston area all share the distinction of being primarily funded by petrochemical companies. During the 1970s there were several oil companies involved. Since the mid 1980s, all of the large scale master planned communities, developed by Newland Communities, have been funded by the same company, Hunt Realty, which is the directly involved in oil and real estate.



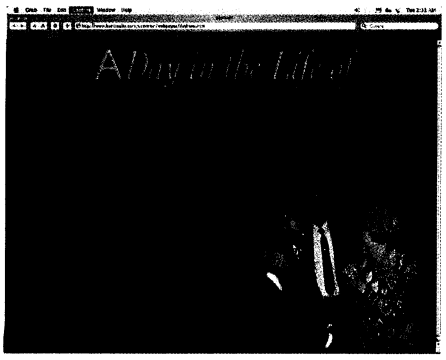
Yemen Discovery

Gulf Operations

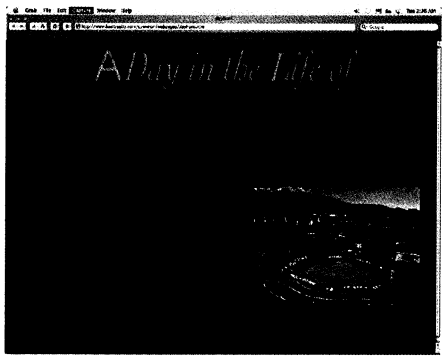
Yemen Desert Expanse



Timeline of MPC Creation and Financing in Houston



Yemen Guest in Texas



Hunt Realty in California

Lake Las Vegas

[redacted] GREATWOOD

[redacted] Seven Meadows
The Feeling of Home.

[redacted] GRAYSON LAKES CLASSIC HOMES OF LAKESIDE ELEGANCE

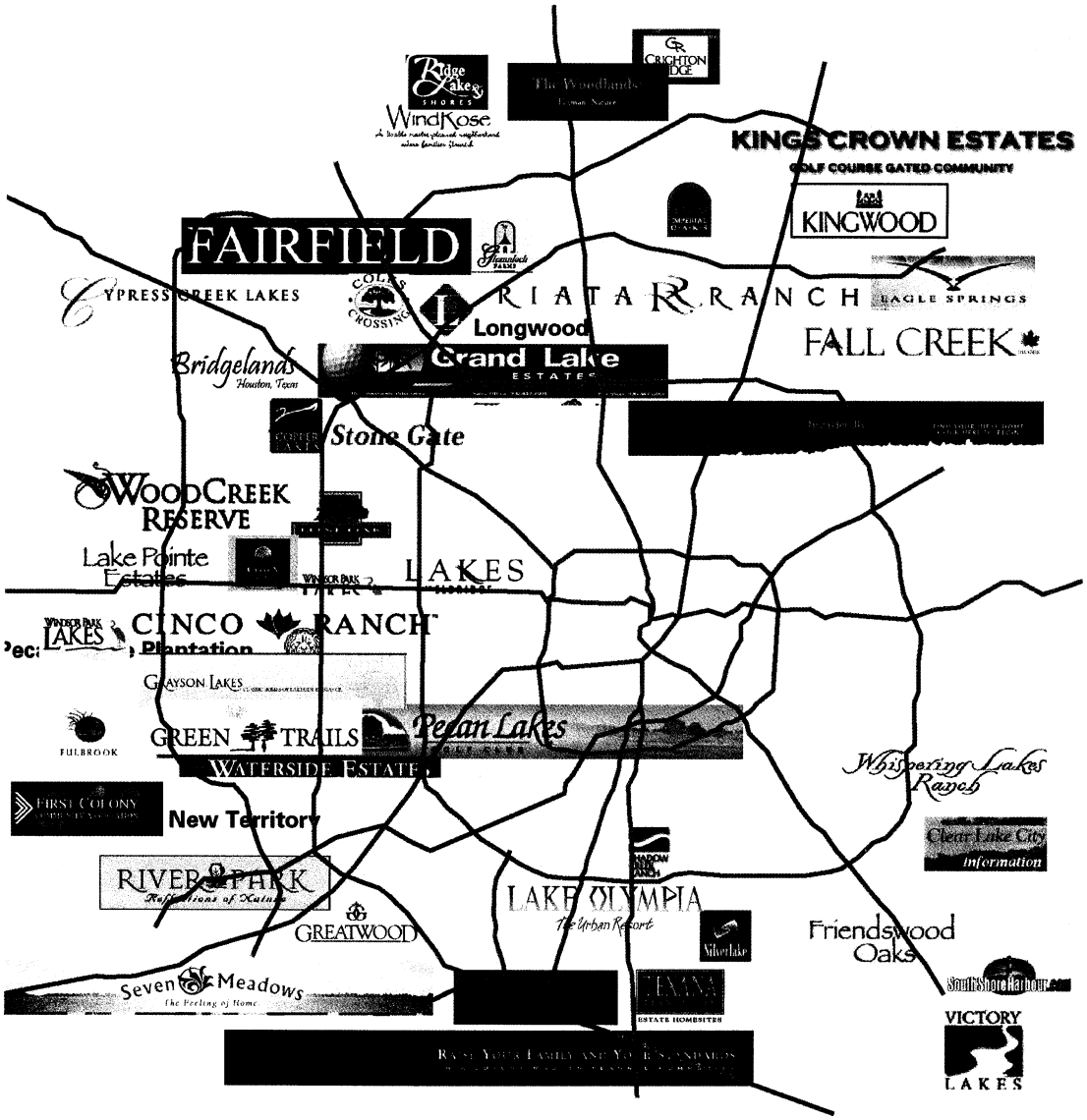
[redacted] EAGLE SPRINGS

[redacted] CINCO RANCH

[redacted]

1997 2000 2003 2005

Starting with the Woodlands in 1974, and followed by Kingwood "The Livable Forest", the forest has been an ideal of the private town marketing machine. However, since the mid 1980s, water has taken over the iconography of these developments. In projects like the Bridgelands and Windsor Park Lakes, water is being used not only as as a natural feature but as a moatlike boundary of single family space.



Water Related Terminology
46 Terms Used

Lakes	Lakes	Lakes	Lakes
Lakes	Lakes	Lakes	Water
Lakes	Lakes	Lakes	Water
Lakes	Lakes	Lakes	Bridge
Lakes	Lakes	Lakes	Bridge
Lakes	Lakes	Lakes	Springs
Lakes	Lakes	Lakes	Springs
Creeks	Creeks	Rivers	Shore
Creeks	Creeks	Rivers	Shore
Creeks	Rivers	Harbour	
Creeks	Rivers	Creeks	

Tree Related Terminology
17 Terms Used

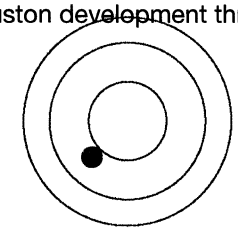
Woods	Woods	Oaks	Grove
Woods	Woods	Oaks	Grove
Woods	Woods	Oaks	Pecan
Woods	Woods		Pecan
Woods	Woods		

Repetition Repetition Repetition
Other Repeated Terms

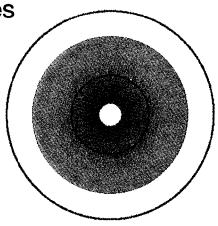
Plantation	Estates	King	Meadow
Plantation	Estates	King	Meadow
Plantation	Estates	Stone	Point
Plantation	Estates	Stone	Point
Ranch	Sugar	Lands	
Ranch	Sugar	Lands	
Ranch	Sugar	Pecan	
Ranch	Copper	Pecan	
Park	Copper	Ridge	
Park	Gate	Ridge	
Park	Gate	Rose	
Park	Grand	Rose	
Park	Grand	West	
		West	

Densities and Parameters

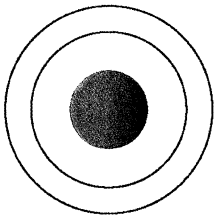
Houston development through a set of abstract density studies



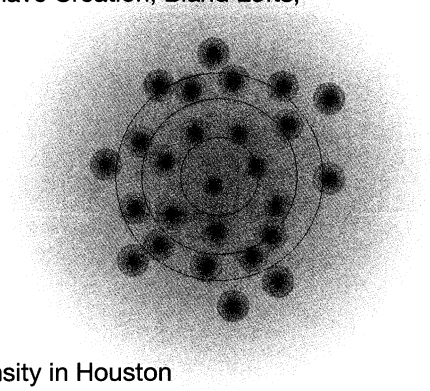
The Most Dense Area of Houston
A lower income neighborhood outside the loop



Suburban to Near Downtown
Enclave Creation, Bland Lofts,

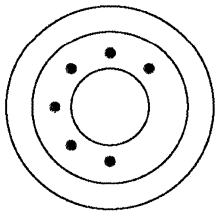


Inner Loop East to West Gentrification
Neighborhood Eradication, Rampant Metro Speculation

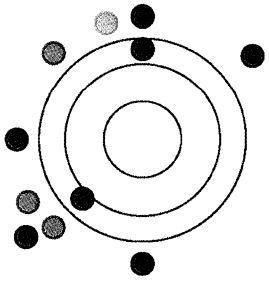


Density in Houston

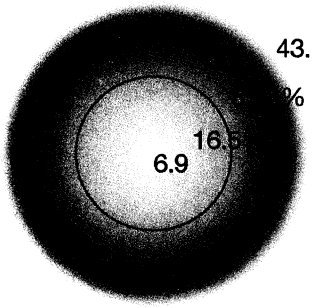
Houston Population Movements



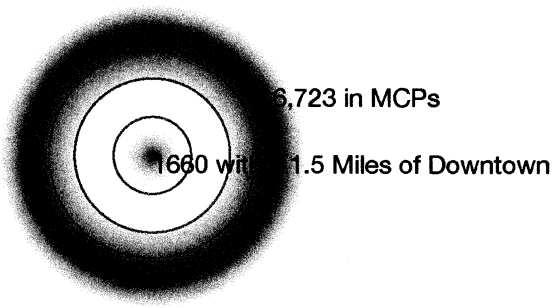
Suburban Cul De Sac
Early Wave



Exurban Ghettos(MPC's)
Recent Wave



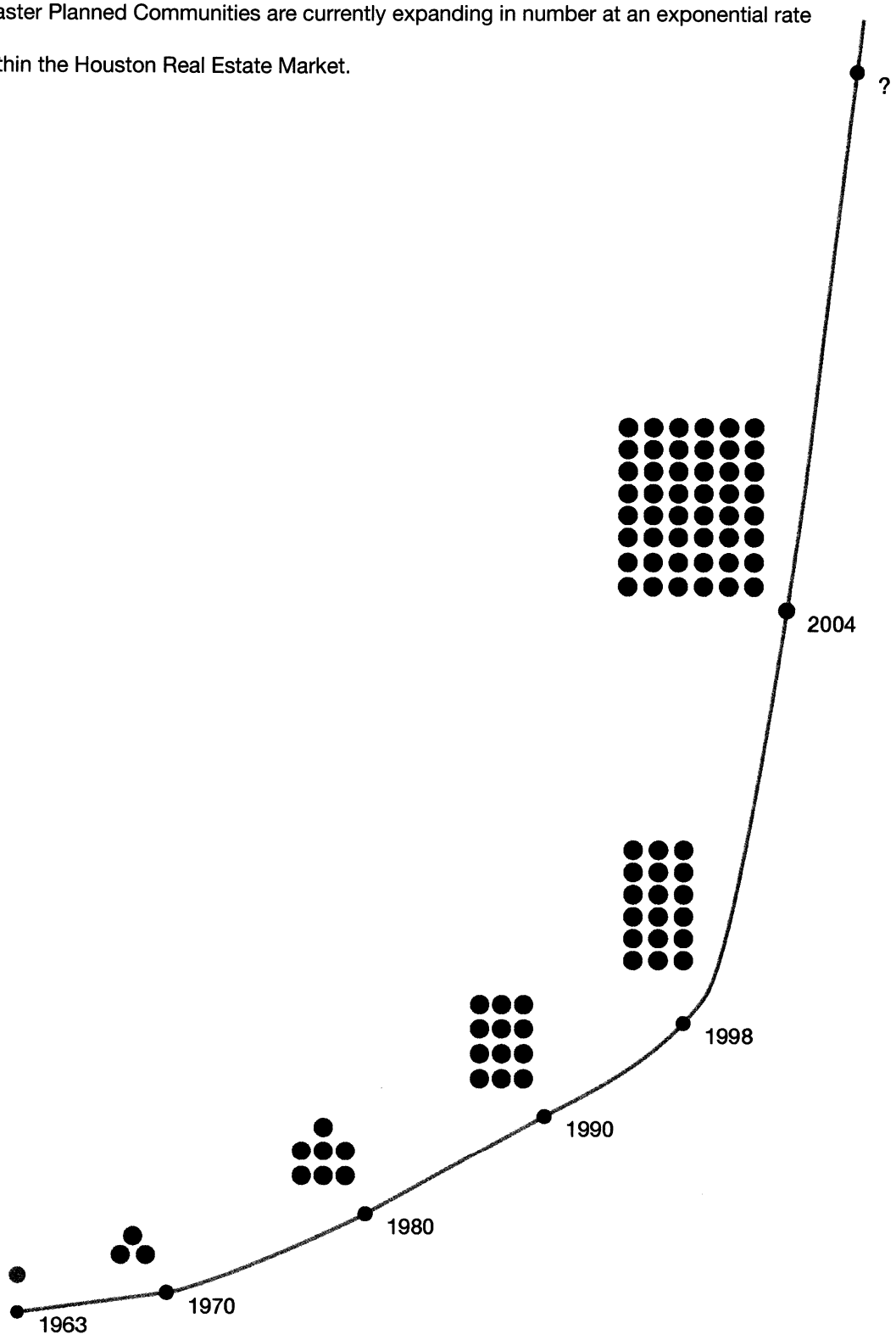
Population Growth (1990-2000)



New Housing Units in 2002

Exponential Production Curve of Master Planned Communities 11

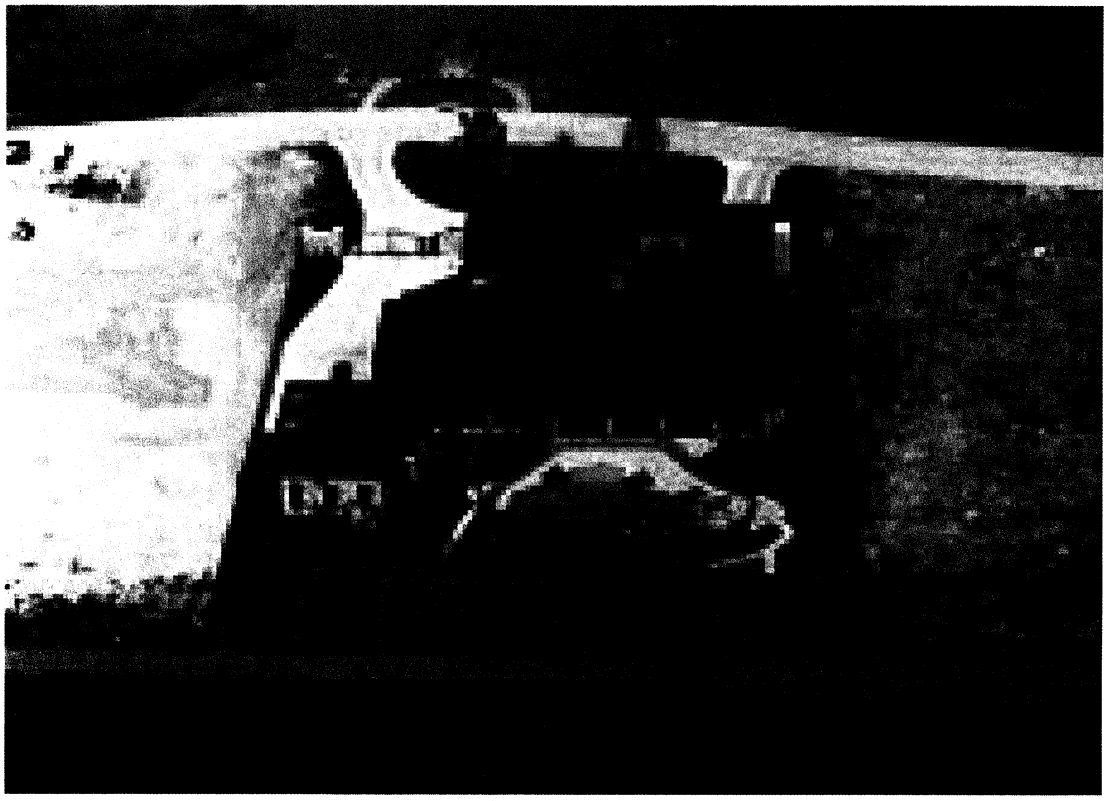
Master Planned Communities are currently expanding in number at an exponential rate within the Houston Real Estate Market.



Case:

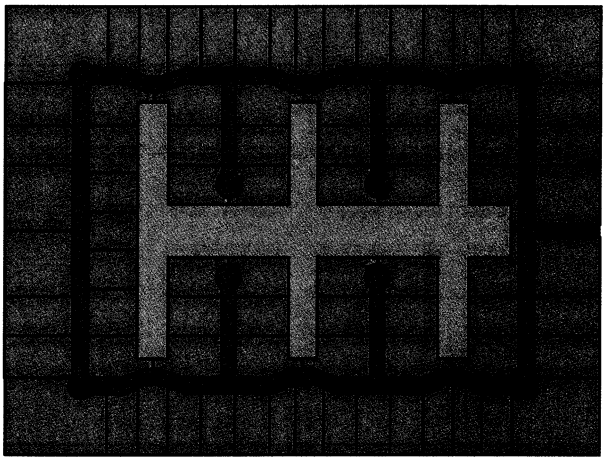
Water Related Master Planned Communities

The following case study looks at Master Planned Communities that integrate manufactured water features into the developments. There is an increasing use of topography as an element in the architectural development of the site, as the populace becomes all too familiar the old suburbs. New Suburbs are currently marketed as dually a home and a vacationland at the same time. You can be on vacation and in a safe domestic preserve at the same time.



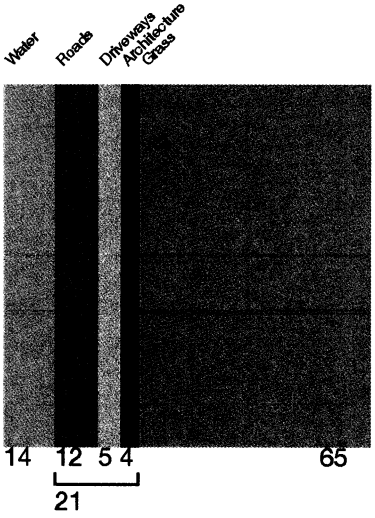
Landscape as Crenulated Court

The Lake Points estates maximizes the size of the lots (about 1 acre), while keeping a low density overall. The pricing of lots is more expensive overall. The strategy of design was to back as many lots as possible up to the water feature.

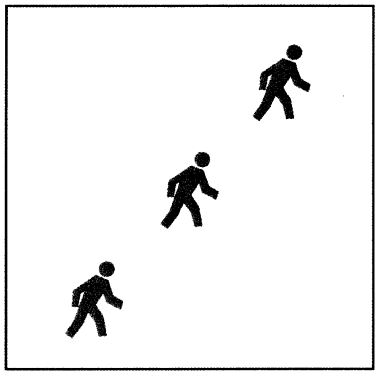


Lake Pointe Estates
79 1 acre lots

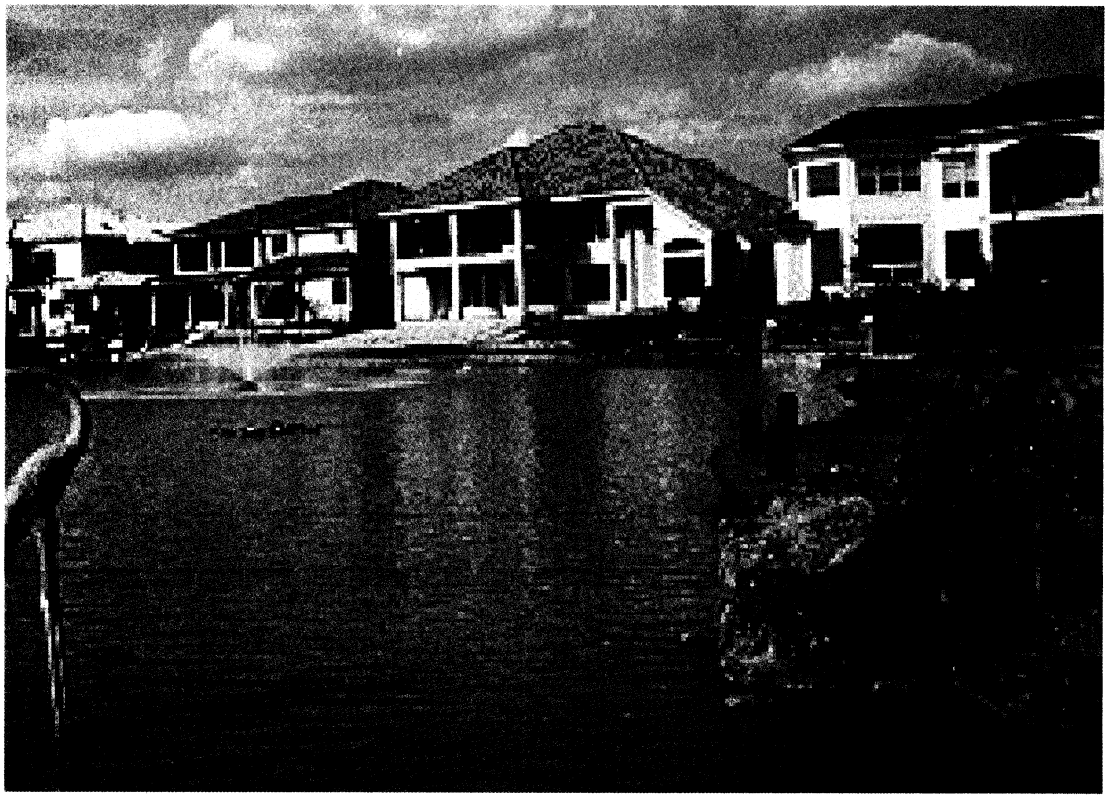
Surface Covers



Densities

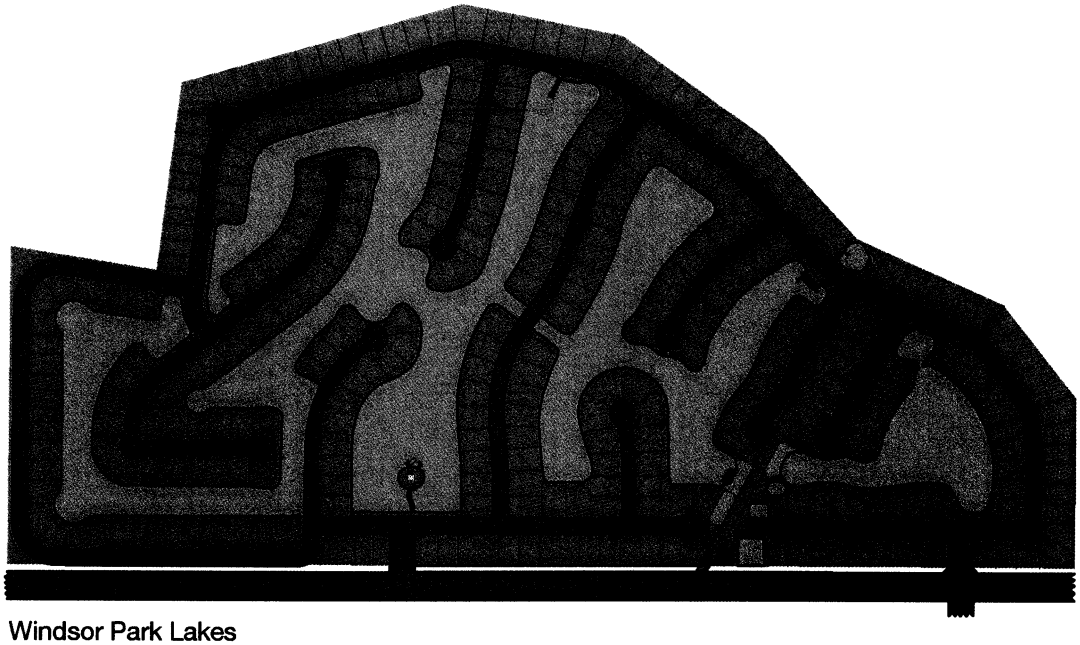


3.0 people/acre



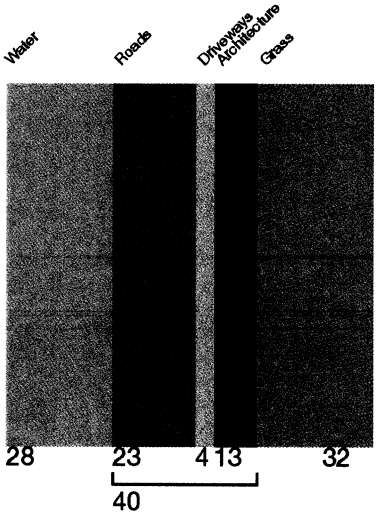
Landscape as Secondary Cul de Sac

This landscape follows a basic cul de sac plan instead of the previous orthogonal one, while it attempts to back up as many lots as possible to the water feature. Since marketing demands that as many lots as possible be fronted by water, these types of plans are solutions to certain marketing problems.

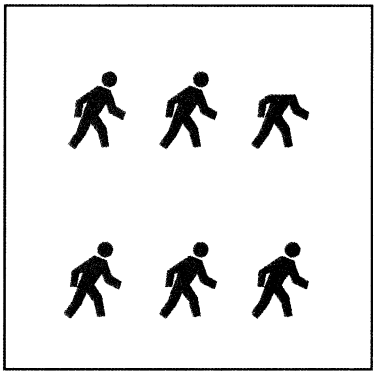


Windsor Park Lakes
300 1/3 Acre Lots

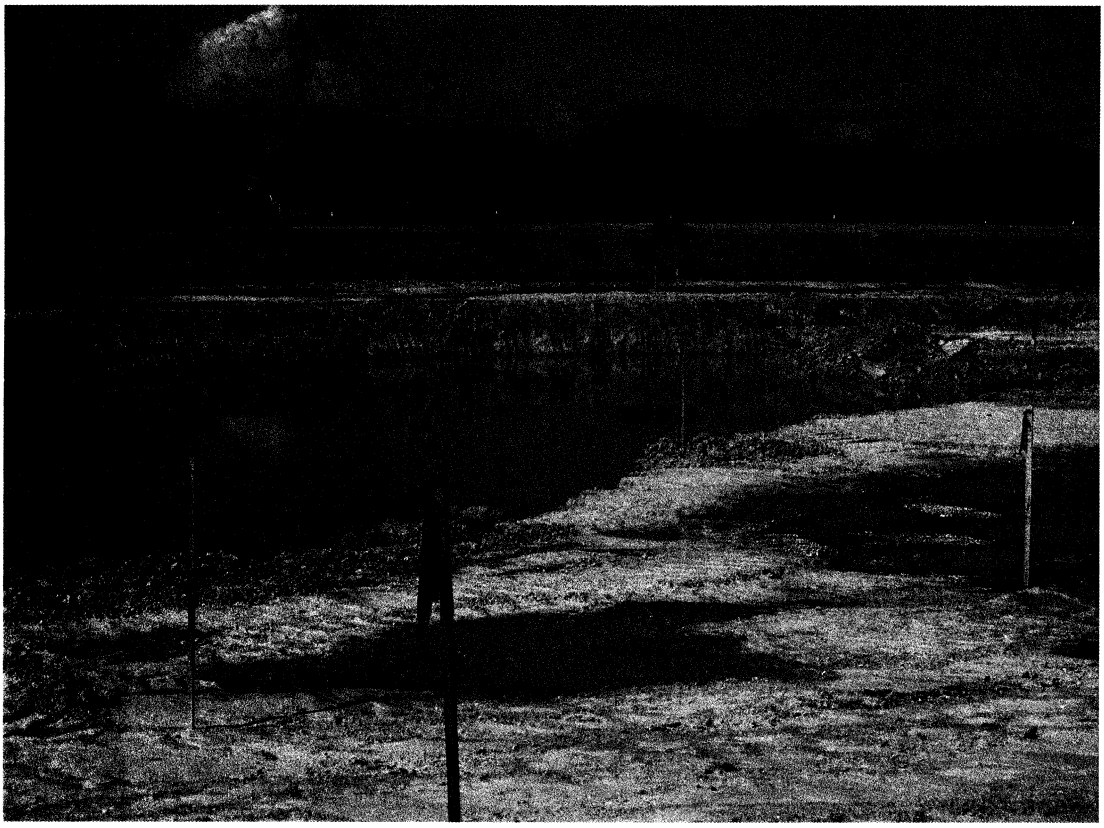
Surface Covers



Densities

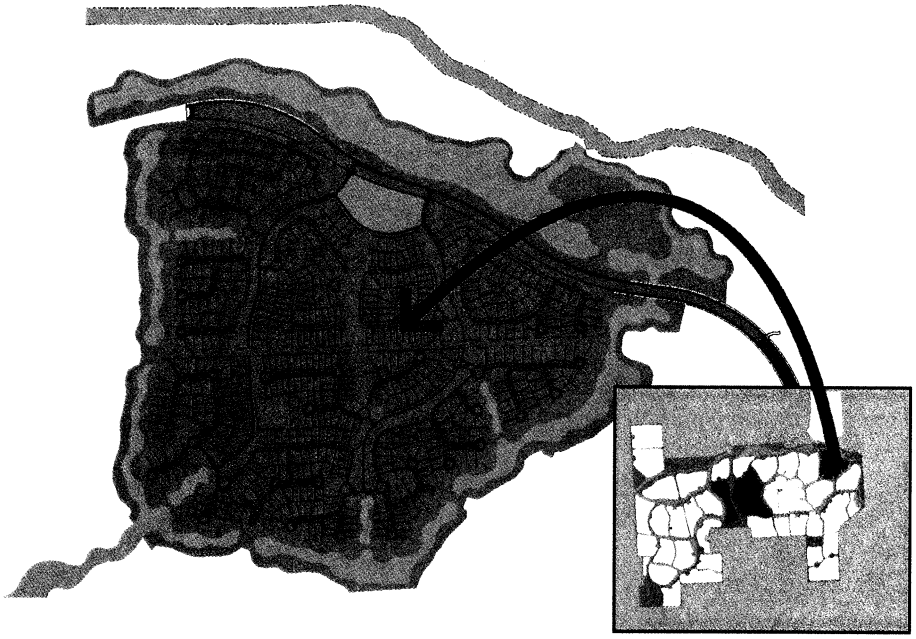


5.9 people/acre



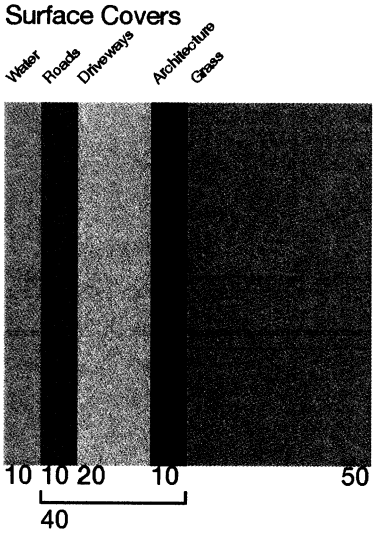
MoatLife, Landscape as Exterior Barrier: The Bridgelands

The Bridgelands is the largest of the new Master Planned Community developments in the Houston metropolitan area. The first section, being developed this year, is being called the largest engineering project in the metropolis this year. This development has been taken on by the Rouse Corporation, the same company that brought Houston the Woodlands, and has been bringing you more of the Woodlands since the mid 1970s. This ostentatious development proposes a series of moats separating around 20 cluster subdivisions within the greater development. The whole development will be bisected by a future stretch of the Grand Parkway, with exits within the development offramping at a commercial mall to fill the "heart" of the project (pictured in red below in the smaller map).

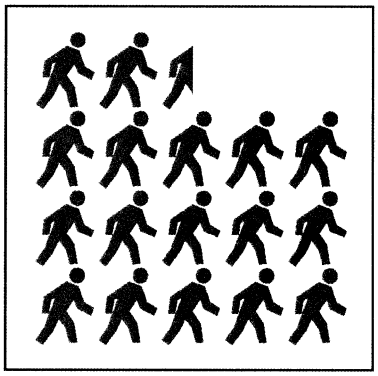


The Bridgelands
1/4 Acre Lots on 10,000 Acres
Potentially 50,000 Homes Total

Surface Covers



Densities



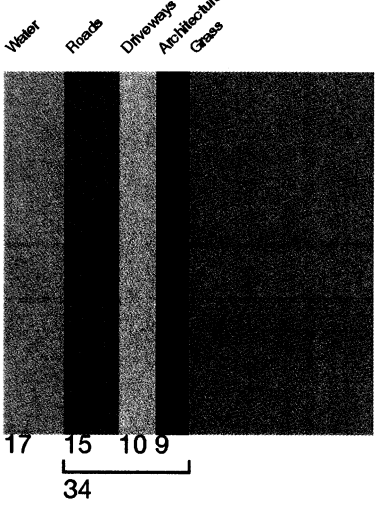
17.8 people/acre

Averages for the past 3 Developments 21

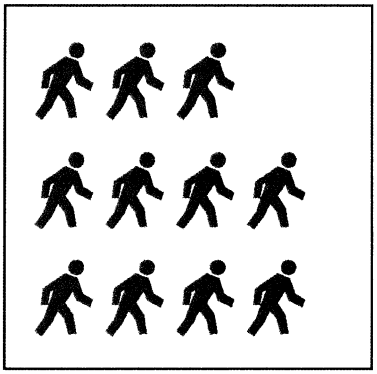
Even within the ex-urban master planned developments, densities are increasing as developers attempt to provide for various budgets.

Master Planned Developments Averages

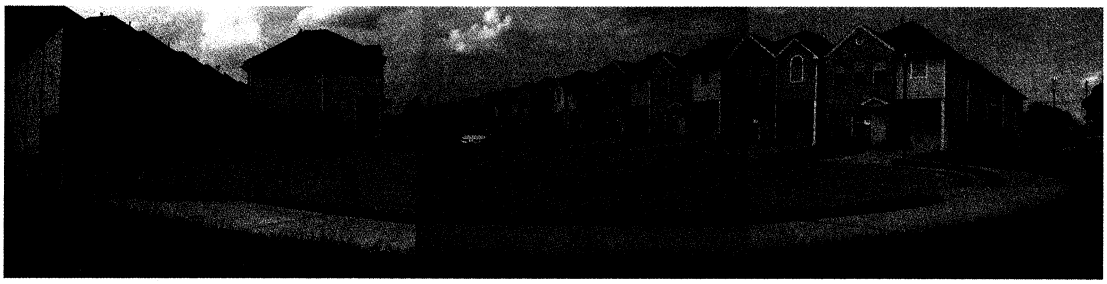
Average Surface Cover



Average Density



11.0 people/acre (Average Houston Density 5.2 People/Acre)



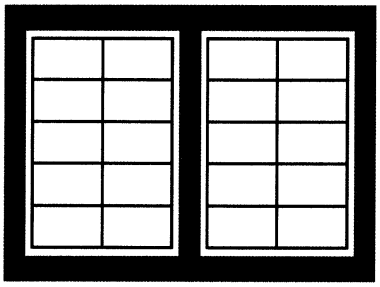
Fifth Ward Clinton Road Development

The fifth ward, as opposed to the developments studied on the periphery of Houston, have been seeing highly dense projects arise in the last few years along the Clinton Drive corridor. Recent developments like the Ballpark Homes have been building at 5 times Houston's average density. Innovation in achieving this density comes about while in this case still maintaining small dwellings of two families each. Lots are split in half, and occupancy doubled, so that on one lot, occupancy is quadrupled from its past conventional use.

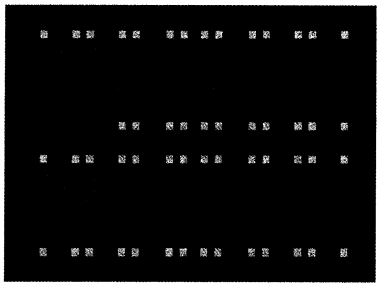
Urban Context Recent Development in the 5th Ward
(BallPark Plaza) The shrinking Single Family Home

Development Strategy

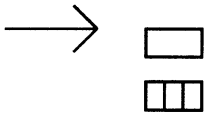
Old Lot Parceling
20 X(50 X 100) Lots)



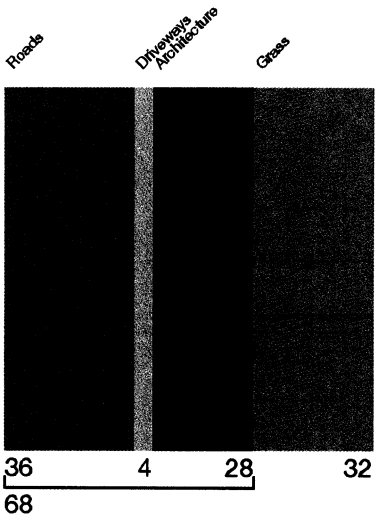
Finished Plan
49 X(33 X 50) Lots)



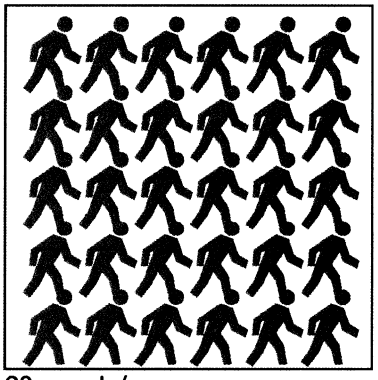
New Parcelization Tactic



3 X(33 X 50) Lots)



Average Density



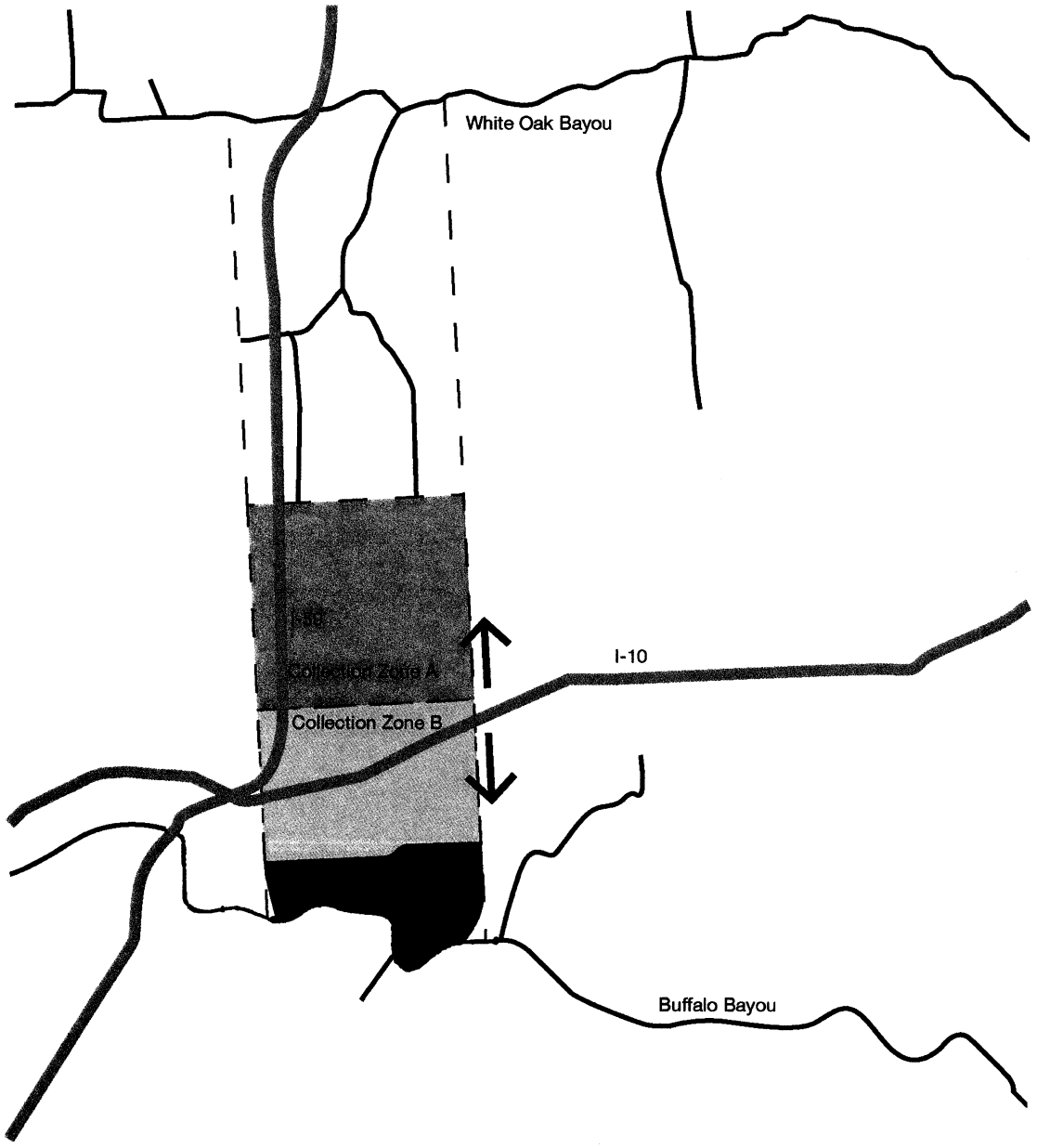
30 people/acre

Water Systems as a basis for Coding Strategies

The site chosen for the thesis will serve as a net of various interests interweaving. Marketing systems and water retention systems will combine in a master plan of a large tract of land northeast of downtown Houston. Urban codes will serve as a means of structuring the development of the site as a whole while leaving certain outcomes up to a hypothetical group of sub-developers working off of them. Their unpredictable responses to the rules will allow the outcome, or evolution of the site to maintain a heterogeneous character.

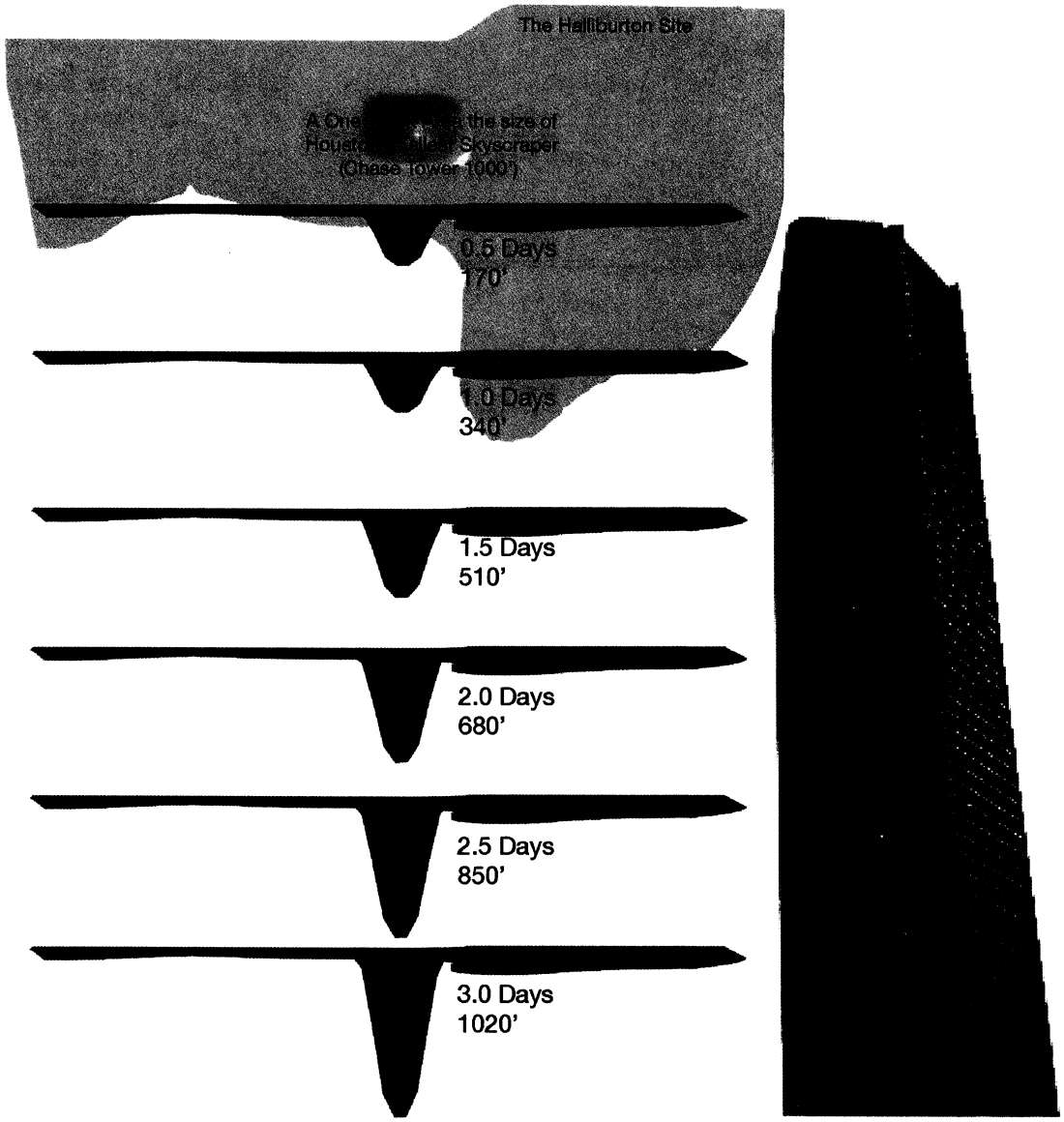
Bayou Collection Zone

The collection zone for the site in question would equal 1/2 the land area between the 2 bayous of Buffalo and White Oak. To calculate the amount of floodwater accumulation on the Halliburton Site, It is necessary to find out what amount in runoff would hypothetically be running across the site towards the bayou. In this case, an estimate is made as to the collection zone limits between the two bayou systems.



Flood Accumulation on Site:

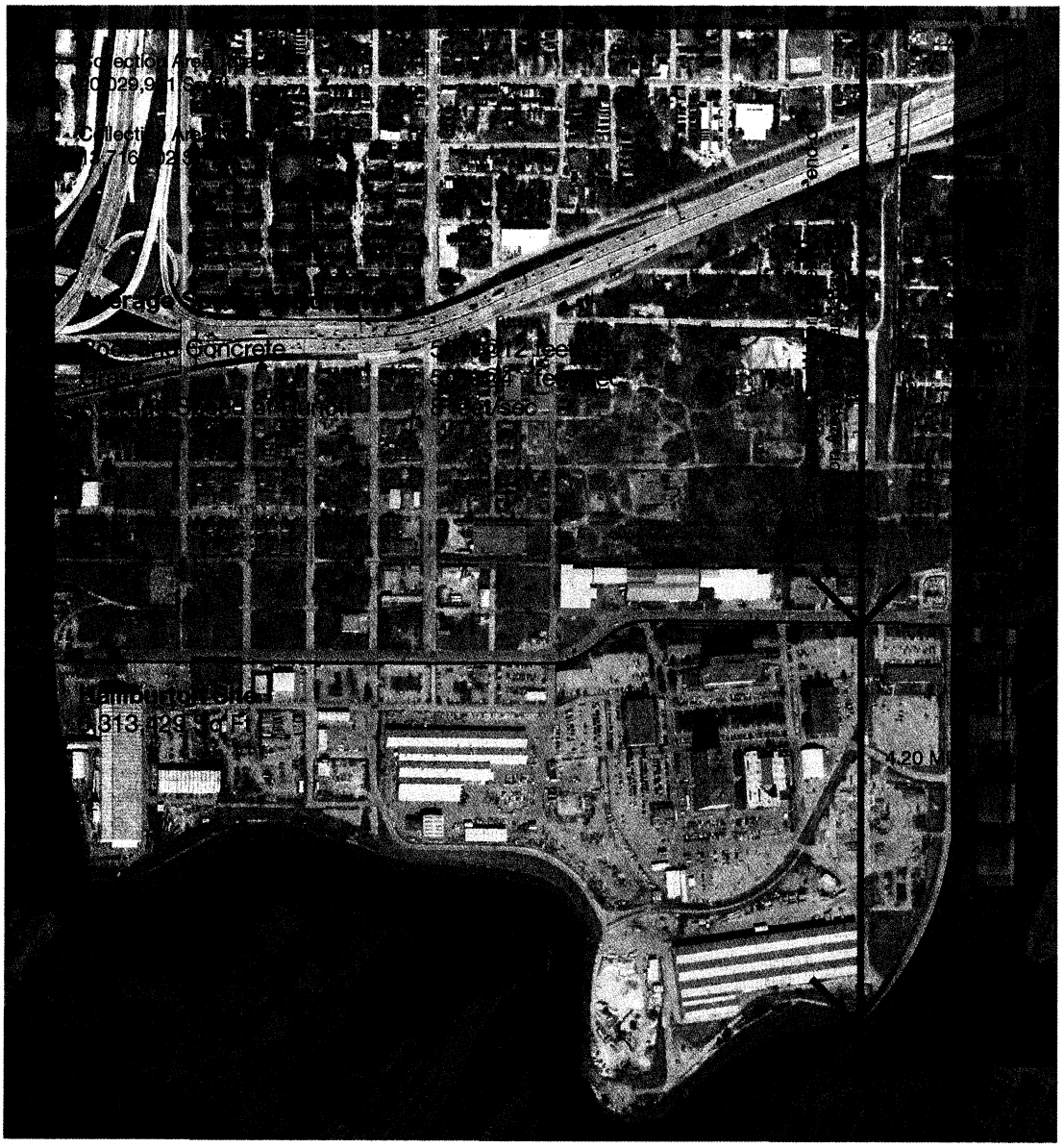
Measured against a three day flood (Storm Allison from 2001). Analysis of coding possibilities on the site start from an idea about retention during a 100 year flood like Storm Allison of 2001. If future development on this property is to take into account flood accumulation, and hold its own potential runoff for a period of 3 days (The actual length of the storm), what scale topographical work would be required on the site? Accounting for runoff onto the site, and for rainwater accumlation, the volume needed would hypothetically be larger than the largest skyscraper in Houston.

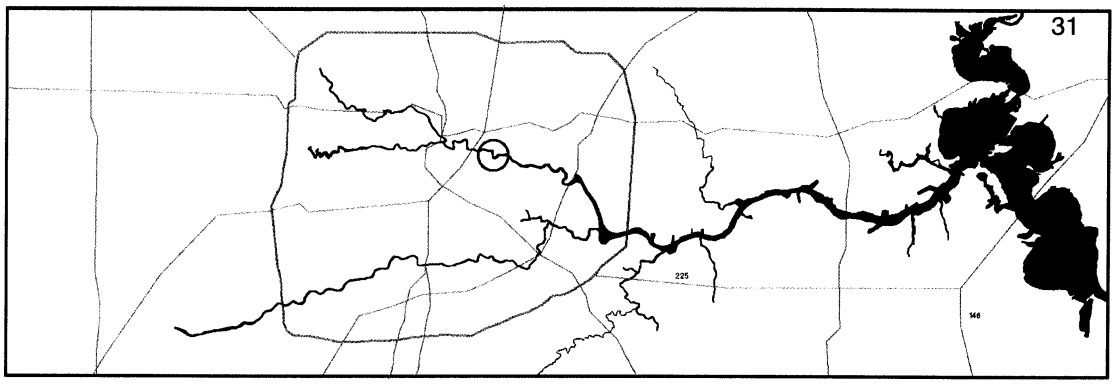


Water Collection Area 28

To account for runoff coming from the collection area, the hypothetical volume is calculated. Water potentially crossing the Halliburton site in the case of a 100 year flood would be three times the amount of water falling onto the site in the form of rain.

While various types of materials have different speed coefficients at which water flows across them, the very small times listed on the right would dictate that some other method of rainwater retention besides just slowing the water be the primary one.





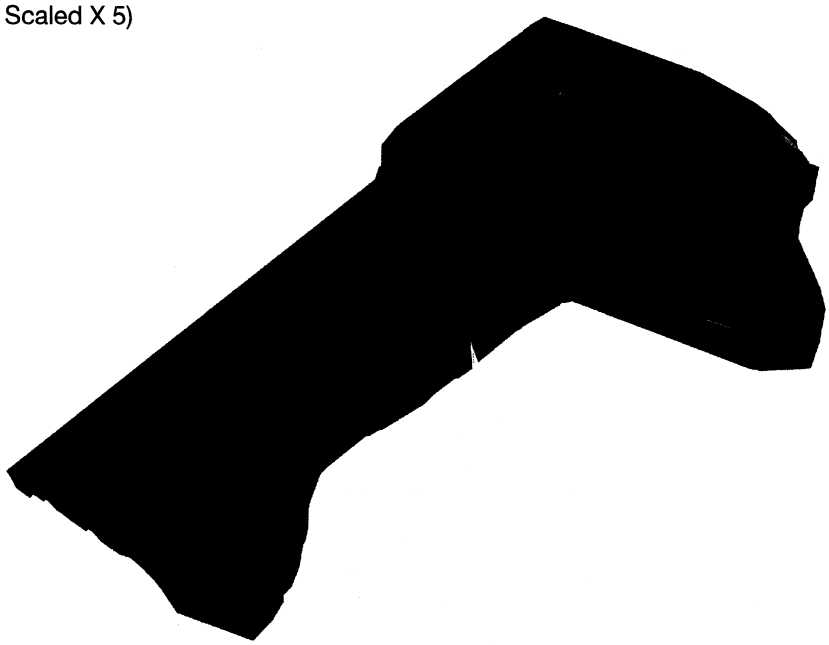
Scenarios for the Site

Three scenarios will be run out on the Halliburton site through a logic of coding potentials for the site. All three scenarios deal with the issue of the landscape of the site retaining water that falls on it or passes over it, for the duration of a 100 year flood.

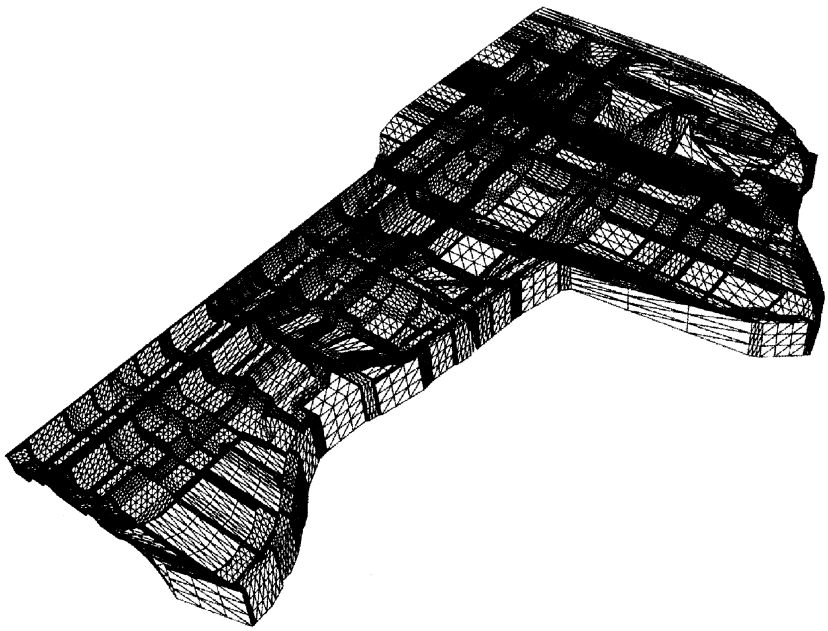
The first two scenarios will illuminate two extreme ways of dealing with the issue of water retention on site. While they are not entirely practical, they illuminate certain possibilities which might be used on a smaller scale in a final model. The first model replicates the development strategy of the water based master planned communities of the ex-urban periphery of Houston. The second model shows what would happen in the architecture of the development, instead of the landscape, were required to deal with water retention as a design criteria.

The third and final model incorporates elements from the first two models, and seeks to find a way of meeting both developer and ecological potentials of the site through the creation of a new form of bayou.

Surface Model of Lake
(Vertical Dimension Scaled X 5)



Vector Based Render
(Vertical Dimension Scaled X 5)



Retention
Retention must be 50% of area size to accomodate development in a floodplain
All Lots must have water adjacencies

Parcels follow densities prevalent in ex-urban master planned communities
Using an Average Density (11 people/Acre)

Retention
Plan doesn't account for any type of water management other than as a holding tank. There is no remediation capability. Water is only a visual amenity, and has no value as a recyclable resource, etc.

Populations
164 Single Family lots X 2 people
328 people

164 Duplexes(Double Floor)
656 people

29 quad occupancy lots(3 story multiplexes)
232 people

260 apartments in mixed commercial area(X1.5)
390 people

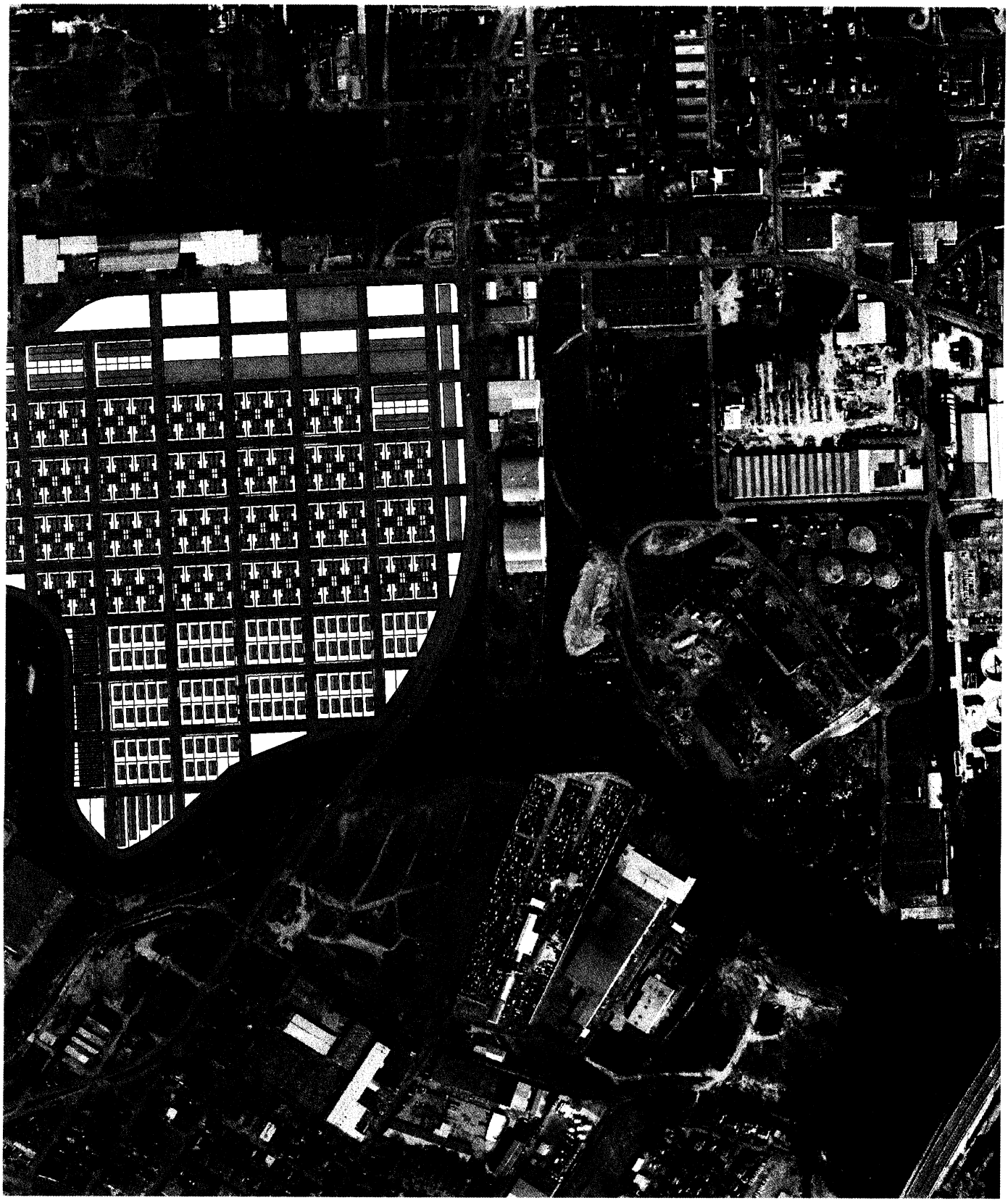
Total 1606 people
Density 12.4 people/acre

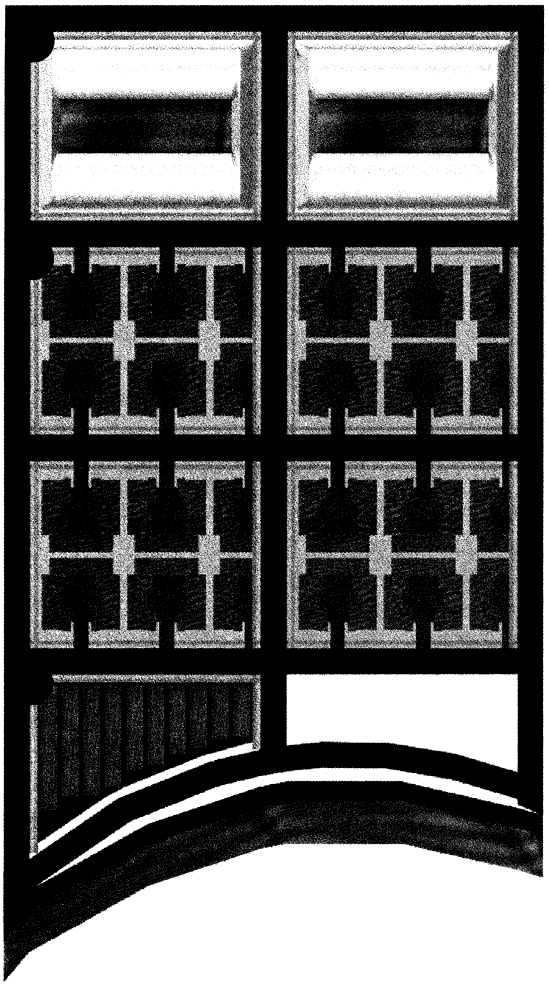
Populations
Density is spread out rather evenly across the site, with similar access to amenities that are not common, but similar. Density does not even approach that found in new projects in the 5th ward (New block densities are at an outrageous high for Houston of 30 people/acre).

Amenities
Lakefront access for all properties not in the Northeast corner.

Amenities
Amenities other than the lakefront are lacking, and would require more clustering of population in future models to offset space necessary for them.

Integrated Lake Model
This model is based on the existing models present on the periphery of the city. It's characteristics are present in the various case studies done earlier in the semester. Water in this case is an amenity, so it must be visually there all of the time. The basins would have to function doubly as retention area, and so would have to be as deep as 23 feet. This model shows a developer logic operating on a mainly single family lot as a comparison to the densities used in the master planned communities studied.

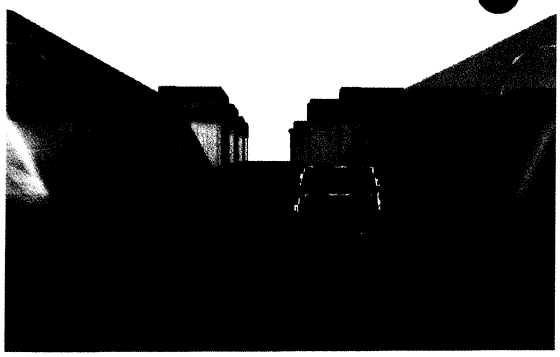


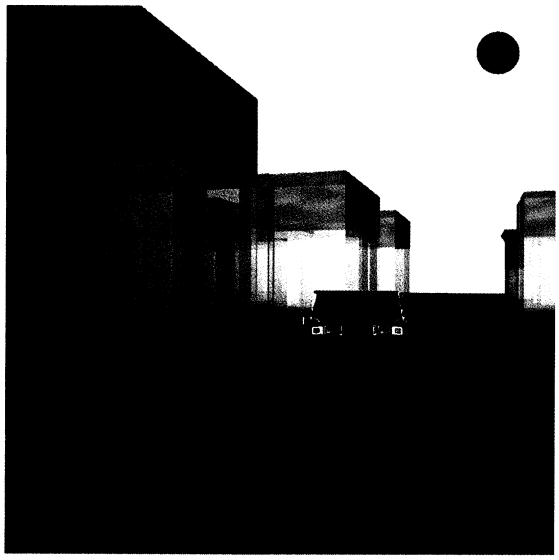


Mat Model
The mat model is not necessarily the most dense model for the site, but is the most severe expression of impermeability of the site surface or ground plane. In this demonstration, which is most close to developer driven projects currently taking place in near-downtown and midtown areas, architecture takes on the work of accounting for the water potentially moving across the site

Synopsis: Retention Strategy
Strategy is cumbersome at best to the architects, and while it might provoke outrageous solutions to the general design problem, many of these solutions are financially and practically untenable.

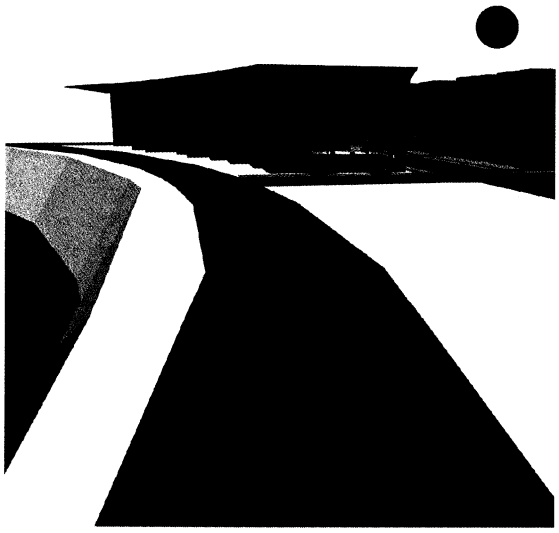
A City based on water storage
Water collection on rooves of double lot townhouses
21.6' Depth of roof collecting tanks.





6,975,000 lbs of water
per double lot townhouse

This is 1337 lbs a square foot, which is 27 times a typical snow load! and would potentially require a new form of structural solution



Single Lot houses funnel rain water from their parcel area to collection area below the living area

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80 80 80 80 90 90 80 80
90 90

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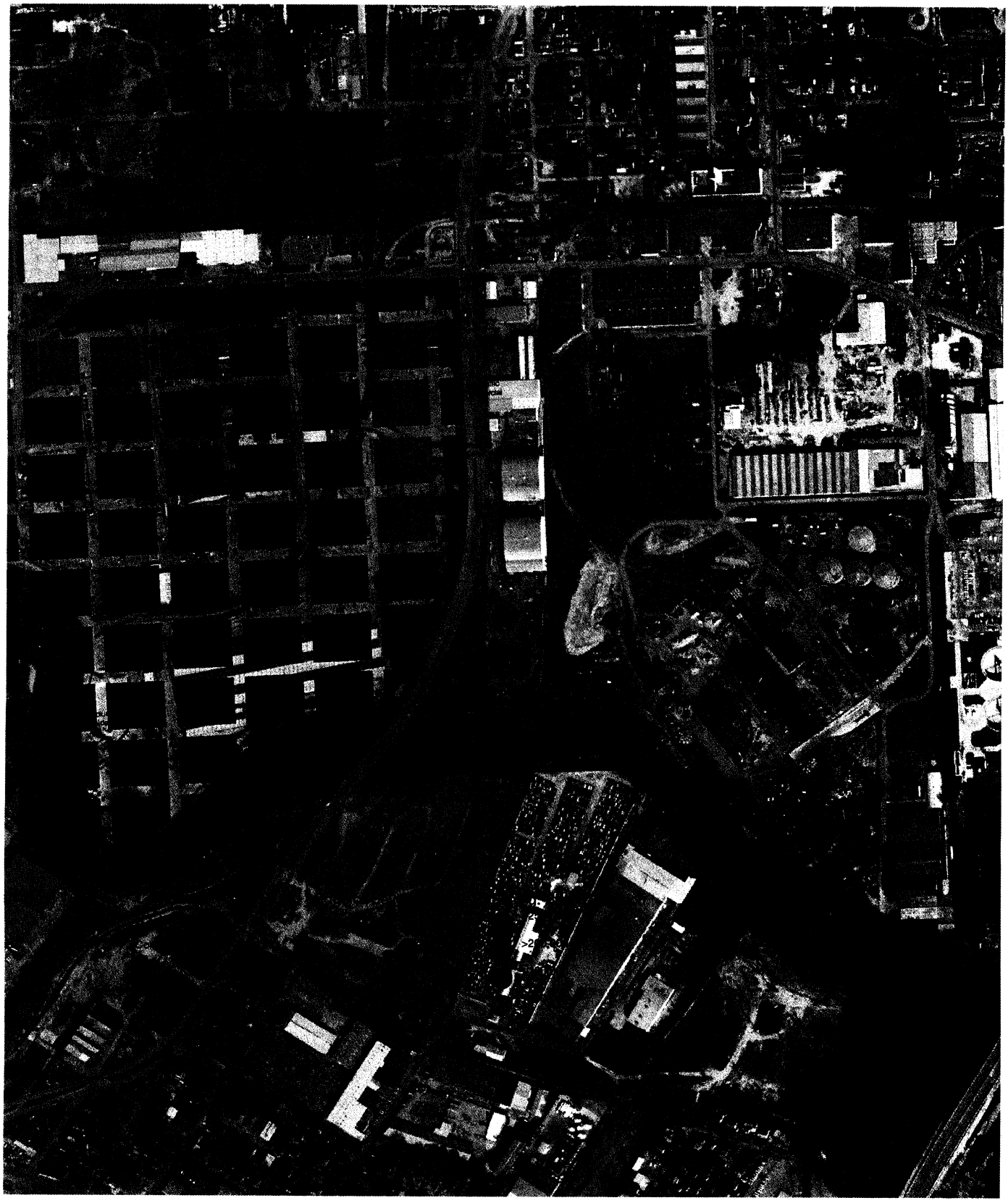
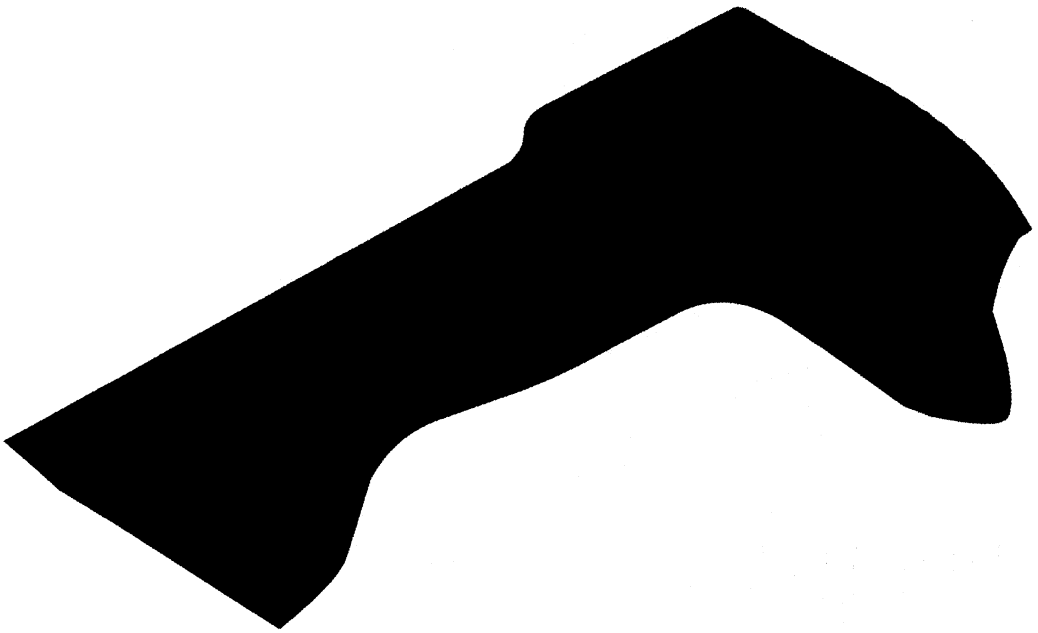


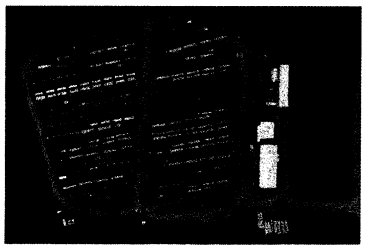
Enzymatic Remediation: Macro Scale Process

My site is currently owned by the oil services company Halliburton, and has been used as a warehouse and manufacturing space for over 100 years by that company and others. At the moment it is highly vacant, and Halliburton has even had a new facility designed for them on a different property by Gensler. This project was cancelled following the tragedy of 9-11-01, and the following financial insecurity that ensued for that company, and the country as a whole. In the instance of its becoming part of a residential project, the site would need to be remediated in some form.

Enzyme Technologies Incorporated has worked in partnership with Halliburton on several remediation projects, including the case study to the right, which occurred in Alaska. Enzyme based remediation is a month long process which cleans soil of petroleum based substances 10 times faster than comparable phytoremediation tactics.

In terms of the scheduling of cleanup on this site, the remediation could happen a BLOCK at a time, as the lots are developed by specific individuals.

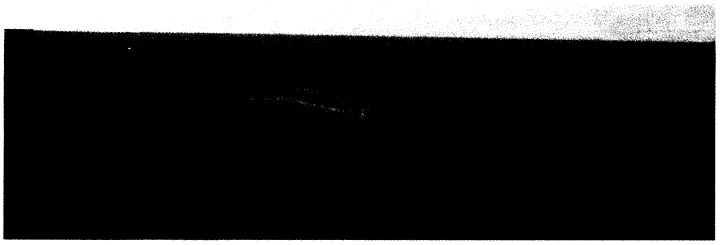




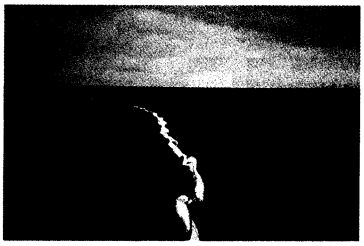
Polluted Parking Lot

Soil is Tilled

Trenches Dug to Drain Runoff



Biocell Construction and Filling



Mitigation measures put in place

Water Monitoring Module Arrives

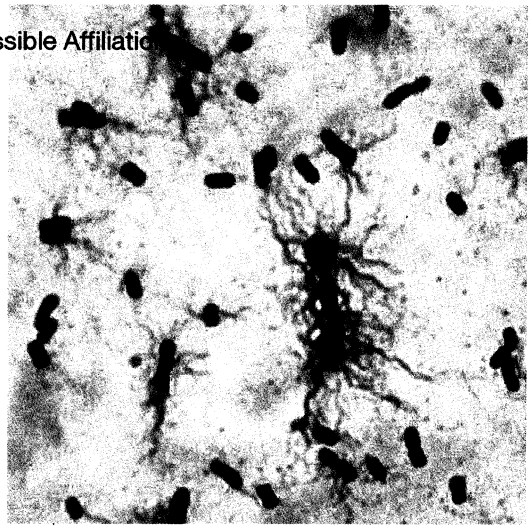
Water Transferred and Monitored over one month

Finished Site

Enzymatic Remediation
Micro Scale Process

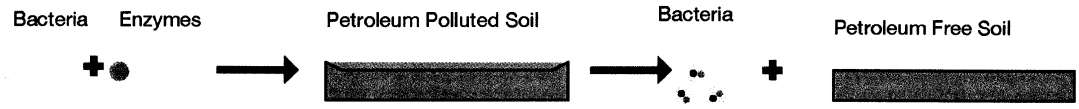
Pseudomonas

Possible Affiliatio



Proteus

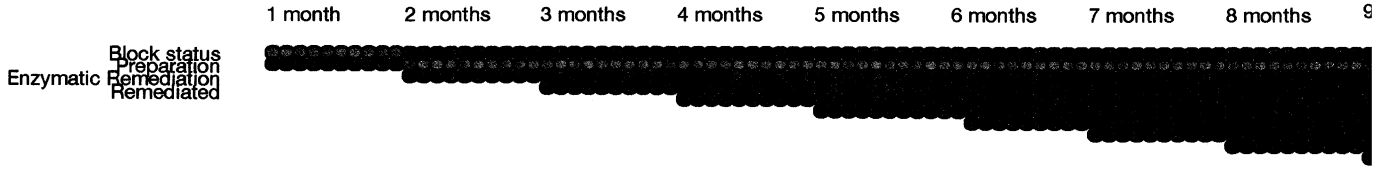
Bacillus

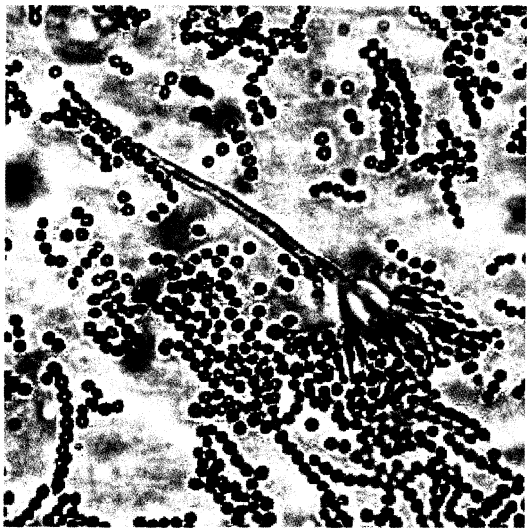


Enzymes added to the pools of water on the site help to create an abundance of certain types of bacteria, which thrive on the carbon in the petroleum molecules in the polluted soil. This process continues over the course of a

Development of Property

130 Acres Total- 5 blocks is largest area to be remediated in any contiguous area
Time for remediation of a block is 1 month





Penicillum

Cunninghamella

Cost Analysis

$34 a cubic yard
normal concentrations allowed=500mg/kg

Soil to be remediated in cu yd
130 acres X 43,560 sq ft = 5,662,800 sq ft
converted to square yards=629,199 sq yd
629,199 X 1, 2, 3, to get cubic yards

Cost Total $34 X 629,199 sq yd=$21,392,766
$283,000 per block

months 10 months 11months 12 months 13 months 14 months

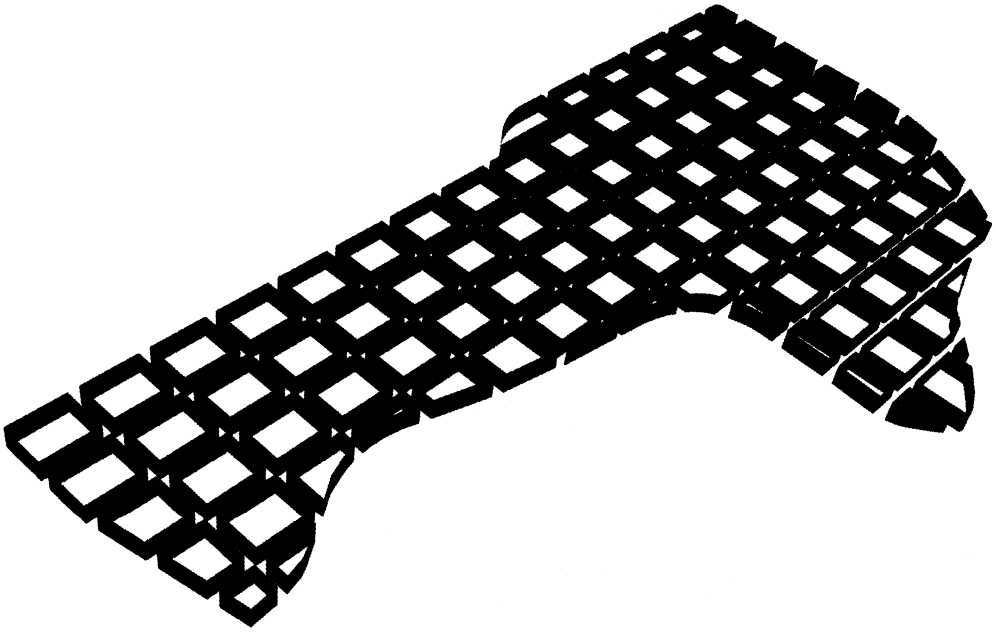
T2: Plat Formation Process 50

Blocks are remediated as they are sold to developers, and platted according to the preferences of the developers. Several developers are chosen, to diversify solutions to the "problems" inherent on the site. Platting, in this study as opposed to the Houston Building Code, has thoroughly depth related connotations

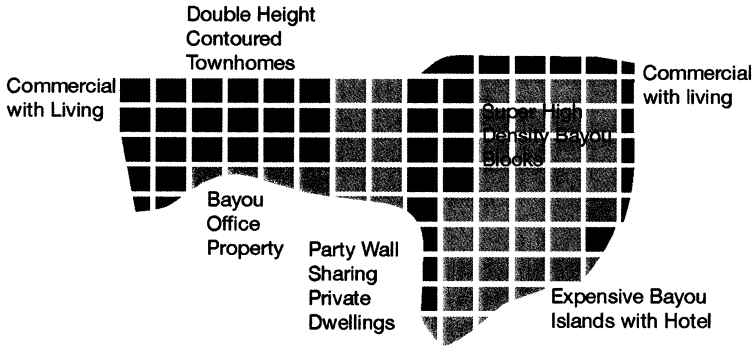
Rules for Developers
No more than four contiguous blocks can be combined into a development

Streets can be closed, as is happening everywhere within the loop, to combine two of more blocks, but access paths must take the place of streets closed in some fashion

The undeveloped area would be held in common with the general water authority of the development

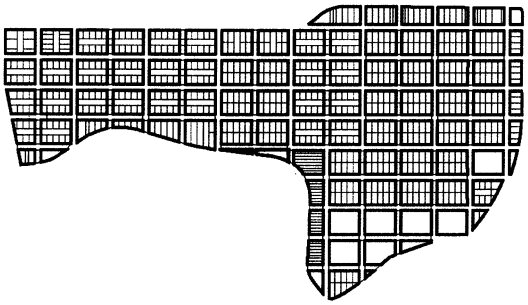


T2-1 Developer Block Choices and Intent
Developers buy certain blocks, and learn the limitations that will constrain their normal development patterns

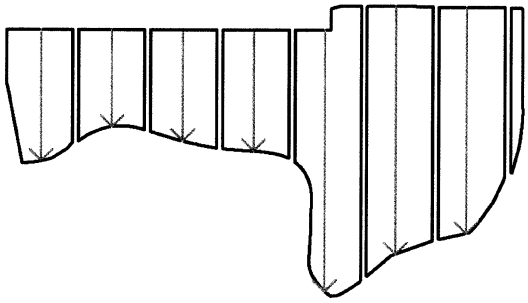


T2-2 Block Parcelization

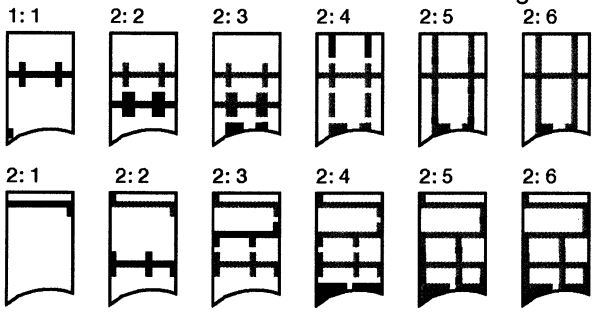
Parcelization occurs, but must account for water moving across several and not only each block.



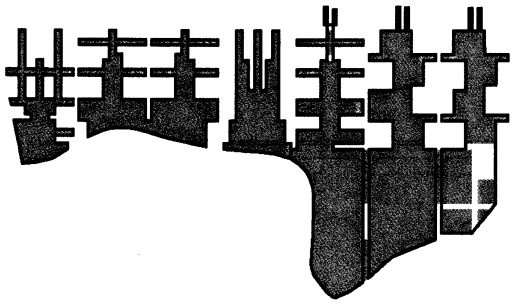
T2-3 Retention Strategy: Double Block Topography Creation



T2-4 Indeterminate Scenarios for Shedding Water

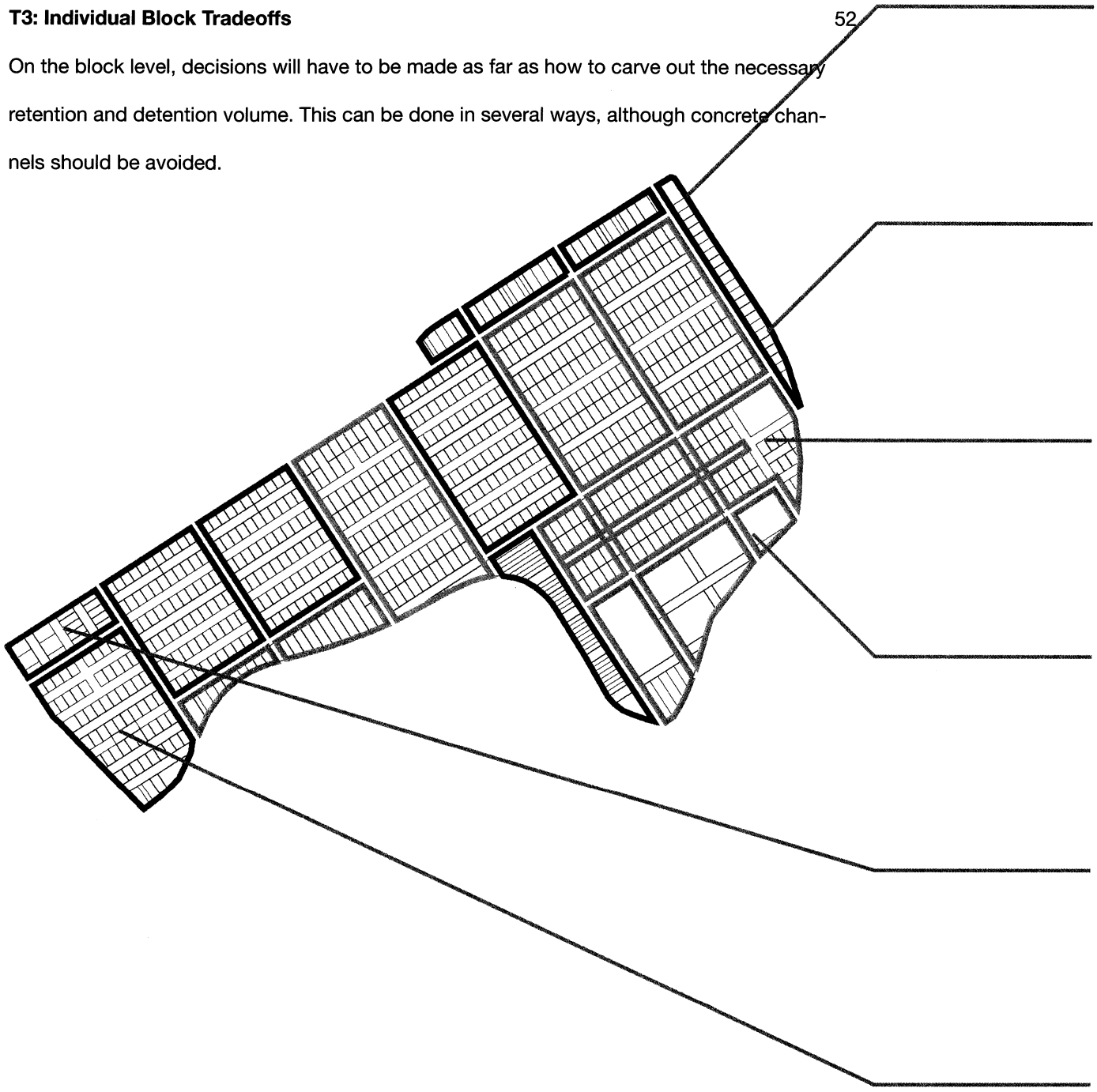


Completed Non-Developed Area Map



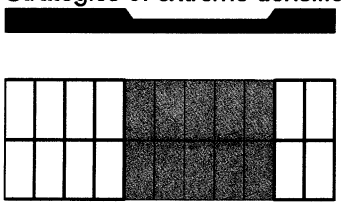
T3: Individual Block Tradeoffs

On the block level, decisions will have to be made as far as how to carve out the necessary retention and detention volume. This can be done in several ways, although concrete channels should be avoided.

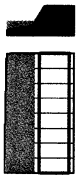


Commercial Area channels lead into main property

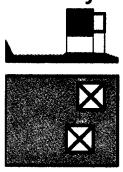
Super High Density Blocks w/ Attached Parking Garages
Strategies of extreme densification aid the creation of new forms of commons



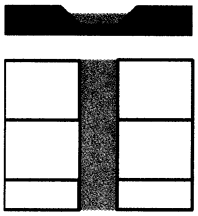
Party Wall Sharing Private Dwellings
Foregoing wasted side lots, these developed blocks have a standard footprint and shared party walls



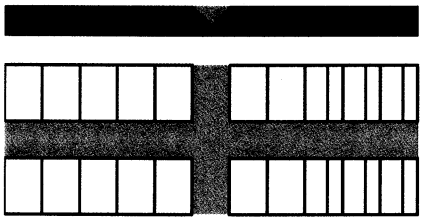
Wealthy Single Family Houses
No Parcelization
Wealthy Landowners take on the challenge of building in the bayou

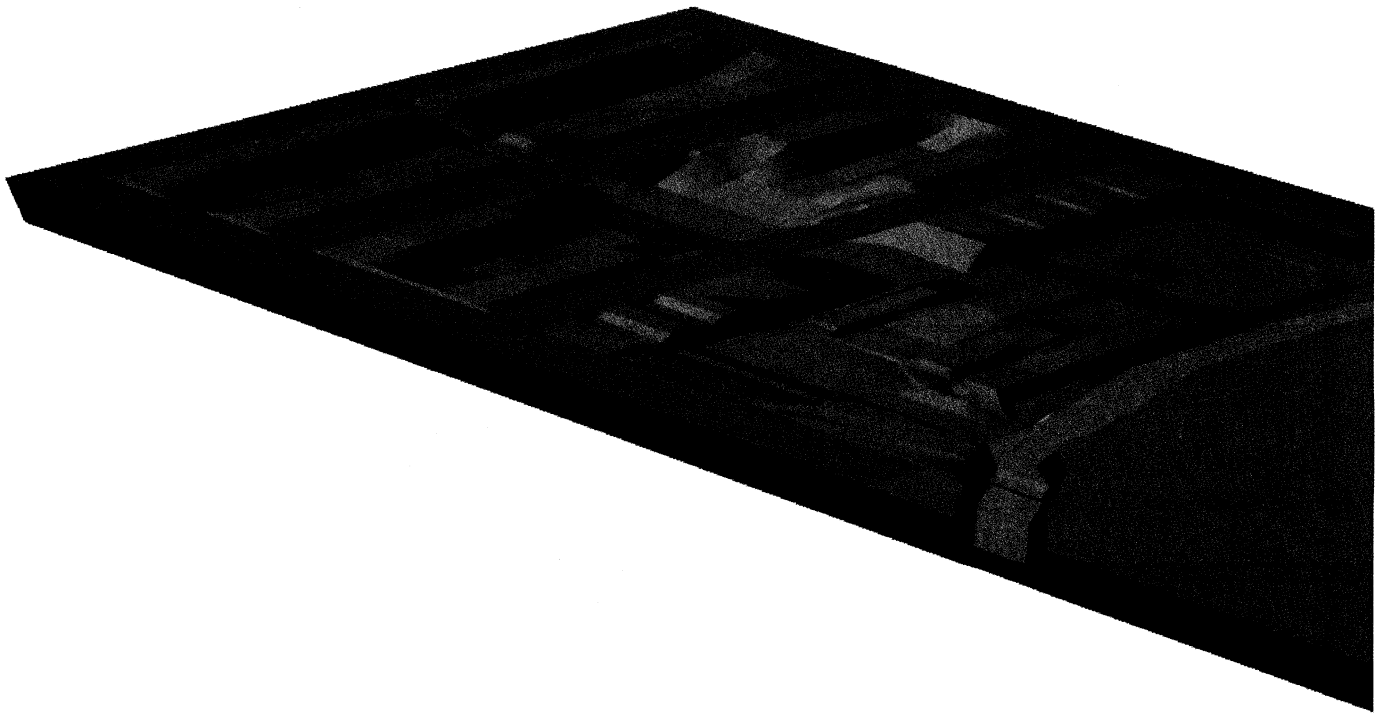


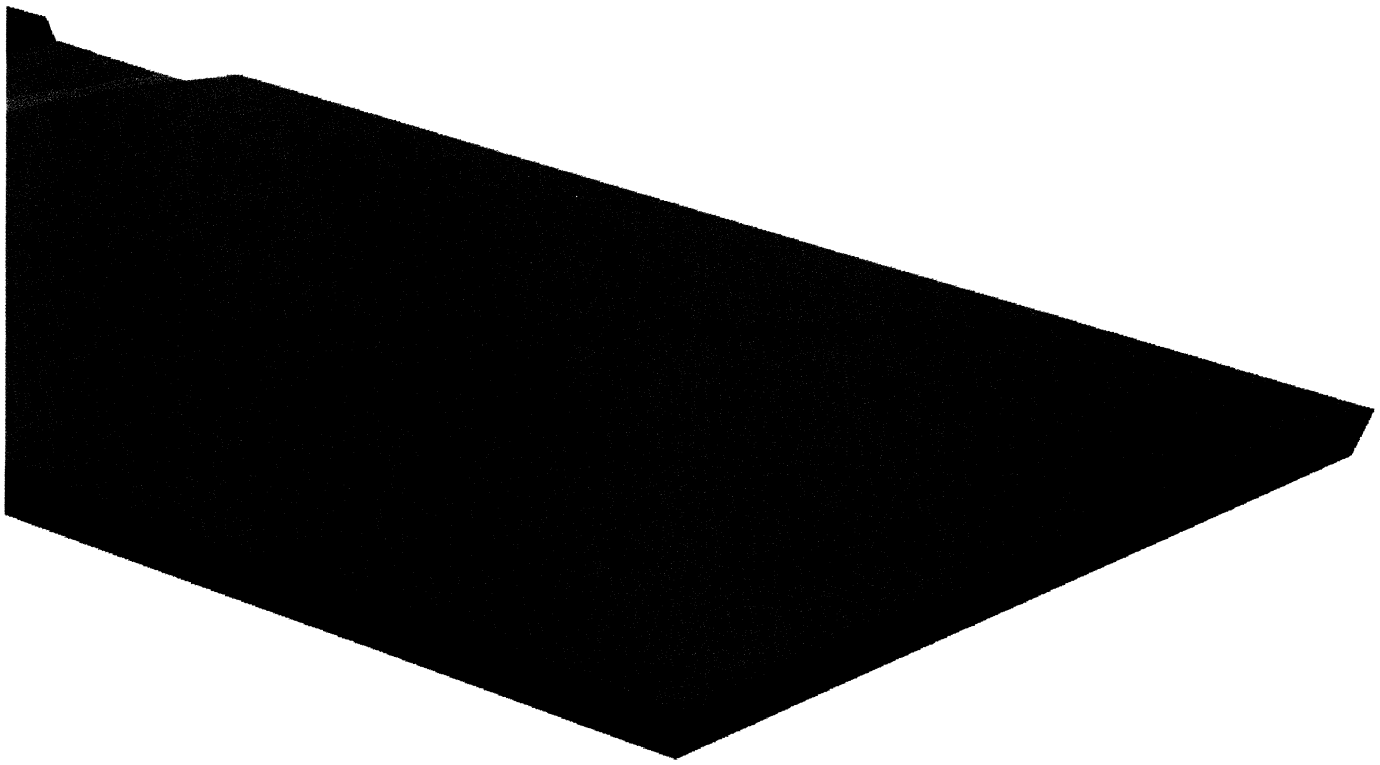
New Fifth Ward Loft Block Typology 6 Floors



New Fifth Ward Loft Block Typology Turned 90°
Short Lots developed, with the middle of the lot given over to channelization



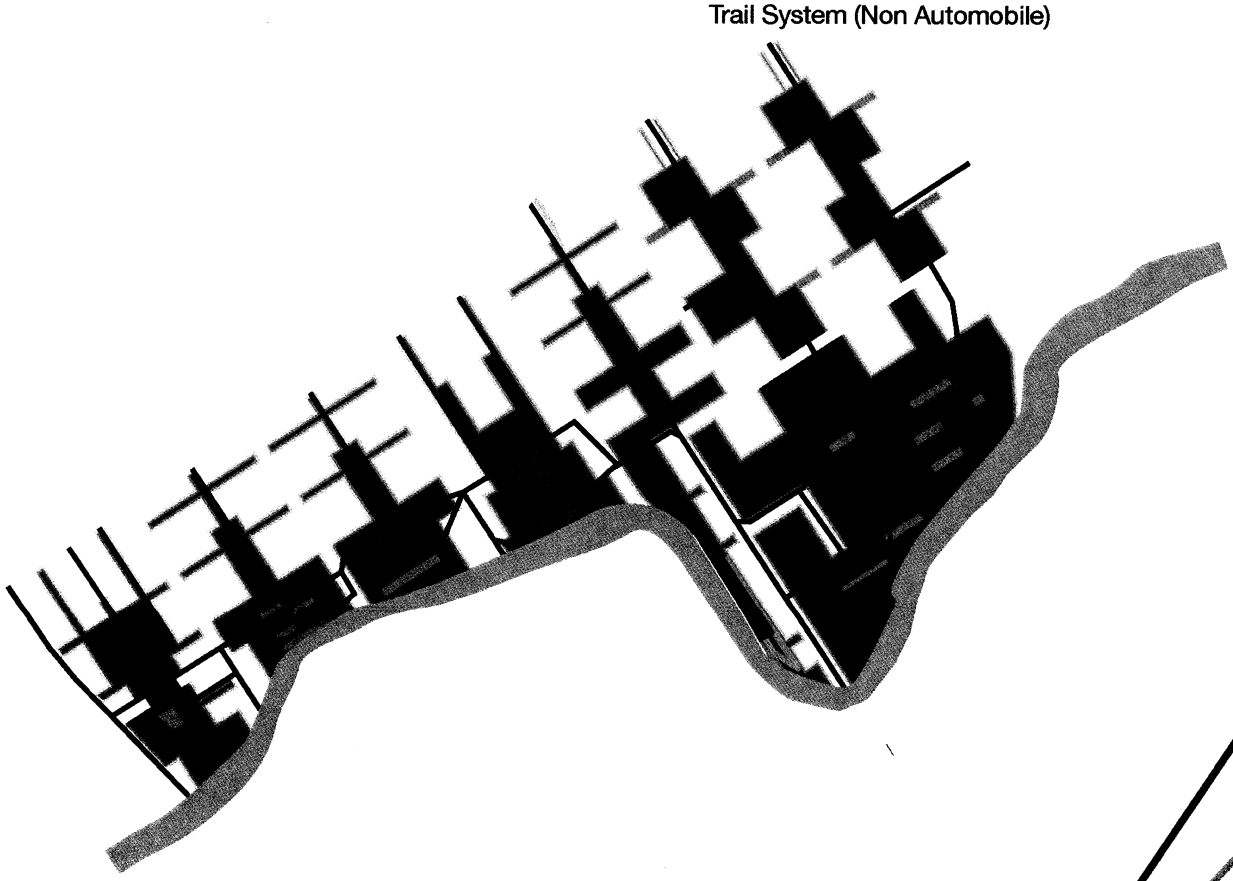


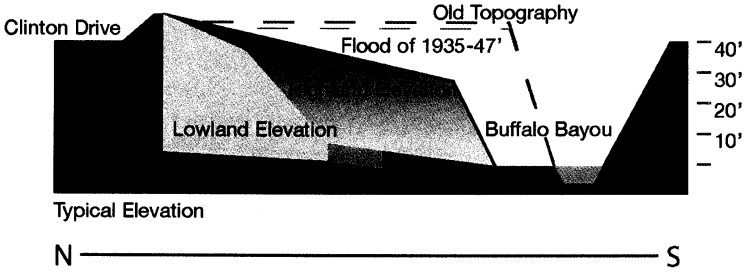


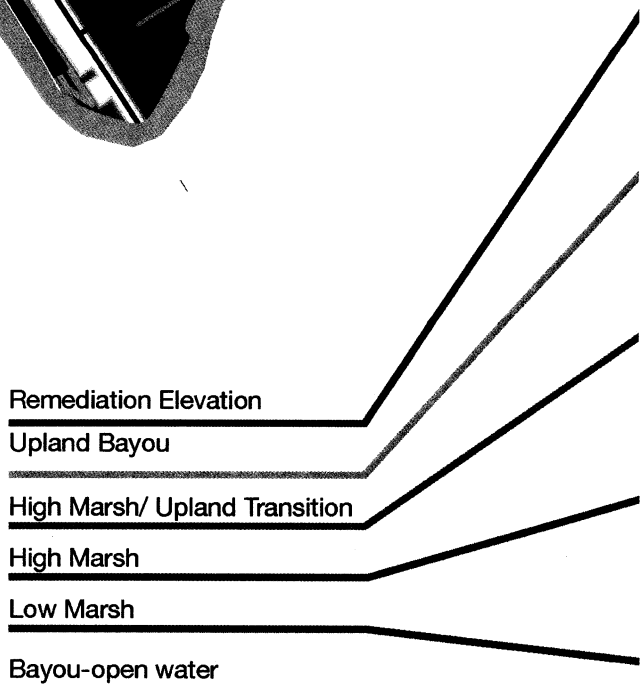
T4: Elevation Creation/ Plant Population Regulations 56

Plant populations are added to the landscape equation. In order for certain bayou friendly species to be reintroduced into the region, the lowest blocks must be engineered back to nature, and set at an elevation much closer to that of the bayou. For this to happen, elevation plans are included for topography created by the developers. Currently the elevation of the bayou is around 40' below the site as a rule, with a 45 degree slope at the edge of the bayou down to the water.

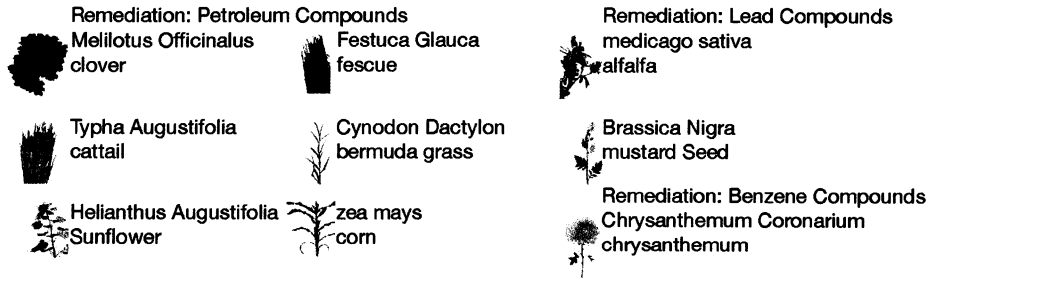
The idea of landscape regulations if taken directly from the master planned communities. Their rules are incredibly fixed, with regards to the character of the architecture and vegetation.

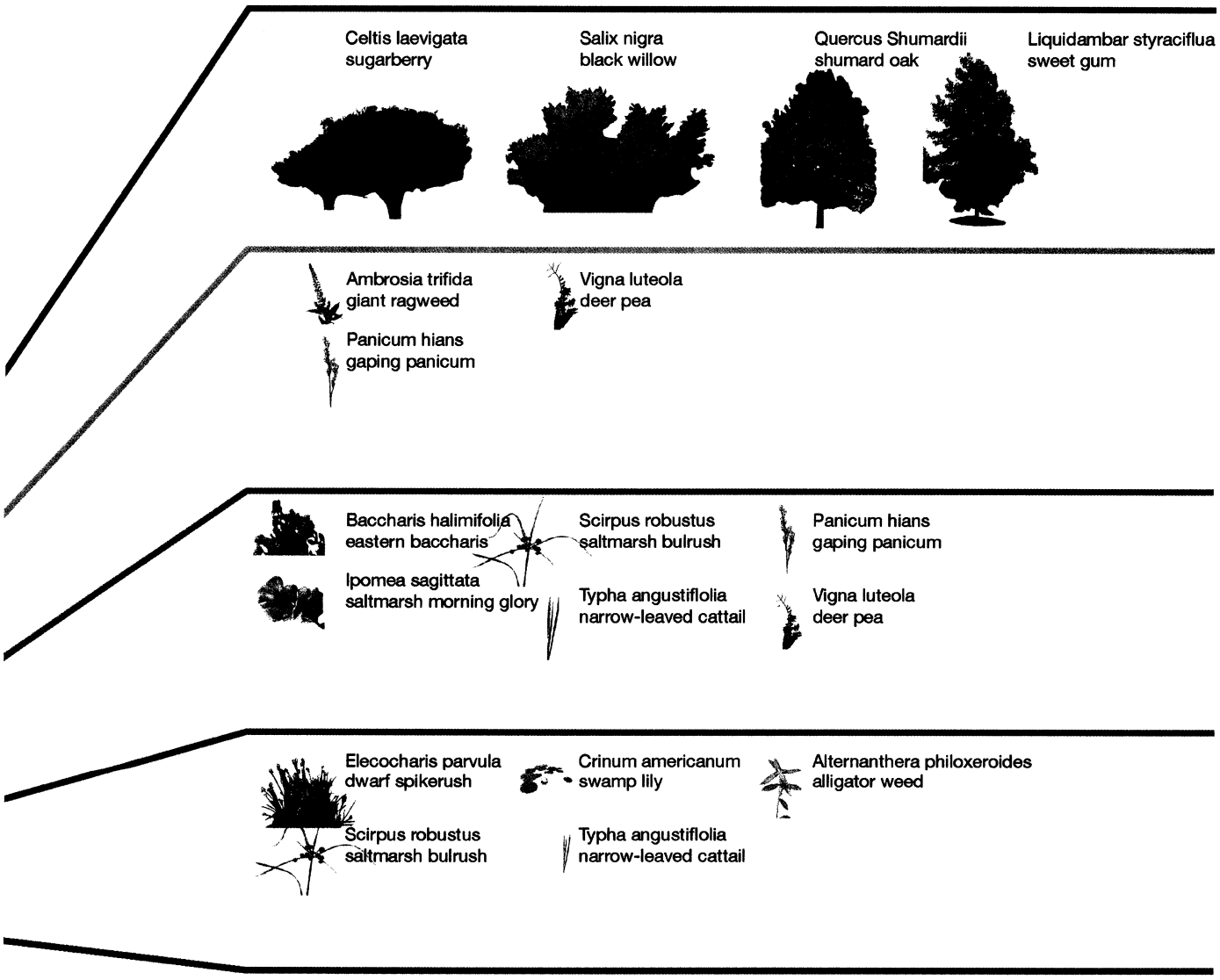






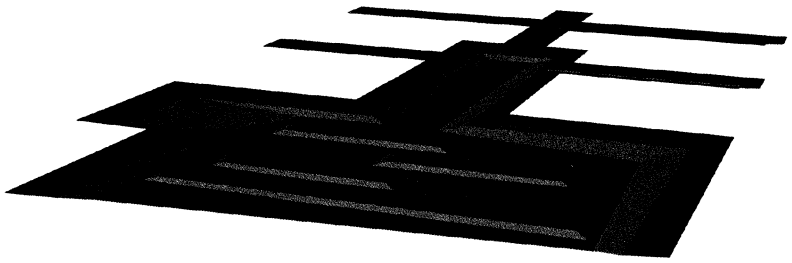
Phytoremediation will be one of the purposes behind landscape regulations in the development. While current master plan regulations are mostly aesthetic, the requirements for this development will take into account the water purifying possibilities of plant growth on the properties.



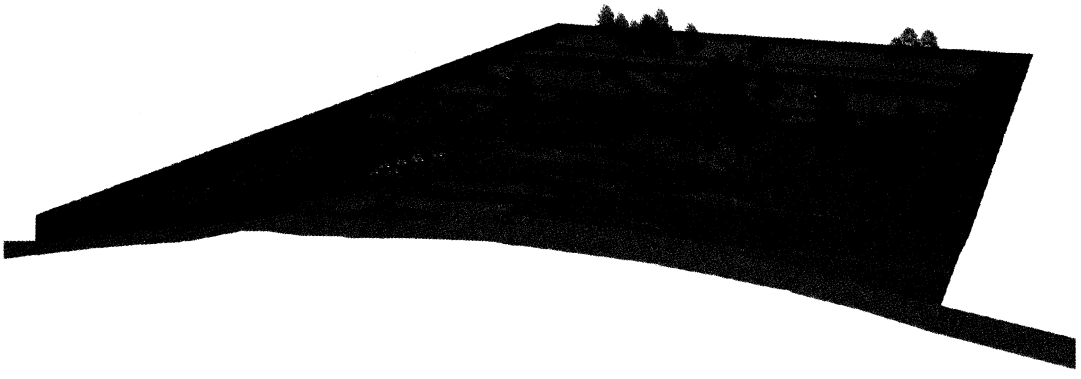


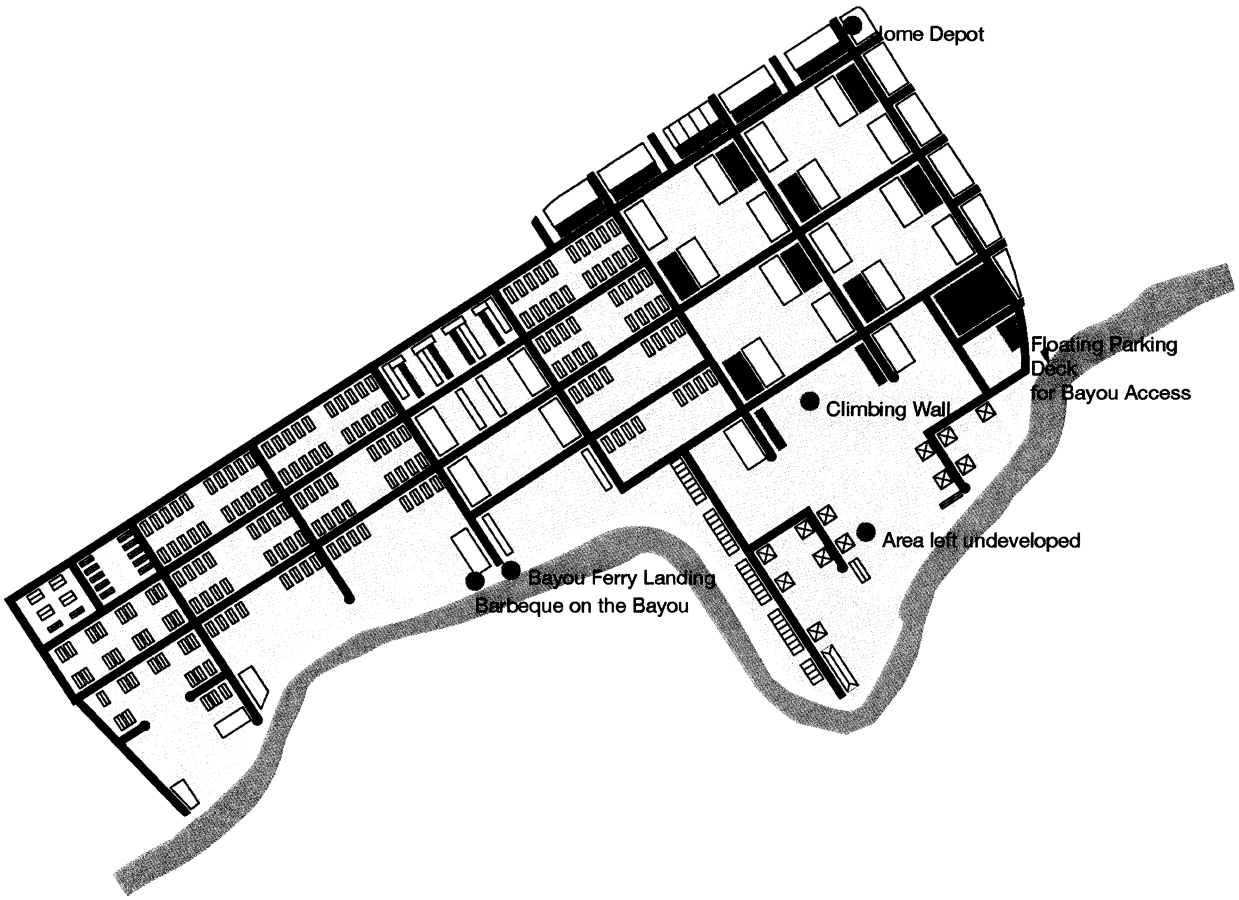
Bayou Landscaping Strategy: Typical 58

Vegetation programs are supplied to the developers at this stage in the process. Within the rules, developers will assist in creating a vegetative landscape which is highly undetermined due to individual choices.



Bayou Landscaping Strategy: Applied





- Amenities are added to the program to compliment the open space gained. These would have to be managed by a conglomerate of the various interests making up the development as a whole, as would the land not developed.

4123, or 31.7 People per Acre, just over the new density being built in the fifth ward

Occupancy Breakdown
Double Height Contoured Townhomes
322

Commercial with Living
50

Commercial with living
10 Half Blocks of 1 Floor Commercial/ 3 Floors Residential
800

Party Wall Sharing Private Dwellings
76

Bayou Office Property
Half Living
40

Expensive Bayou Islands with Hotel
42

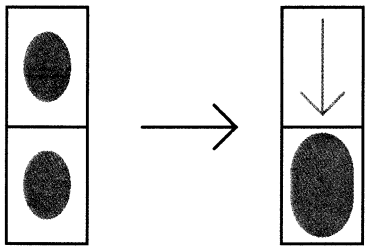
Hotel with 20 Rooms

Super High Density Bayou Blocks
22 Blocks
2793

Developer Tradeoff Network 62

A loose rule structure allowing individual developers to make interest based decisions. This flexibility makes various types of housing possible, and makes things like offset density reasonable options to increase the natural capital of the whole development.

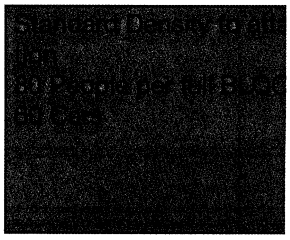
nonStandard Developer Interests Standard Development

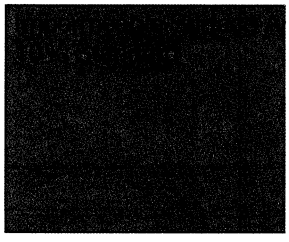


(On a two BLOCK area, if one BLOCK was left without retention area, the other whole block would be retention area 6' Deep)

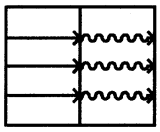
Avoiding Water Retention on BLOCK completely

Developer rights can be traded between adjacent BLOCKS to create areas of retention, as long as the water is directed towards and retained by the adjacent blocks
(On a two BLOCK area, if one BLOCK was left without retention area, the other whole block would be retention area 6' Deep)





Fast Surface Area must be equalled by a slow surface area within the path of drainage towards the retention area

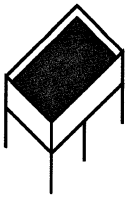


A faster Surface Speed of Water Drainage-i.e. a traditional parking lot

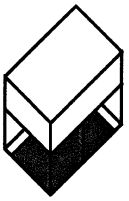
Developer Interests

nonStandard

Covering whole site with architecture/and or upping density of BLOCK



Water Storage Must Be Raised Above the Architecture



Architecture must be raised above ground level and water must be stored beneath it

Upping Density of BLOCK must still account for other rules of Standard Development

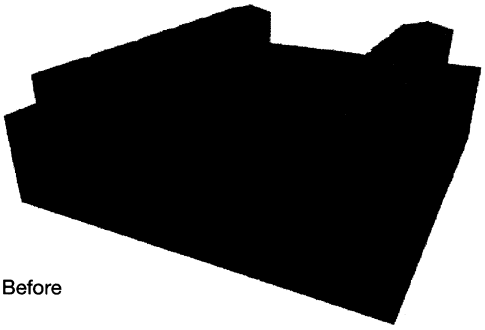
More People= Same amount of detention

Permeability Must Average out on each BLOCK (no trading of rights)

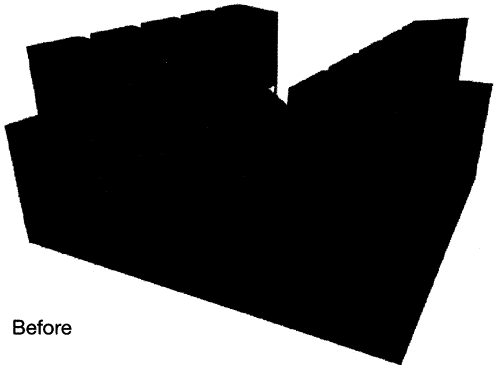
"Water Time" from Decreased Permeability must be made up for in another category

New Fifth Ward Loft Block Typology 6 Floors

These take into account the need for increased density by building up, and down, into the landscape. The tradeoff is a possible 4 floors of added living space.



Before

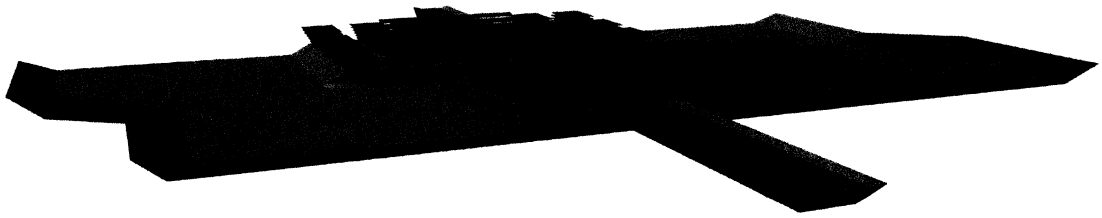


Before

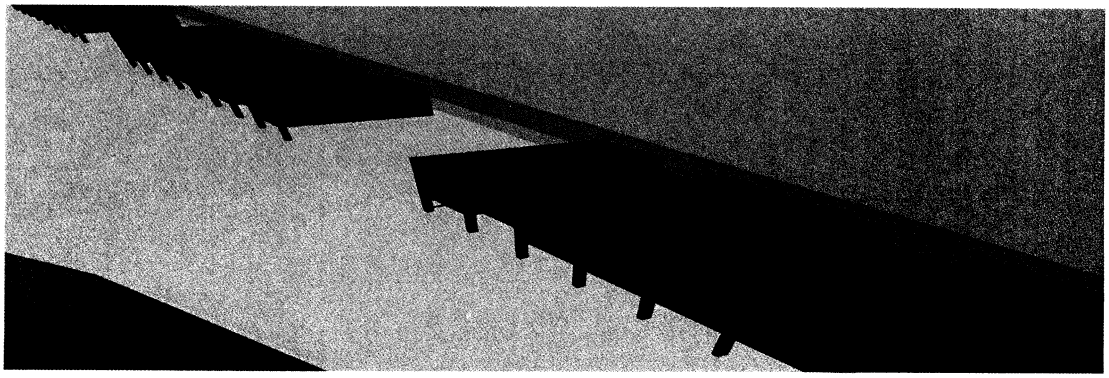
Northeast Commercial Area

Roof and Ground channels lead into the interior of the development, creating a form based extention of the Coding influencing the development.

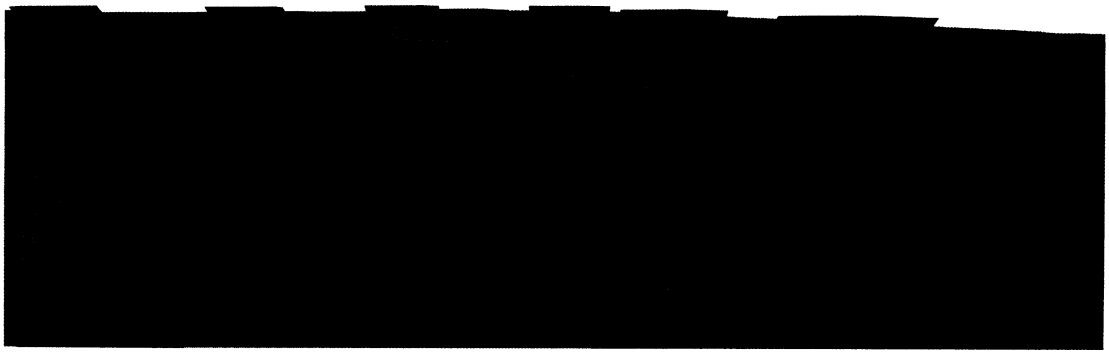
Super High Density Blocks w/ Attached Parking Garages
Strategies of extreme densification aid of creation of a new form of commons



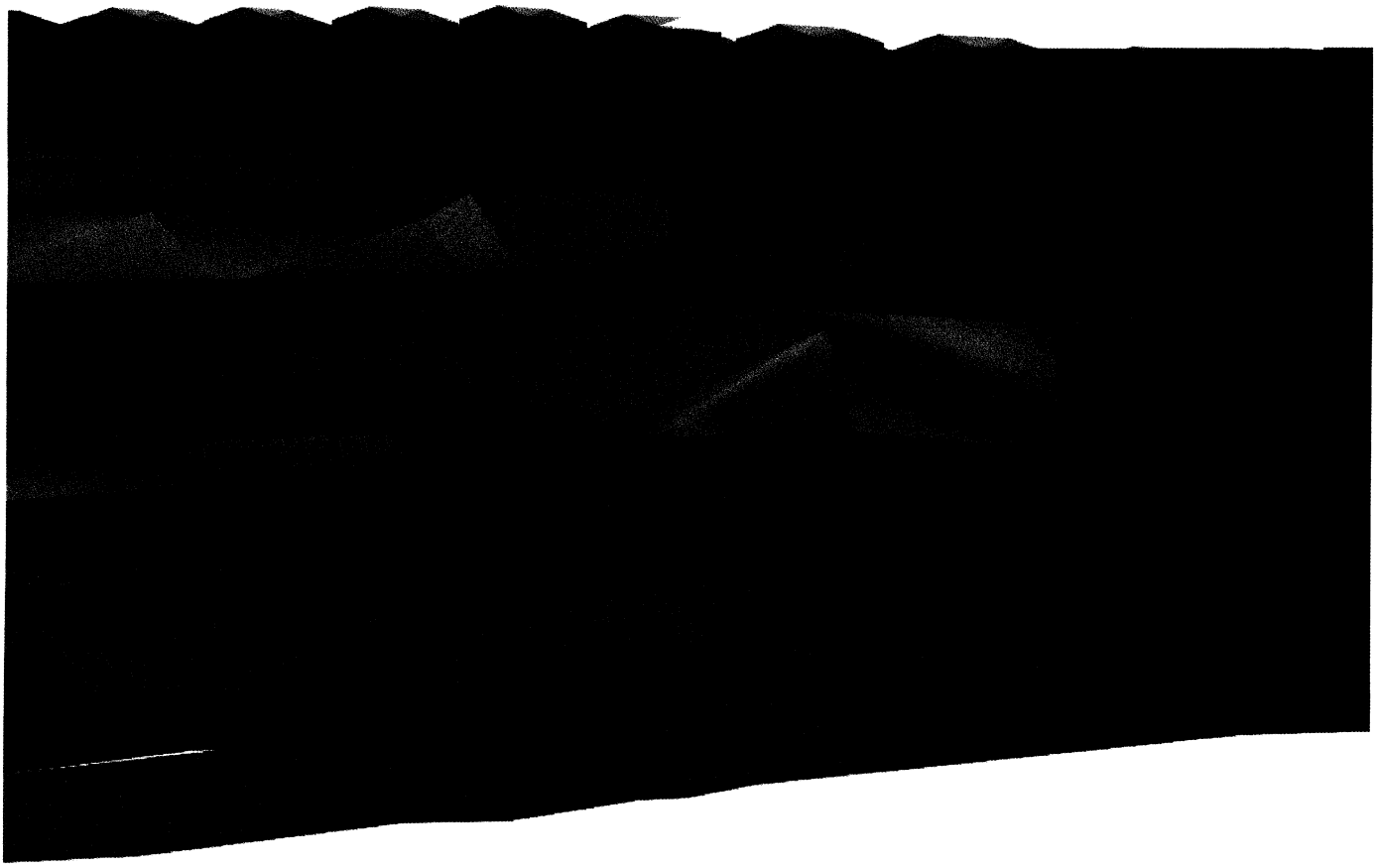
Party Wall Sharing Private Dwellings
Foregoing wasted side lots, these developed blocks have a standard footprint and shared party walls



Wealthy Single Family Houses
No Parcelization
Wealthy Landowners take on the challenge of building in the bayou



In this model the topography and parcelization are developed in association in order for a more varied landscape production. The buildable area on each lot is different



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I am also indebted to conversations and interviews with a few people, including:

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