From ‘the projects’ to a sustainable community:
Re-envisioning public housing in Lower East-side Manhattan

by Mahammad Shamsuddin Momin
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CONTENTS

• Abstract .................................................................................. i
• Acknowledgement .................................................................. ii
1. Introduction ........................................................................... 1
2. Site Analysis ........................................................................... 8
3. Case Studies ........................................................................... 30
4. Design Program ..................................................................... 45
5. Urban Design Framework ...................................................... 50
6. Compliance with Zoning Regulations .................................. 57
7. Infill Scenarios ....................................................................... 66
8. Connectivity ........................................................................... 86
9. Accessibility and Green Infrastructure .................................. 88
10. Social Integration ................................................................. 92
11. Implementation ..................................................................... 96
12. Conclusion ........................................................................... 101
13. Bibliography and References ............................................. 104
14. Appendix ............................................................................. 106
Abstract

Cities are like living organisms, they keep changing, growing, shrinking while responding to positive or negative social, environmental, ecological, economic, and technological influences. All cities and parts of cities go through these cycles of transformation; They prosper, decline and regenerate themselves over millennia, centuries or even decades.

One of the main factors that determines the path cities take is the approach planners and policy makers take in response to these influences. Alongside successful ones, we have many examples of failed approaches where wrong policies and wrong planning and design principles have made serious negative impact on the urban environment and ecosystem. Public housing is one such policy which has harmed American cities more than it benefitted. There is now an urgent need to induce an urban regeneration that will turn this one of the most unsustainable urban form into the most sustainable one.

This thesis is a part of a larger thought process that tries to correct the wrongs of the past and strives to make this urban regeneration possible, viable and successful for future generations. As the title of my thesis suggest, this is an exercise about transforming public housing neighborhoods, commonly known as ‘Projects’ into sustainable communities. The word ‘Project’ is a stigmatized word associated with social disconnection, single land-use and most importantly, underutilization of urban land. The main driving force behind my thesis is this gross underutilization of precious urban land in metropolitan cities.

This thesis achieves many aims – urban repair, physical, social and economic integration of the isolated public housing neighborhoods, community development, sustainable compact development, optimal use of scarce land resources and revenue generation for cash strapped city housing authority and tries to prove that Towers-in-the-park public housing is a big opportunity for the future of affordable housing in New York City. It also complements and conforms with major initiatives taken by the city and works in full compliance with the NYC zoning regulations.
Acknowledgement

I can not go further in presenting my thesis without mentioning and expressing my gratitude towards the people who helped me achieve this and guided me in visioning, research, analysis and design of this thesis. It was a very enriching experience interacting and validating my ideas with them.

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INTRODUCTION
Public Housing in the United States

“Modern architecture died in St. Louis, Missouri, on July 15, 1972, at 9:32 p.m. …”¹ well known critic Charles Jencks wrote in his book The Language of Post-modern Architecture about the nationally televised implosion of Pruitt-Igoe housing in St. Louis. Pruitt-Igoe not only marked the demise of Modern Architecture but also the beginning of the end of an important era in American housing development that made a huge impact on urban environment in the US.

Mentioning Pruitt-Igoe in the beginning of a book or article on public housing has become so common that at least a dozen of the books I consulted for this thesis began with direct or indirect mention of it. And my thesis is also not an exception. It is the most significant event in the history of American public housing that changed everybody’s perception about public housing. By mentioning Pruitt-Igoe, I want to highlight this perception in the beginning of my thesis wherein I am going to recommend preservation rather than wholesale demolition of public housing. Thousands of public housing neighborhoods have been demolished since the demolition of Pruitt-Igoe. Many have been redeveloped into low-rise, low density mixed income communities. Many sites are still awaiting new development years after demolition.

cities, these neighborhoods became islands of poverty, disability and unemployment. Deterioration of physical environment and safety ensued very soon. Now, it has been more or less accepted that public housing has harmed more than helping the people for whom it was developed and implemented.

**HOPE VI**

To mitigate the serious social problems of public housing, United States Department of Housing and Urban Development (HUD) has been formulating various programs. HOPE VI is one of the most important and successful programs. It was specifically targeted for the most distressed and dilapidated public housing projects. The program drew inspiration from a path-breaking redevelopment of a public housing project in Boston. Formerly known as Columbia Point, this highly distressed neighborhood was redeveloped in 1991 for the first time by a private developer named CMJ. Renamed as Harbor Point, this mixed-income neighborhood became a unique social experiment that successfully housed a diverse mix of income groups in one neighborhood. Though the program began in 1992, it took six years to be formally recognized. Till then it operated under a mixed set of evolving laws and regulations.

Once formally enforced, HOPE VI provided public housing authorities (PHAs) with a lot of operational and financial flexibility that encouraged them to redevelop distressed projects under their purview. Following are some of the most critical policy changes that made redevelopment of projects feasible (Jerry J. Salama, 1999)1

1. Elimination of federal preferences emphasizing the lowest income households for admission to public housing (U.S. Public Law 102-550). With a local system of preferences, PHAs can reduce the concentration of the very poor and seek a mix of working tenants in public housing.

2. Elimination of the one-for-one replacement requirement for demolished public housing units (U.S. Public Law 104-19). Prior to this change, PHAs could not demolish even devastated or unsafe developments unless they acquired sites in “non-impacted” neighborhoods and rebuilt at least as many public housing units. This requirement had all but stopped public housing redevelopment.

3. Authorization to use public housing development funds and operating subsidies for projects owned by a private entity other than a PHA. This allowed the first public–private partnerships for the creation of mixed-income housing and leveraging of private resources.

While it is lauded for its success, HOPE VI has also been criticized for low density development, low replacement of affordable housing stock, displacement and gentrification.

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Public Housing in New York City

‘Housing projects radiate dysfunction and social problems outward, damaging local businesses and neighborhood property values. They hurt cities by inhibiting or even preventing these rundown areas from coming back to life by attracting higher-income homesteaders and new business investment. Making matters worse, for decades cities have zoned whole areas to be public housing forever, shutting out in perpetuity the constant recycling of property that helps dynamic cities generate new wealth and opportunity for rich and poor alike’ (Howard Husock, 2003).1

Howard Husock, a strong opponent of public housing policy, minces no words in describing the effects of ‘projects’ on American cities. While most of the cities fit perfectly in the description, New York City shows a mixed picture. New York City Housing Authority (NYCHA), the largest & one of the few well-managed public housing authorities in the US, is neither a success nor a failure. It has been facing similar social problems, but in lesser degree as compared to cities like Chicago, Detroit, Baltimore and St. Louis where large number of high-rise public housing buildings have been demolished because of distressful social and physical conditions. Problems of NYCHA are compounded by serious lack of funding, aging and deteriorating buildings and huge demand for low-income affordable housing.

New York City is one of the few American cities that are growing in population. It is projected to grow by 1,000,000 by 2030 and this growth is going to put huge pressure on supply of housing in the city and more so on affordable housing. NYCHA being the biggest provider of affordable housing in the city has to take the biggest share of this pressure. As of today, there are 143000 people on NYCHA wait list and its going to grow considerably.

There is no city-owned vacant land available to create more affordable housing and federal funding is shrinking day by day. To counter this, NYCHA, the largest landlord in the city, has 1500 acres of underdeveloped properties with 77,000,000 sqft of unused FAR rights. With this potential, I strongly believe that NYCHA is not a liability but a huge opportunity for the future of affordable housing in NYC. Because it is functioning well and in demand more than before, public housing in New York City deserves more attention and a creative approach in resolving its problems.

**Public Housing in Manhattan**

To test my hypothesis I have selected Lower East-side area of Manhattan which is one of the largest concentrations of high-rise public housing neighborhoods in New York City and also in the US. Spread over approximately 340 acres, these neighborhoods have only 16% average land coverage and an average density of 75 du/ac as compared to 100 du/ac average gross density of surrounding neighborhoods. The most significant aspect of this large tract of underdeveloped land along the East River waterfront is its proximity to Downtown Manhattan, a highly gentrified East Village, and economically and culturally vibrant China Town. Out of a large number of public housing neighborhoods, I have selected three contiguous NYCHA properties - Baruch Houses, Wald Houses and Riis Houses - which altogether covers an area of 78 acres.

While accepting the need for affordable housing in the city, I echo Howard Husock’s opinion also. I strongly believe that a global city like Manhattan cannot afford to keep such a critical land mass perpetually underdeveloped. It also cannot keep it zoned only for public housing for decades and not allow it to regenerate and create wealth & opportunities for all classes of the society.
**Thesis**

*Can underdeveloped / underutilized land in public housing neighborhoods in metropolitan cities be developed to improve quality of life and to create social and economic diversity; while preserving & enhancing the existing affordable housing stock and avoiding / minimizing displacement?*

**Premise**

High-rise public housing project built in large American cities during 1950s and 1960s represent the failure of the “Towers-in-the-park” ideology with their associated problems of crime, social and economic segregation, and underutilization of precious urban land. Large, undefined open spaces created between the high-rise towers are often poorly maintained, inefficiently used and in many cases misused, thus comprising one of the significant physical indicators of the failure of public housing projects.

Therefore, this design thesis proposes solutions to the various public housing problems outlined above by leveraging opportunities offered by the availability of large tracts of underdeveloped land in strategic locations. The objective is to create diverse, vibrant, sustainable, mixed-income, mixed-use communities without demolishing the existing high-rise towers and displacing the existing tenants.

**Approach**

Public housing as a policy and as stigmatized neighborhoods has always been a subject of heated debates among policy makers, citizens’ groups and planners & designers. Atmosphere is generally polarized when it comes to dealing with situations related to public housing neighborhoods. Under the HOPE VI program, a large number of high-rise public housing neighborhoods have been demolished and replaced with low-rise, low density, mixed-income communities. But the issue of resultant displacement and poor replacement of the existing stock of public housing has become contentious. As a result, strong dissenting voices have also began to gain strength favoring preservation of public housing and keeping them for very poor people.

This thesis tries to strike a balance between the two extreme positions and explore -

- Preservation of affordable housing and its augmentation by Infill as opposed to wholesale demolition and redevelopment.
- Retaining of public housing residents and bringing in mixed-income population and mixed uses to create diversity rather than displacement and gentrification.
- Increase in density rather than de-concentration.
Key driving factors
- Huge demand for public and affordable housing.
- Insufficient affordable housing stock.
- Unavailability of vacant land.
- Aging and deteriorating buildings.
- Serious financial problems faced by the housing authority.
- Availability of large chunks of underdeveloped land in inner city areas.
- Location of neighborhoods in strategic and well served areas.

Significance
In an era of economic slowdown when demand for affordable housing is at its peak and city housing authorities are facing serious financial problems, underdeveloped public housing neighborhoods located in well served areas should be seen as unique opportunities to create compact, diverse and inclusive communities that will serve our quest for social, economic and environmental sustainability.

Critical Issues
- Displacement and gentrification: In order to make this proposal acceptable by a wide majority of existing tenants and supporters of low-income affordable housing, this thesis shall work on assumption of zero displacement and zero net loss in existing public housing stock. A major portion of new development shall be dedicated to low income affordable housing. This will negate the possibility of displacement and drastically reduce the impact of gentrification.
- Designing for High Density Development: Although high density is not new to and is not negatively perceived in Manhattan, this proposal will make sure that this will be a low impact development and will actually improve the livability of these neighborhoods.

Objectives for Lower East-side
- Development of precious, underutilized urban land.
- Preservation & Augmentation of public housing stock.
- Creation of affordable and market rate housing options for various social groups.
- Improvement in quality of life and safety.
- Creation of social and commercial services.
- Better integration with the urban and social fabric of the city.
- Integration with / improved access to the East River Park.
- Preservation / retrofit of deteriorating existing buildings.
- Protection from storm surge and sea level rise.
- Sustainability measures in design, construction and management.
2. SITE ANALYSIS
How do you use and see the Lower East-side public housing currently? What are the biggest problems faced by Lower East-side public housing? What do you envision there in the future? How is it connected with the surrounding areas, how can it be better integrated with surrounding neighborhoods? How can the area be utilized for creation of more housing, economic opportunities and jobs? How can access to transit be improved? What uses could locate along the park and waterfront? These and many such questions arise in mind when I think about the site I selected to apply and test my ideas. What I am going to propose for this site is a part of an unending process through which cities evolve. Therefore, it was as important for me to trace and understand what transformations this part of the city underwent until it became what it is now as it is to understand how it is performing now. Also, important was to know the factors that influenced its transformation and the factors that would influence its future.
As mentioned earlier, to test my ideas, I have selected three contiguous public housing neighborhoods from this huge concentration of public housing. They are Baruch Houses, Wald Houses and Riis Houses. As described in the notes that accompany the following aerial view and figure ground maps, these three neighborhoods have a gross area of roughly 78 acres with average gross density of 78 Du/ac and a population of 17026.
Wald Houses
Area - 17.33 acres
Population - 5220
1861 Du
Net density - 113 Du/ac
Built - 1949
Riis Houses
Area - 17.67 acres
Population - 5259
1768 Du
Net density - 100 Du/ac
Built - 1949
2.1. History

Delving into the history of great cities is a great experience and New York City is a city which has a layered history spanning a comparatively short time. Going back to early sixteenth century, Manhattan was a largely uninhabited island and growth of the city started from the southern tip of this island. It was the rapid growth of early nineteenth century that consumed the somewhat wetland areas where the public housing neighborhood stands today. New York City is a city of immigrants. The areas in which this site is located have historically been very diverse in terms of ethnicity. There had been working class neighborhoods which attracted immigrants from different parts of Europe in the end of nineteenth century and beginning of twentieth century. During those times Germans, Italians, Poles, Irish and Ukrainians made this area their home. Though they were economically very active the settlements were very dense. Famous tenement buildings housed families in cramped spaces with very little light and ventilation. Further deterioration of living conditions prompted authorities to redevelop the area under the Urban Renewal Program spearheaded in the city by Robert Moses in the 1950s.
2.2 Context

The area under consideration is a group of 4-5 large public housing neighborhoods. As mentioned in the earlier chapter, this is one of the largest concentrations of public housing in the US. It occupies a prime piece of land located along the West bank of the East River, in close proximity with East Village, Alphabet City and China Town. The South-west end of the site abuts Downtown Manhattan. On the other side of the East River is Brooklyn, one of the oldest boroughs of New York. Three historic bridges pass through the study area and connect Manhattan and Brooklyn.
2.3 Scale

Occupying roughly 78 acres of land, the study area is little less than the size of Battery Park City and almost one tenth of the Central Park. This shows the enormous potential this site has in shaping the future of Manhattan. Considering the fact that the site has used approximately 50% of its development rights, it opens up a whole range of development opportunities for the future.
2.4 Accessibility

The site area outlined in black once had a combination of three dense rectilinear street grids all oriented towards the once busy waterfront. As shown in street network: 1824, almost all streets ended with piers that were active with port activities and commerce. Overcrowding and poor safety and hygienic conditions prompted city authorities to redevelop this area under the Urban Renewal program in late 1930’s. This resulted in destruction of the walkable small grid and creation of superblocks that affected accessibility of the residents to various facilities in the vicinity. Construction of FDR freeway along the East periphery further cut off the neighborhoods from the waterfront and the East River Park. Accessibility within these large blocks is also not very good as one has to pass through large undefined open spaces. Although there are properly delineated, paved pathways, one does not feel safe after dark.
2.5. Transit Connectivity

The site is accessible by car by FDR drive on the East side. Three major historic bridges, Brooklyn, Manhattan and Williamsburg, pass through this area and connect Manhattan to Brooklyn. Though the bridges do not touch the ground near the site, accessibility to areas on the other side of East River is better. Two subway stations, Essex Street / Delancey Street and East Broadway are located on the Western side and are within 15 minutes of walking distance. The area also has a few bus routes that connect these neighborhoods to the Downtown, Chinatown and East Village. Yet they are not considered well connected by the standards of transit-rich Manhattan. Accessibility of subway stations by walking is not desirable as distance is too much and street environment is also not very good. Having been located in a central part of the city, residents can access any employment center in the city if good public transit facilities are made available.

MTA Bus routes

Bikelane network
2.5 Socio-economic environment

The neighborhoods that were once bustling with people and economic activities have now been static low income subsidized housing districts. Upon development of public housing, ethnic diversity of the area gave way to concentration of one or two particular low income communities. While population in the northern half of the site is predominantly Hispanic the south-eastern part abutting Chinatown is Asian. People of African American ethnicity also have a good presence though not as high as those of Hispanic or Asian origin.
2.5 Socio-economic environment. contd...

The study area includes some of the poorest neighborhoods of New York City with median household income as low as $11,000. Though NYCHA has been very successful in providing a place to live to those who cannot afford a house, it has created such islands of poverty in vast areas of the city. In the context of social economic segregation, the neighborhoods in the study area enjoy a unique position. A vast majority of public housing neighborhoods across the nation are geographically and economically segregated from the other city areas by keeping them away from employment opportunities and better transportation facilities. But having been located in an ethnically diverse district in close proximity with the downtown, Chinatown and East Village, Lower East-side neighborhoods are an exception. Even though transportation connectivity is not the best, residents still have easy access to employment centers in any part of the city. Sharing boundaries with a few of the most expensive areas in the world has many advantages as well as many disadvantages. This area has always been under the threat of gentrification. A major part of it around the Tompkins park has already been gentrified.

![Linguistic isolation, Source - OASIS](image1)

![Median household income, Source - OASIS](image2)
2.6. Urban form

As everywhere, public housing neighborhoods in this area were designed on the modernist principal of Towers-in-the-park offering the poor residents a lifestyle that was considered a privilege of the rich and the middle-class. The noble intention behind this was to improve living standards of the poor by shifting them to an environment with lot of open space, light and hygienic conditions. But even though the buildings are ostensibly modern high-rise of a particular era, they are very bare in design and have been built with excessive repetition expressing a dreary functionalism.

Transformation of Lower East-side from fine grain urban fabric to towers-in-the-park superblock.
2.7. Open spaces

Fascination for this design philosophy was so extreme that hundreds of small walkable city blocks were destroyed and large superblocks were created. But the large open spaces thus created have not been supported by superior programming. Even though the purpose of providing large thickly vegetated open spaces was to bring the poor people in proximity with nature, management of the open spaces has defeated the very purpose. Most of the spaces are generally undefined having only lawns and lot of trees. Almost all these lawn areas are restricted for entry by metal barricades. All buildings have only one access point that leaves periphery of these large buildings totally impermeable. Hence there is no opportunity for any interaction between the open spaces and the buildings. High-rise living has kept majority of the residents away from the open spaces and removal of the streets has taken away the street life and activities at the ground level. All this has contributed to reduction in the sense of safety.

One thing is worth noting: unlike other public housing neighborhoods where such open spaces turned into filthy trash yards, open spaces in Lower East-side are relatively well maintained.
2.8. Land-use pattern

Expectably, the land-use of the whole study area is a fine example of monotonous land-use. As seen in the figures on pages 23 - 25, the study area demonstrates a character that is completely different from the surrounding neighborhoods which have fine grain urban fabric and a good mix of residential, commercial, institutional and industrial land-use. Large superblocks in the study area are totally dedicated to residential use with very few lots for institutions and even fewer for commercial. It is essential to know that the zoning regulations of the city has put these areas in residential district (R-7) Predominantly public housing nature of the neighborhoods also impedes development of new commercial establishments.
The land-use pattern of the site shows concentration of single land-use type and negligible provision of other land-uses.

Source - OASIS
2.8 Natural factors

2.8.1. Topography

Manhattan, ‘land of many hills’ in American Indian language, used to be a hunting and fishing reserve full of streams, swamps and ponds. Over the last six centuries topography of the area has been heavily altered. Small hillocks left no traces and many areas along the water’s edge have been filled up. It can be observed that some part of the site rests on landfill. At present, the site area has a very light slope toward the waterfront. The highest level in the site is approximately 30 feet above the water level. The East River estuary is tidal in this area and water level fluctuates between -4.0 feet to – 4.5 feet.
2.8.2. Tree Cover

Having been developed as Tower-in-the-park, open spaces within the neighborhoods have been planted heavily. This is one of the few areas in Manhattan which has considerable green cover and is heavily relied upon while calculating ELQR standards of the surrounding areas.

2.8.3. Natural Hazards

The study area is susceptible to two major natural hazards, Storm and Sea Level Rise, and the shallow topography have made it more vulnerable. As seen in the adjacent figure a major portion of the site comes under Zone A of the Hurricane Evacuation map that is vulnerable to inundation in hurricane of any category.
2.9. Weather conditions

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<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
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New York City surface meteorology. Source - Gaisma

Prevailing wind direction. Source - Gaisma
2.10. Opportunities

As mentioned in the introduction of this thesis, public housing neighborhoods under consideration provide a huge opportunity for NYCHA and New York City in many forms.

The analysis of the site highlights some of these opportunities very prominently -

*Scale*

Area of the site is 78 acres which is large enough to make a huge impact in many ways. It has potential to change the character of the area completely. It will create a big stock of affordable and market rate housing to make a considerable impact on supply of housing in Manhattan.

*Development potential*

Towers-in-the-park typology of the built form has left large amount of open spaces between the buildings. In addition to that, all these properties have large amount of FAR unused. This unused FAR can be utilized to construct new buildings in the available open spaces.

*Land ownership*

All these properties are owned by a single owner, NYCHA. This makes the design and development easier than other such neighborhood revitalization projects as there would be less complexity in land tenure issues.

*Proximity*

This large piece of land is situated in a very close proximity to major urban centers such as Downtown, China Town, East Village and also Midtown. The area surrounding the site demands a very high real estate value. This creates a big opportunity for NYCHA to exploit the real estate potential of the land and generate much needed revenue. East River Park and the waterfront are very important public amenities of New York City that are not being utilized to their fullest potential. Through this design exercise there is an opportunity to connect and integrate these great assets with the city employing appropriate urban design interventions.

*Transit connectivity*

While all parts of Manhattan are highly connected this part of the island lacks equally rich transit access. With this redevelopment proposal transit facilities in this area can be improved and better connected with the existing subway system.
2.11. Challenges

While this site offers great opportunities in many ways it also poses many challenges. In order to make this proposal a success and to achieve all its goals and objectives, these challenges must be taken care of.

Controlling gentrification
Gentrification is one of major concerns of planners and policy makers and main fear of the supporters and tenants of public housing. As these neighborhoods are located very close to important urban center and also a highly gentrified East Village, these neighborhoods are at a higher risk of gentrification. This is one of the many reasons for stiff political opposition to redevelopment of public housing neighborhoods in New York City.

Economic development
As in most public housing neighborhoods, unemployment is these neighborhood is very high (25%). Therefore their economic development is equally essential. This can be achieved by creating jobs within the development area, developing training facilities and linking residents to educational and employment opportunities.

Facilitating cross culture interaction
To make these neighborhoods diverse and mixed in real manner, it is important to create opportunities that would help interaction among various social groups. This can be achieved by planning for shared spaces, public places and facilities, and distribution of housing types among various income groups.
3. CASE STUDIES
3. Case Studies

There is no existing precedent to this kind of redevelopment of public housing where majority of the existing public housing building have been preserved, most of the existing tenants retained and the neighborhood has been integrated with the urban and social fabric of the city. Therefore to do my research through case studies I selected two such projects which jointly fulfilled these criteria - Park Boulevard (formerly Stateway Gardens) in Chicago and Harbor Point (formerly Columbia Point) in Boston. I got some of my ideas validated and found inspiration for many other ideas in the urban design principles these two projects employed. Similarly, I also learned from shortcomings and mistakes of these two projects. While studying various positive and negative aspects of these projects I tried to draw parallels between them and my thesis and noted similarities and differences. This in a big way helped me strengthen and finalize the goals and objectives of my thesis.
3.1. Case Study 1 – Park Boulevard (formerly Stateway Gardens), Chicago

3.1.1. Facts

Location: Bronzeville, Chicago, 4.0 miles from the downtown.
Area: 40 Acres
Year of Construction of Stateway Gardens: 1949
Original Number Units: 1644
Proposed number of housing units: 885
3.1.2. Situation before Public Housing Development
Formerly known as Stateway Gardens, the area was a crowded African American neighborhood, a result of race-based restrictive housing covenants. Buildings intended to accommodate one family per apartment had been divided up into multiple small kitchenettes with one shared toilet. Poor hygiene and compromised fire safety situation had made living conditions very poor. In the spate of Urban Renewal program, Stateway Gardens was cleared of slums and transformed into modern high rise of public housing in 1949.

3.1.3. Situation after Public Housing Development

Existing public housing neighborhood.
3.1.3. Situation after Public Housing Development

Stateway Gardens originally consisted of eight high-rise buildings which accounted for 1,644 public housing units and housed more than 3000 people. Management of the public housing neighborhoods by the Chicago Housing Authority has always been questionable. Racial policies, mismanagement and negligence caused once well-functioning neighborhoods fall into chaos. Gang violence and neglect created terrible conditions for the residents. In 1984, Stateway Gardens was within the sixth poorest U.S. census tract. In 1988, crime rate in the neighborhood & surrounding area was highest in the city. In 2000, the CHA formally approved the 10-year ‘Plan for Transformation’ (with HOPE VI federal funding) to remake public housing in the city under which Stateway Gardens is also being redeveloped.
3.1.4. Redevelopment

The new neighborhood planned by Skidmore, Owings and Merrill (SOM) is known as Park Boulevard.

Project Highlights:
- The master plan for this project calls for diverse housing types that include town houses, flats, and mid-rise buildings.
- More than 1,300 units will be built; 885 units on-site and 430 units off-site.
- On-Site construction began April 2006; Phase-I consisting of 391 units, is complete. Phase II, consisting of 385 units, is under construction.
First phase of development
3.1.5. Strategies:

- Before 1949 this part of the city was a fine grain neighborhood spread over thirteen small blocks. During the urban renewal era these dense neighborhoods were demolished and transformed into Towers-in-the-park superblocks. SOM’s plan sought to re-establish the historic urban fabric by restoring a similar street grid.

- As opposed to the demographics of the original settlement and public housing neighborhood, both of which were predominantly poor pockets of the city, this redevelopment plan has brought in people of different income status making it a mixed income community.

- Similar to pre-1949 settlement, the new development has also been planned a fine grain development with a rich variety in housing typologies and building designs. To achieve this, SOM has invited different designers and developers to develop this neighborhood. (Landon Bone Baker, Johnson & Lee, Worn Jerabek Architects, Kathryn Quinn Architects, and UrbanLab).
3.1.6. Comparison with Thesis site and Proposal.

Similarities: There are many similarities between this project and the thesis site. Both have a similar background and history as well as opportunities that are offered by their location and development potential.

- As described earlier, this neighborhood was also a fine grained, small block settlement which was demolished during the urban renewal era to create public housing projects. And similar to thesis site, these projects were also designed with towers-in-the-park ideology with vast undefined open spaces between the buildings.
- This site is also located in close proximity to important economic centers & institutions like the Illinois Institute of Technology, and U.S. Cellular Park. It is just 4.0 miles away from downtown Chicago.
- The site is well served by good public transit connectivity. It lies between two important transit lines, Red line and Green line.
- As intended in my thesis, redevelopment of this neighborhood has also been planned as a Mixed-income community.
- To repair this part of the urban fabric, SOM has restored the historic street grid and recreated the original urban blocks.

Differences:

These are some of the things that I do not want to permit or follow in my thesis -

- Redevelopment of the site caused relocation of residents off the site to various parts of the city. Situation of the displaced residents and the neighborhoods they moved to is unknown.
- CHA preferred reduction in the number of new housing units and hence reduced density.
3.2. Case Study 2 – Harbor Point, Boston

3.2.1. Facts
Location: Dorchester, Boston.
Two miles from the downtown.
Area: 45 Acres
Year of Construction: 1954
Original Number Units: 1504
Year of Redevelopment: 1991
New housing units – 1283 (883 market rate units)
3.2.2. Situation of Public Housing before redevelopment

The Columbia Point public housing project was built in the early 1950s on a 45-acre oceanfront land that was isolated from downtown Boston and cut off from the local community. The project, comprised of 1,504 units, was the largest in Boston and one of the largest nation-wide. During the 1950s and early 1960s the project housed working class families who took pride in the community and who worked to bring public transportation and social services to Columbia Point (CP). By the mid-1960s, however, blue-collar workers moved out and were replaced by the urban poor. At the same time the Boston Housing Authority began to neglect Columbia Point; maintenance of the property was virtually nonexistent, rules were no longer enforced, and the social fabric of the community disintegrated. Continued waste dumping in the dump site in the South side made affected the environment and safety of the area. By the 1970s Columbia Point had become plagued by crime so severe that even ambulances refused to enter the project without a police escort. In 1970, Boston campus of University of Massachusetts and in 1977 JFK Library & Museum were opened, but were completely isolated and detached from the housing.
3.2.3. Redevelopment

In 1984 the state turned the property over to the private development firm Corcoran, Mullins, Jennison (CMJ). This was the first federal housing project to be transferred to a private developer. CMJ razed the old Columbia Point apartments and built the Harbor Point Apartment Community in their place. Harbor Point also opened 883 of the 1,283 units to market-rate renters, creating a mixed-income community. Proportion of housing was 70% market rate and 30% subsidized. Subsidized units were distributed throughout the neighborhood. No single building had more than 50% subsidized housing units.

Taking advantage of the waterfront location, the new plan included a waterfront park and reoriented buildings and streets so that most apartments would have water or downtown skyline view.

A new health club, swimming pool, tennis courts, and ample parking appealed to people from all ethnic backgrounds and social classes, further ensuring the diversity and stability of the revitalized community. Today Harbor Point is viewed as a successful model of urban revitalization and has been studied by city planners and developers across the country.
**Strategies**

- Street Layout orientated toward the waterfront
- More streets, small blocks. Most buildings offered waterfront or downtown view.
- Effective integration of the waterfront with the neighborhood layout and open spaces.
- Waterfront accessible from surrounding areas offering recreational opportunities to people from other communities.
- Mixed-income, racially mixed community – 70% market rate, 30% subsidized low income.
- Tenant participation in planning and management.
- Indistinguishable distribution of subsidized housing.
- Provision of subsidized housing in each building avoiding stigmatization of one particular building.
- Creation of private entries for ground level apartments creating a better streetscape, vigilance and activity on the street.
- Provision of support services.
3.2.4. Comparison with thesis site and proposal

Similarities:
- This neighborhood also abuts a waterfront. Street network of the existing public housing had turned its back on the waterfront. This mistake has been corrected in the redeveloped project and the street network has been reoriented toward the waterfront, creating great vistas.
- This is a very good example of integration of waterfront with a neighborhood layout. An active waterfront park has been created which is used by the neighborhood residents as well as visitors from the vicinity.
- A large Green open space corridor has been created that extends toward the waterfront and connect it with the areas across the neighborhood.
- Racially mixed, mixed-income community.
- Tenant participation in planning and management.
- Preservation and retrofitting of some existing buildings. Activating them at the ground level by opening them up to streets and open spaces.

Differences:
- Similar to Stateway Gardens and many other HOPE VI redevelopment projects this scheme also relocated many of the existing residents off the site to various parts of the city. Situation of the displaced residents and the neighborhoods they moved to is unknown.
- Reduction in the number of new housing units and hence reduced density.
4. DESIGN PROGRAM
4. An Integrative Design Program

4.1. Driving factors
The analysis of the site, surrounding neighborhoods and the present situation of public housing, and the case studies helped in formulating a program for this design exercise that promise a change in social and physical environment of this particular ‘projects’ site. Three major driving factors emerged out of these analyses – City’s need, Tenants’ needs and the Development Potential of the particular land.

4.1.1. City’s needs
As mentioned earlier, need for affordable housing for different income groups is always growing. Economic slowdown, which has reduced median income and increased unemployment, has also made an impact on this need. Further, the projected growth in population is going worsen the situation. City has been promoting programs such as Marketplace Plan for Housing that aims at creating more and more affordable housing by following various policies. But these efforts are always inadequate and need for affordable housing remains high.

In such situation, one way to create affordable housing would be to utilize underdeveloped and underutilized land in a more efficient way. Since most of the NYCHA properties are city-owned, it has huge leverage in helping the city solve this problem. Alongside affordable housing a healthy network of social infrastructure can also be created on these lands.

As most of the large public housing properties are zoned only for residential use, there is a serious lack of retail and commercial facilities. Large size of these superblocks also negatively impact the accessibility to such facilities in the surrounding areas. Most of the properties are so huge that there is possibility to create employment opportunities also. Therefore it is essential to create a good diversity in land-use that would help make these neighborhoods more sustainable.

Over the years NYCHA has been facing ever increasing lack of funds. Economic downturn has forced Federal Government to reduce the funding. For housing authority, monetizing some of their properties is a good way of generating revenue for maintenance of existing public housing and creation of new affordable housing stock.

Large size of the superblocks without internal public streets and single land use has physically disconnected these properties from the existing amenities in the vicinity. Many of the public housing neighborhoods are situated near major parks, waterfronts and urban centers. It is necessary to establish a better connectivity to and better integration of these
neighborhoods with such significant existing amenities.

A large, predominantly poor population with high percentage of unemployment, disability, single mothers and old people in these neighborhoods has been segregated from the rest of the community. Revitalization of these neighborhoods also aims at their social and economic integration with the surrounding urban areas.

Optimal use of such lard tracts of urban land helps in promoting sustainable development and preservation of environmental assets.

New York City has many significant, long terms vision plans that address development of housing, community and waterfront development (PLANYC 2011, Marketplace Plan, Waterfront Revitalization Program, and Manhattan Waterfront Greenway Master Plan 2004 etc.). Since NYCHA properties cover a large portion of city land and abut waterfront in many locations, compliance with these plans is essential.

4.1.2. Tenants’ needs

As it has become evident from the site analysis, there is urgent need for improvement in the quality of life of the present residents of the neighborhoods. These superblocks must be made walkable, and safe street environment and active street frontage must be created. As discussed on the previous page, it is also important to connect these neighborhoods with the significant amenities in this part of the city, such as East River Park and the waterfront.

To bring about a social integration and to promote better interaction among the residents opportunities should be created for various social and income groups to come together.

The existing neighborhoods lacks quality public spaces and well programmed open spaces. Such spaces must be developed to create opportunity for social interaction and recreation. Similar to other public housing neighborhoods in many parts of the city, there is a complete absence of retail and commercial facilities in these neighborhoods also.

Lower East-side of Manhattan, where this site is situated, has always been deprived of and underserved with better access to public transit, especially the Subway system that can easily connect the residents to employment opportunities in various parts of the city. The program of my thesis addresses
this problem with utmost priority. Redevelopment in this area and improvement in transit facilities would support and perfectly complement each other. To achieve this, new transit opportunities such as streetcar and water transit should be created.

Except for public schools, existing community facilities in these neighborhoods are not sufficient and residents deserve better services. As additional population of diverse social and economic background will be brought in, more community facilities would be feasible to provide and manage. A major portion of the resident population are single mothers and seniors, therefore some employment opportunities for them should be created within the neighborhood.

4.1.3. Development potential of the thesis site

My thesis site which has a gross area of 78 acres, has approximately 50% of FAR unused. This equals to 4.2 million square feet of buildable area which can be easily converted into approximately 4000 housing units. For a city like New York which is projected to grow by one million in population by 2030 and where 143000 families are on wait list for NYCHA housing today, such underused city owned properties are a huge opportunity to create more and more affordable housing for the poor as well as other income groups.

The biggest strength and advantage of this site is its location. Strategically located in close proximity to the Downtown, East Village, China Town and Midtown, this critical land mass has a huge potential to be a thriving mixed-use community and to attract a diverse range of residents, users and visitors. In addition to that, it also abuts East River Park and East River waterfront that add to its potential. This also one of the very few underdeveloped properties left in such close proximity to important urban centers.

High and rising real estate property values in this area make a good opportunity for NYCHA to generate a considerable amount of revenue by developing these properties and selling a portion of housing stock.
Integrative Design Program
5. URBAN DESIGN FRAMEWORK
5.1. Design Strategies
The driving factors I discussed in Chapter 4 guided me to formulate a set of holistic design strategies that revolves around density but also addresses issues related to transportation, accessibility and environment.

5.1.1. Improving Accessibility: Reintroduce the historic street grid and mitigate the impact of FDR drive.

As evident from the urban form analysis, the destroyed street grid in this district calls for attention as the first priority. Putting the original street grid in place promises to bring about a great transformation in this district. The biggest change this strategy makes is breakdown of large superblocks into smaller blocks. This improves the accessibility and walkability in the area and also restores the view corridors to the waterfront. With such a great possibility for creation of a walkable and efficient public realm, along these new streets, it also offers opportunity for infill in the large open spaces between the towers. Along with the reinstatement of the historic grid, this thesis proposes one major intervention in relation to the FDR drive. Along its whole stretch, FDR has been a major barrier between the city and the East River waterfront. This has deprived the city of a great opportunity to create thriving public spaces along the waterfront. Even the existing public spaces such as East River Park have been isolated from the city and are suffering underuse relative to its real potential. This thesis proposes partial capping of the freeway and creating a waterfront boulevard that becomes an interface between this part of the city and the waterfront.
5.1.2. Creating Density and Diversity: Infill along the new streets.

This strategy forms the crux of this thesis. This infill exercise takes advantage of availability of unused FAR and large gaps and undefined underused open spaces between the buildings. Care has been taken to avoid overcrowding and congestion. Gross density of the properties is matched with that of East Village, while it is slightly higher than Alphabet city. This strategy also allows for creation of variety of housing types that would be occupied by various social and income groups. This will bring about the much needed diversity in this mono-cultural setup. Another important part of this strategy is exploiting the value of land along the waterfront by way of introducing a new skyline along the eastern edge. These high-rise buildings along the newly proposed waterfront boulevard shall be mixed-use mixed-income developments with significant portion dedicated for market rate housing. Some these buildings in strategic locations shall provide space in lower two floors for various commercial and retail uses that would complement recreational activities in the redeveloped East River Park and the waterfront. This high density portion of the development shall generate revenue for the revitalization of the district and shall help making this proposal financially feasible. Considering the present political opposition to redevelopment of public housing properties, Infill in this district shall be done incrementally over a period of minimum 30 years following a phased roadmap. This will avoid rapid and abrupt change in the physical and social character of the neighborhood and also possible gentrification.
5.1.3. Establishing Connectivity: Linking the new development with public transit.

Community district 3 which comprises of Lower East-side, East Village, China Town, Alphabet City and other areas has always been deprived of good public transit facilities within walkable distance. This has further contributed to isolation of public housing neighborhoods as all of them are already situated along the outer edge of the community district. While it is crucial to connect the existing residents and new residents to public transit, it is also an opportunity to address transit needs of the community district. This thesis discusses an idea of a transit corridor that will pass through all of the above mentioned districts and will be integrated with the existing Subway network at two nodes, Union Square Park and the City Hall.
5.1.4. *Environmental infrastructure: Integrating with the urban ecosystem.*

Creating environmentally sustainable communities is one of the major goals of this thesis which would be achieved by application of many sustainability measures at many levels of planning and design. Integration with the surrounding urban ecosystem is the first and foremost of such measures. This part of the city has been endowed with significant environmental assets in form of the waterfront and a great waterfront park. This thesis has created opportunities for preservation, up-gradation and better use of these assets by a large and diverse section of population by establishing a close connection between people, built environment and the natural environment.
5.2. Framework plan

With the application of earlier mentioned four design strategies, a framework plan has emerged which demonstrates how this isolated patch of settlement shall be integrated with the surrounding urbanism. It demonstrates how superblock urban fabric is transformed into small grain and stitched back into the grid, how surplus land is utilized to create more bulk without overcrowding, and how buildings are assigned uses to improve accessibility and diversity in land-use. The framework plan envisages an integrated development that has a good mix of housing typologies, diversity in form and design, and balance and interaction between open space and built form. The whole infill and urban repair exercise has brought about a major quantitative change in the existing situation (Refer table below) and has achieved additional 3231 dwelling units with a gross density of 119 while consuming 3.08 FAR. Ground cover has been doubled to 37.63% and excessive open space has been reduced to 48.98% while amount of accessible open space is increased by more than five times.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing units</td>
<td>6120</td>
<td>9321</td>
<td>152.30%</td>
</tr>
<tr>
<td>Open space</td>
<td>79.22%</td>
<td>48.98%</td>
<td>61.82%</td>
</tr>
<tr>
<td>Ground coverage</td>
<td>18.33%</td>
<td>37.63%</td>
<td>205%</td>
</tr>
<tr>
<td>Gross density</td>
<td>78</td>
<td>119</td>
<td>152.56%</td>
</tr>
<tr>
<td>FAR</td>
<td>1.91</td>
<td>3.08</td>
<td>161.0%</td>
</tr>
</tbody>
</table>

Table: Post infill change.
An integrated development with a good mix of housing typologies, diversity in form and design, and balance and interaction between open space and built form.
6. COMPLIANCE WITH THE NYC ZONING REGULATIONS
6. Compliance with zoning regulations

6.1. Restrictions due to Zoning Regulations

Alongside political opposition, restrictions born out of some of these zoning regulations have been a major impediment in the utilization of unused FAR on excessive open spaces in the superblocks. One of the main reasons for these restrictions is that most of the superblock public housing properties are single zoning lots. And as per the regulation 23-711 (Standard minimum distance between buildings) of Article 02 Chapter 03, minimum gap between the ventilating sides of two adjacent buildings shall be minimum 60 feet. (Refer: Appendix 1: 2). This regulation has made infill development really difficult. Even though gaps between two existing buildings range between 100 feet to 140 feet, a new structure cannot be built between the two after leaving 60 feet gap. Another condition on which new infill construction can be allowed is that it must have access from a public street. In these superblocks there are some open spaces large enough to accommodate a residential building with the minimum required gaps. But nothing can be constructed there as there are no internal streets within the superblocks.
6.2. Complying with zoning regulations without modifying zoning text or lot conditions.

In this situation some buildings can still be constructed. Especially in Baruch Houses, there are some large open spaces along the periphery, presently being used as either parking lots or playgrounds. These spaces have direct or indirect street access and can accommodate residential structures. To check this possibility and assess the resultant form that would arise out of that, I worked out a schematic plan. I placed building structures in all opportunity areas while following the zoning regulations of minimum gap. The plan that emerged could have accommodated some extra housing units but it does not have a coherent form and an order in the placement of buildings. It does not serve any purpose of transforming this inefficient neighborhood other than providing some extra housing units and using part of unused FAR. This is demonstrated in the accompanying diagram. The biggest risk this approach poses is perpetuation of underutilization as it can use only a fraction of unused FAR and occupies all of the potential developable land. In absence of systematic long term framework plans for revitalization of their large properties, NYCHA has done this kind of piecemeal additions in some areas. This approach would make the situation of redevelopment of public housing even complicated. This thesis serves the purpose creating a vision for redevelopment of this public housing district and a role model for other such large properties.
6.3. Working around the zoning restrictions

It is important to comply with the zoning regulations and yet make redevelopment feasible and coherent. Therefore, I explored in the zoning regulations various provisions that may help making this possible. Some of the provisions are as follows -

6.3.1. Large Scale Development

A large-scale development is a development on a large zoning lot or several zoning lots planned as a unit that are contiguous or only separated by a street. In order to promote good site planning for these types of developments and their surrounding neighborhoods, given this unique nature of scale, the City Planning Commission (CPC) may modify the underlying zoning district rules to allow greater flexibility of bulk and open space on the site. To do this, the Commission may allow site plans that shift floor area, dwelling units, lot coverage and open space on a development site without regard to zoning lot lines or district boundaries, allowing use, bulk and parking configurations which would otherwise not be allowed (NYCDCP Zoning Handbook).

A large-scale residential development is a development located entirely in a residence district or in a C1, C2, C3 or C4-1 district. It must be situated on a tract of vacant land comprising at least three acres (130,680 sq. ft.) and contain a minimum of 500 dwelling units, or at least 1.5 acres with a minimum of three principal residential buildings. Because these developments are designed predominantly for residential uses and a population of differing family sizes, planning ensures a mix of apartment sizes to accommodate different family groups, variations in building configuration and siting, open space that meets the passive and active recreational needs of residents, and protection and preservation of natural features on the site. On-site community facilities are encouraged. Commercial uses in the development are restricted to uses permitted in C1, C2 and C4 districts. (NYCDCP Zoning Handbook).

Since large-scale residential development is allowed only on vacant land and does not allow retaining any existing building, this regulation cannot govern the development of thesis site.

6.3.2 Enlargement, change of use, or extension within buildings containing residential uses.

NYC zoning regulation allows enlargement, change of use or extension to the buildings that existed prior to December 15, 1961, provided that such acts do not increase the amount or degree of the existing non-compliance. (Refer: Appendix 1: 3 & 4). Since almost all buildings in the development site have existed before 1961, I have relied heavily on this provision because it allows enlargement of existing buildings up to 50 percent of its original floor area.
6.4. Redevelopment Tools

As mentioned and analyzed in chapters 6.3 and 6.4, to make redevelopment of these properties possible, feasible and fully in compliance with zoning regulations I have devised a set redevelopment tools. These tools are a combination of strategies that considers modifications in some regulations, change in lot conditions, special permits by Board of Standards and Appeals, special permits by City Planning Commission and also some design decisions. Following are the tools.

6.4.1. Land Subdivision and New Streets
One of the many advantages of re-introducing the original street grid is that it subdivides the superblock into smaller blocks, provides street access to the existing buildings as well as vacant land pockets located deep inside the superblock. This makes infill development possible along the streets in newly subdivided smaller lots, improves accessibility and walkability, and makes it easier to develop blocks in phases and manage them efficiently.

6.4.2. Rezoning from R7-2 to R9
Creation of new streets requires almost 12 acres of land which is a big loss for the present owner NYCHA in terms of development of new housing units and possible revenue. The development site is situated along the famous East River waterfront and the park which makes it a very desirable residential location after redevelopment. This is a big opportunity for NYCHA to sell a portion of new housing stock in the market and generate funds which will finance this whole development also help in maintaining or retrofitting other such properties.
6.4.3. Parcelization of new blocks

The newly subdivided blocks are further divided into parcels of various sizes. Parcelization is done in three stages-

- Locating an existing building in a parcel with minimum 30 feet open space in all directions and making sure that area of the parcel is equivalent to the floor area of that particular building when multiplied by 3.44 (FAR).
- Dividing existing open spaces along the streets into small parcels.
- Parcelizing newly created open spaces after selective demolition of some of the existing buildings.
- Sizes and shapes of the parcels are mostly determined by availability of developable open spaces and locations with respect to designated open space system and green fingers. Parcelization of blocks offers many advantages -
  - Flexibility – Buildings can be developed on various lots in a flexible, phase wise manner.
  - Diversity in design and form - Buildings on different lots will be designed by different architects and different lot areas will create varying bulk, hence creating diversity in design and form.
  - The regulation of minimum 60 feet separation between two buildings will not be effective any more on separate lots which will create lot of developable space along the new streets.
  - For smaller buildings in this district, if parking requirement is below 15 it is waived. This will encourage creation of an environment less dependent on automobile.
  - Small buildings without gaps along the street will create continuous street wall and result in a better and safer street environment.
6.4.4. **Enlargement of existing buildings**

The zoning regulation that allows enlargement of existing buildings is very useful in the pursuit of better utilizing underdeveloped land and creating more housing stock. Enlargement of existing buildings have following advantages –

- It allows for augmentation of housing stock with any major change in lot condition.
- Enlargement can be done along with retrofitting of the existing part and the whole structure can be made suitable for use over a longer period of time.
- Most of the existing buildings are set back from the existing streets and have been orientated with odd angles with the streets. Using this regulation buildings are enlarged in such a way that they abut a nearby street and have better frontage. This further helps in creation of a continuous street wall and active frontage.

6.4.5. **Concession for minimum distance**

In spite of various modifications in lot conditions there would still be some situations where there would be sufficient buildable space but maintaining 60 feet gap would be difficult. I have identified such situations where special permits can be procured to allow infill in such locations-

- Where two buildings do not have parallel faces – many building in these properties are placed diagonally or with odd angle with streets. These buildings have ample space inside their corners for light and ventilation. Therefore instead of 60 feet gap from their outer corners a lesser distance can be maintained.
- Where a low-rise (4-5 stories) buildings is constructed on south side of an existing building a lesser gap should be allowed.
As earlier mentioned, all public housing properties in New York are strictly zoned in residential district. This zoning district allows only some community facilities in addition to housing. Due to this most of the public housing neighborhoods lack good neighborhood retail and other commercial facilities within walking distance. To implement the principal of mixed land-use it is imperative to introduce these new land-uses. Overlaying commercial zoning over residential district and allowing it in limited amount is good way to do this. In this case, the adjacent East Village and Alphabet City have undergone rezoning recently in 2008 and have commercial activities overlaid along north – south avenues. Depth of these overlays is generally 100 feet from the street side lot boundary. It was logical to follow the same kind overlay in these properties also. There are two types of commercial overlays in the East Village, C1-5 along minor avenues which allows only neighborhood retail and C2-5 along major avenues which allows small commercial activities in addition to neighborhood retail. Since Avenue D is a major street along the thesis site and also going to be a major part of the proposed transit corridor, I have proposed C2-5 overlay along the Avenue D. Along with much needed neighborhood retail facilities this overlay will provide the residents some employment opportunities in the small commercial establishments and bring in variety of activities. Sale or leasing of commercial space would generate more revenue for NYCHA. A similar overlay is proposed along the new waterfront boulevard also. Unlike Avenue D, this overlay is done in short stretches near important activity centers such as the waterfront plaza and the marina along the East River Park.

In the buildings under these overlays, commercial uses shall be limited to first two floors only. An additional FAR of 2.0 shall be permissible.
6.4.7. Selective demolition

This thesis proposal suggest demolition of buildings which are

- Low rise with less floor area but occupying more land area in strategic location.
- Awkwardly placed buildings that become impediment for a good site plan.
- Buildings that obstruct creation of new street grid.
7. INFILL SCENARIOS
7. Infill scenarios

Based on the existing building pattern, I have developed three infill scenarios which use some or all of these redevelopment tools. Alongside creating more bulk, the main objective of this infill exercise is also to re-organize the vast undefined open spaces into smaller, better managed, better programmed vital spaces. Each superblock has now been broken down into smaller blocks that have such vital open spaces in the center which are linked to a larger open space system. Smaller block size will also help in efficient redevelopment and management of whole neighborhood.

7.1. Baruch Houses

This is the biggest of four public housing properties measuring 30.0 acres. But this is also the most difficult property for infill because of its irregular pattern of buildings. As earlier mentioned in the analysis part, this neighborhood comprises of nineteen buildings of almost same plan profile differing slightly in there floor plan details. Not a single building abuts any street and all buildings are placed randomly at odd angles with lot boundary. This has been further compounded by the very strange shape of buildings which made addition or extension to these buildings more difficult.

Infill in this situation shall be made possible by applying almost all of the redevelopment tools. As the first step, a grid of streets shall be introduced by extending Stanton Street and Rivington Street towards East, and Lewis Street and Baruch Place towards north. An existing Dewitt Reform Church shall be relocated to south to make way for Rivington Street. Similarly building no. 12 shall be demolished for Lewis Street.

The East – West streets would meet with service lane of the FDR Drive and the North-South streets East Houston Street. Following the Manhattan street designs these one-way minor streets shall be designed with 60 feet right-of-way with 12 feet sidewalks, two 11 feet wide traffic lanes and on-street parking lanes on both the sides. Only exception to this shall be Baruch Place which shall be designed as a major street with 75 feet right-of-way. This has been done so because ‘Tower-on-a-base’ building typology is allowed only on a major street (minimum 75 feet wide).

These four streets divide the Baruch Houses superblock into nine smaller blocks, six blocks measuring 400’X400’ and remaining three 400’X200’. Each block has minimum two existing buildings. Middle row of three blocks has been incorporated with a linear green open space that spans between Avenue D and FDR Drive. As described in detail in later chapters this open space forms one of the main green spines /
fingers that connect this neighborhood with the East River Park and the waterfront. This particular green spine crosses over the FDR Drive and terminates into a grand waterfront plaza and a new ferry landing. Three larger blocks along the FDR Drive have been rezoned from R7-2 to a higher density district R9. These blocks accommodate mainly tower-on-base high-rise buildings which form a part of the new east coast skyline. These subdivided blocks are further divided into smaller parcels as prescribed in 6.5.3. All existing buildings that fall within these parcels have been enlarged so that they establish a frontage with streets and create a sense of enclosure for the block.

Remaining vacant parcels have been developed in such a way that they complete the perimeter of the block forming a continuous street wall on all sides. Zoning regulation of minimum 60 feet gap is strictly followed in most of the cases. Varying sizes of parcels formed due to constraints of existing buildings makes it easier for creation variety in building typologies and bulk. All parcels along the Avenue D and the new waterfront boulevard have been overlaid with commercial overlay C2-5. This creates compatible land use at street level along the Avenue D and creates opportunity for a new street life along the new waterfront boulevard.
Public school
Ferry landing
Waterfront plaza
Greenhouse urban farms
Farmers’ markets
7.2. Wald Houses

Already developed to a higher density of 113 Du/ac, 17.0 acre Wald Houses neighborhood has a rectilinear building pattern. And as I have mentioned earlier, even though existing gaps between two buildings range between 100 feet to 140 feet, an independent structure that complies with zoning regulations cannot be constructed in this space. To subdivide this superblock East Fourth Street has been extended eastward and connected to the FDR Drive. East Third and Fifth streets are extended in the form of green fingers. This creates four linear small blocks. Four existing buildings at the eastern end of these blocks have been demolished and the vacant parcels have been rezoned to higher density R9 district. As done in Baruch Houses, these four rezoned parcels hold high-rise mixed-use mixed-income buildings which accommodate a major portion of market rate housing segment and become a part of the new eastern skyline.

Since this property doesn't have open spaces large enough to build a large independent infill structure, I have mostly relied on enlargement of existing buildings and development of attached multi-family row houses.
D

Public school

Connection to FDR drive

Green finger connections
7.3. Riis I & II Houses

The existing layout of this neighborhood is very formal with fairly symmetrical placement of buildings and a formal open space along a central axis parallel to the FDR Drive. As mentioned in the Urban Form Analysis chapter, despite such a strong axial arrangement this vital open space had been relegated to a secondary space due to orientation of buildings and location of building entrances on the outer periphery of the site. This formal axis also ignored the natural flow of movement from the E-W streets across Avenue D. This design proposal has corrected that anomaly. By extending E 8th Street and E 12th Street across Avenue D and the site, and connecting them with FDR Drive, these two large blocks have been broken into four smaller blocks separated from each other either by a street. Each block has an E-W green spine that continues remaining E-W streets with the FDR Drive. Since majority of the existing buildings in this neighborhood are diagonally placed and set back from the streets, it was difficult to implement the tool of enlargement and increase the bulk to add more housing units. Therefore, enlargement has been done in a very limited way, only for creating retail facilities along the streets. The tool that has been used here more effectively is selective demolition. This neighborhood had six long buildings which were low in height (six stories) and had occupied comparatively large lot area utilizing less FAR. This made them ideal for demolition. The land that was cleared made space for six large buildings, one public school and twenty attached multi-family row houses.
7.4. Representative Block

As mentioned in previous chapters, the infill exercise along with restoration of street grid completely transformed the superblocks. In doing that it re-organized the open spaces and integrated them with a larger open space system by connecting them with East River Park and the waterfront. This open space system now comprised of a number of well programmed, well managed and protected open spaces of various sizes and nature. To demonstrate how these scaled down open spaces work with the new built form, I developed detailed plan of a block. This block has three randomly planned existing buildings. Perimeter of the block has been completed by new infill structures as well as enlargement of existing buildings. The open space thus enclosed has been programmed in a manner that it evolves a clear hierarchy of access and use. It has been maintained that there would be front and back side to any building. All buildings shall open onto and have access from both the sides, hence establishing an interaction with this inner block open space.

This awkwardly shaped space has been anchored by a community facility strategically located at the intersection of two circulation paths. At the junction of these two paths is a common forum which is supported by a stage on one side and a sloping grass-covered landform on the other. This sloping mound acts as a spectator / sitting gallery during special events and social gatherings. Children's play areas have also been located in a manner that residents from all buildings can have easy access to them. The play areas are visible from all sides of the block space and hence under constant vigilance. Pathways inside the block provide access to various buildings as well as various public, semi-public and private spaces. They also mark a notional boundary between public and private spaces. The bio swale that runs through the block collects the urban runoff from the block and takes it to a retention pond, overflow of which is connected to the larger storm water network. All existing trees within this open space have been preserved and new trees have been added.
Existing building enlarged
Retail & Commercial
Pedestrian pathways and Emergency access

First floor units with ground access
Live / Work units
Multi-family Rowhouses

Multi-purpose Lawn
Common forum
Community Facility
Child Healthcare

Design of representative Block
7.5. Housing Typologies

It must be first noted here that however miserable the built form and building pattern of towers-in-the-park may be, design of individual housing units is of very high standards. These high standards for design of housing units were an important aspect of modernist public housing movement and were a direct response to pathetic leaving conditions in the slums of pre-urban renewal era. In the existing buildings, each housing unit is a dual aspect unit with ample light and ventilation in every room including kitchen and toilet. Though these were really commendable efforts, they along with towers-in-the-park typology did not work well for the efficiency of open spaces at the ground level. The sole objective of providing dual aspect to every housing unit and ventilation for every room gave way for evolution of strange building forms that occupied more space and created comparatively less amount of floor space. Absence of ground access to first floor units and provision of only one entrance to the buildings disregarding the orientation of open space further isolated them from the surrounding environment. While emulating the high design standards of existing housing units, I have tried developing housing typologies that are equally good and have been arranged in a compact building envelope. Three factors influenced the design of representative typologies – environmental sustainability, diversity and to an extent, need for space in changing family structure.

- Sustainable building design - A major portion of NYCHA funds goes in maintenance and operation of utilities for public housing. In this context, making new and old housing energy efficient, climate-responsive, socially responsive and comfortable in all seasons was very important. This has been taken care of by following a set of sustainability measures -
  - Maximized South exposure with shading devices.
  - Maximized E-W exposure.
  - N-S orientation of dual aspect units.
  - E-W orientation of doubly loaded, single aspect units.
  - No back and front sides to the buildings, access from both the sides.
  - No units should face only North.
  - Mix of housing types in one block
  - Solar Energy.
  - Wind Energy for towers.
  - Green Roofs and urban farming.

- Diversity – It has always been one of the major objectives of this whole re-envisioning exercise that there should be a healthy diversity in various social groups as well as design and forms of the buildings. Essential to that principle is
diversity in housing types that creates choice in housing options for various social groups depending on their income, affordability, family size, need for space and access to various amenities. This was also important for optimum utilization available land since these infill structures had to be accommodated in sometimes small and odd shaped lots. Keeping this mind, I have developed four housing typologies – multi-family row houses, small apartment blocks, linear apartment blocks and towers-on-base high rise buildings. I have also enlarged, modified and retrofitted existing buildings to make them suitable for different social groups, long term use and higher tenant occupancy. These are representative typologies, developed to demonstrate an ideal situation. But a well-functioning and diverse built environment can be generated incrementally over the years following the design guidelines suggested in this chapter.
7.5.1. Multi-family row houses

In keeping with the scale and form of the built environment in adjacent areas of East Village and Alphabet City, I have liberally used this typology for Infill in these public housing properties. Mostly multi-family houses, these walk-up structures shall be four to five stories high with a basement. Generally there would be two one or two bedroom apartments on each floor. But flexibility can be allowed to design any configuration of affordable housing units of various grades. Houses shall be built on two sizes of lots, 40’X 60’ and 20’X 60’ feet, with 3.44 FAR. All houses shall have access from both, front and rear, sides with stoop on the front side and a backyard or a deck on the rear. Rear yards can be fenced to protect the property but not higher than four feet and an active entry to the common open space in the block must be maintained. Windows and openings on the south face shall be protected with screens and projections. All houses shall have green roofs and roof farming activity shall be encouraged. Buildings shall also use solar power extensively. Storm water shall be collected from green roofs and fed into the green areas and bio swale network.
7.5.2. Small apartment block – First Houses model

This typology takes its inspiration from the First Houses in New York City. First Houses are said to be the first public housing project developed in the United States. NYCHA, that was founded in 1934 developed First Houses in 1935 by demolishing every third structure and combining two structures in a row of 24 old tenements on the intersection of Avenue A and E 2nd Street. Each building is a four or five story walk-up with four apartments on each floor and buildings have been planned around and accessed from a garden on the rear side. This provided a great change from the light and ventilation conditions in old and new tenement buildings. (Landmarks Preservation Commission designation, 1974).

To develop this typology I have used the scale and floor plan pattern of First Houses. Unlike First Houses, this typology shall be built on vacant lots measuring 90’X 80’ with 3.44 FAR. Buildings shall have elevator access and two scissor type staircases. Depending on the demand four or two apartments shall be accommodated on each floor. Orientation of the building must be along N-S axis and each apartment shall be exposed to either South or East or West. Two achieve this, a 10’ wide side yard shall be provided on both sides of the building even though it is not required by zoning regulations. This 20’ gap thus created between two such buildings shall provide additional light and ventilation to housing units on lower three floors. Above third floor, building shall be further set back on two sides by 10’ creating a 40’ gap between two such buildings. This would improve light and ventilation condition for lower three floors.

In this proposal these buildings have been designed in a group of two to three. The farthest of these buildings would be at least 40’ away from any large apartment block but could share one wall with a row house. An easement of a 30’ rear yard shall be kept which would be programmed with the block open space to achieve an integrated open space structure. Another easement for public access to the block open space shall be provided between two buildings. Windows and openings on the south face shall be protected with screens and projections. All houses shall have green roofs and roof farming activity shall be encouraged. Buildings shall also use solar power extensively. Storm water shall be collected from green roofs and fed into the green areas and bio-swale network.
7.5.2. Small apartment block – First Houses model
7.5.3. Apartment Block

Conventional apartment blocks with doubly loaded corridor have been made different in this proposal by prescribing a certain orientation to them. As mentioned in the sustainability measures all doubly loaded apartment blocks have been orientated N-S with longer sides facing East and West to provide direct sun exposure to every housing unit. All buildings shall have green roofs and roof farming activity shall be encouraged. Buildings shall also use solar power extensively. Storm water shall be collected from green roofs and fed into green areas and bio swale network.
7.5.4. Tower-on-base

Designed with highest FAR and situated along the eastern waterfront edge of the site, these towers provide the main bulk of market rate housing. As specified in the zoning regulations these structures comprises of a 65-85 feet high base and a tower that sits on the base. The tower covers 30-40% portion of the lot. The base can have 100% ground cover and can be planned for parking, residential or community facilities. Tower part shall have only residential use and 55% of floor area must be built below 150 feet height of the tower. The towers shall be allowed to penetrate sky exposure plane but must be set back by 10 feet above the base height. This setback shall be 15 feet for minor streets. At least one side of the lot must abut a major street (min. 75’ wide). Having been situated along the waterfront, these towers shall be placed perpendicular to the water edge to maximize opportunity for waterfront views. This makes the towers vulnerable to north exposure on one side. To avoid this and to provide every unit South, East or West exposure, towers shall be staggered as shown in the diagram. This will also offer waterfront view to all units. Taking advantage of the height and prevailing winds from North – West, windmills shall be installed on all towers. Windows and openings on south side shall be protected by projections of made up of appropriate materials.
Towers make the biggest physical, visual and environmental impact of any urban environment. Considering this along with the extreme climate of New York City, it was necessary to make sure that this development did not adversely affect the microclimate of the neighborhood. Therefore, following factors have been considered while locating and designing these towers –

- **Tower Spacing** – Locations of the towers have been planned in staggered manner and minimum gap between the two towers is 100’. This way that the impact of collective bulk of the towers is minimized. Shadows of the towers would not be continuous, there would be sense of openness and more amount of sky would be visible from various parts of the neighborhood.

- **Viewshed** – Having located along the East River Park and the waterfront, availability of great views from the buildings is a very important aspect to enhance the living experience and increase real estate value of the development. To maximize this opportunity, rectangular towers have been placed perpendicular to the water edge. In addition to the waterfront, this location also provides great views of Downtown and Midtown. Since the tower-on-base buildings are taller than the existing public housing buildings, they provide this opportunity also.
• Minimizing shadows – To exploit real estate value of the property and to make the project financially feasible, it was necessary to develop the prime portion of the property to the higher density and hence with taller structures. Unfortunately, since this part falls on the East side of the property taller development would have casted long shadows on the existing public housing buildings and new infill development. To minimize this, I have proposed stepping down of towers on the West side.

• Minimizing wind effect – Staggering and stepping of towers also help minimize wind tunnel and downward vertex effect.
7.6. Enlargement of existing buildings

As mentioned in the open space analysis, most of the towers in these ‘Tower-in-the-park’ neighborhoods are setback from the street and have minimal interaction with the streets. Similarly, as all buildings have only one access point there is no interaction between the buildings and the huge open spaces around them. Enlargement of existing buildings provides solution for both of these problems. As per zoning regulations 11-412, 73-621 and 73-641, existing buildings constructed before 1961 can be enlarged up to 50% of their existing floor area without creating any new non-complying situation. Taking advantage of this provision I have proposed enlargement of many existing buildings.

This approach has many advantages -

- Creates more housing units without displacing existing tenants.
- Can be carried out along with retrofit of existing buildings.
- Do not have to deal with minimum 60 feet separation regulation.
- Creates diversity in monotonous tower buildings.
- Helps creating a street frontage and improves street environment.
- Provides opportunity for retail / commercial / community facilities along the streets.
- Provides new housing units at the ground level which optimizes the use of open spaces and improves safety situation.
- Provides an opportunity to create street walls and active street frontage.
8. IMPROVING CONNECTIVITY
8. Connectivity

Alongside improving physical environment of public housing neighborhoods, connecting public housing residents to various community facilities, educational and employment opportunities in various parts of the city has also been a major objective of this proposal. It is a well-known fact that Community District 3 of Manhattan and Lower East-side in particular has always been under-served in subway transportation connectivity. New York City has started construction of a new subway line along the Second Avenue. But this route also does not fulfill the transportation needs of Lower East-side. This proposal is an opportunity to address this need. Therefore I am proposing a transit corridor that loops through east village, alphabet city and china town and connects two important urban centers, Union Square Park and the City Hall. From Union Square Park this corridor takes a route along Broadway, turns left on E 10th Street, turns right on Avenue D along the NYCHA properties, turn right on East Broadway and terminates in the Foley Square near the City Hall. In the reverse direction, it take the same along the East Broadway and Avenue D but turns left on E 7th Street and turns right on Broadway to terminate in the Union Square Park. It is also integrated with ferry service along the East River and connects Lower East Side with Brooklyn. This will be a huge amenity for the people of this part of the city that will connect them to employment, education and other opportunities. This transit corridor can be operated as Bus Rapid Transit system in the first phase and subsequently converted into a Light Rail Transit system. This corridor would also serve as a complete street providing space for all kind of transit modes, and hence an equal importance shall be given for pedestrian and bike movement.
9. ACCESSIBILITY
AND GREEN INFRASTRUCTURE
9.1. Accessibility and Green Infrastructure

As specified in the design strategy 5.6.1, reinstatement of original street grid will immensely improve accessibility and walkability of the area and create a great opportunity for a robust public realm. But all these extended streets do not provide infill opportunity due to the existing building pattern. Creating some of these streets would also destroy lots of existing trees. To avoid this possible loss of trees and yet to establish easy access to the waterfront, I have proposed green fingers in place of alternate streets. All newly formed urban blocks have been planned around these green fingers or open spaces that are connected to green fingers. These green fingers make important elements of the new open space system that perform ecological and recreational functions. They have been programmed extensively with various active and passive recreational activities for different age groups such as kids play areas, basketball and tennis courts, parks and gardens, amphitheaters and open lawns. They also provide accessibility to the waterfront and act as crucial link between transit corridor and the water transit.
Phase 1 & 2 - green fingers crossing the freeway

Phase 3 & 4 - new waterfront boulevard above FDR

Berm to protect from storm surge

Landfill to match new street level

Berm to protect from storm surge

Typical green finger
Linking transit corridor and ferry landing
Rainwater retention and infiltration
9.2. Protecting from storm surge

New York City has always been vulnerable to hurricanes and storm surges that are caused by them. As described in point 2.8.3 of the Site Analysis chapter, a major portion of thesis site is within the Zone A of Hurricane Evacuation Map and is at risk of inundation during hurricane of any category. As a part of the last phase of this revitalization program, I have proposed partial capping of the FDR drive that has separated these public housing neighborhoods from the East River Park and the waterfront. This capping is done in form of a boulevard that would be constructed above the existing FDR drive. At all major street junctions it will completely cover the freeway and establish a better connection with the other side of the freeway. In addition to these connections, two major waterfront activities shall be developed in the East River Park that will cover a major part of the freeway and will be closely linked with the new development. A large waterfront plaza will be developed on the other side of Baruch houses across the freeway, which will have a ferry landing at the water edge. Another such plaza will be planned along with a marina opposite Riis Houses.
10. SOCIAL INTEGRATION
10. Social Integration

One of the major objectives of this thesis is social integration of these isolated, low income neighborhoods. While I have employed all possible design strategies and design measures to create opportunities for fulfillment of this objective, it will also require some policy measures to make them more effective. There has been a huge amount of research done on social integration of low and other income groups. Many experiments have been done, and not all have been successful.

10.1. Housing distribution

The augmentation of housing stock that was made possible by infill, and retrofit and enlargement of existing buildings created 50% additional housing units. In keeping with the strategies to increase affordable housing, create diversity, and at the same time to generate revenue to make this development financially feasible, I have proposed a judicious distribution of this new housing stock. According to this distribution scheme, 35% of the new housing units shall be new public housing units for low income group, 25% shall be affordable housing for various other income groups, 5% for senior housing and remaining 35% shall be built as market rate housing. As seen in the figure on page no. 93 that graphically describes the existing distribution 30% of the existing housing units are occupied by single person households and the remaining by families. Less than 10% households have income more than citywide median income which is $50,285 and the average median income of these neighborhoods is only $17,828. My experiment of housing distribution tries to alter this situation and give this neighborhood a diverse character.

10.2. Cross-culture interaction

This is one of the most difficult parts of the thesis. Although the success of this thesis does not solely depend on cross-culture interaction, it is a very important aspect that would help us achieve our primary goal, social sustainability. There is no sure shot formula to create a successful interaction between different income groups of a society. It can be conveniently assumed that communication and interaction would be easier between two immediate income levels. But the same may not be as easy to achieve between two extreme income groups. There are a number of reasons that prevent this interaction and this includes but is not limited to people's preferences, various prejudices, sense of comfort and safety to cohabit, cultural differences, different needs and abilities to meet them and so on. It is also impractical and unfeasible to force these different groups to live together. Market rate housing is an important
element of this development and it is essential to make it financially feasible as well as socially diverse. So it is essential to cater to some of the reservations of this income group in regards to sharing space and building services with low income groups. Therefore while distributing various housing types and marking their locations in the neighborhood, I have followed a strategy of 'maximum interaction and minimum conflict'. Taller buildings proposed on the rezoned parcels along the waterfront are a natural choice for market rate housing because of their attractive location, waterfront view and access, and also great views of the skyline of downtown and midtown. I have not proposed any low income or public housing in these buildings. However, following the Inclusionary Housing Policy of New York City, there would be a substantial portion of these buildings dedicated for affordable housing for moderate and high income groups. Rest of the buildings in the neighborhood shall have a good mix of existing public housing, new public housing and new affordable mix income housing. Families with children shall be given preference for ground and lower level floors to encourage more use of ground level public open spaces.

A robust public realm and an efficient social infrastructure will play a major role in creating opportunities for cross-culture interaction in this strategy of housing distribution.

### 10.3. Design of public spaces and communities facilities to facilitate positive interaction among social classes.

In this proposal I have made special efforts to transform the open spaces that are presently undefined and underused. Along with newly created streets, these well planned, well programmed and well managed open spaces would create a healthy and robust public realm, invite people of various social groups and support host of activities. These public spaces would work at all levels - district, neighborhood, block and building and would be a part of larger open space system that would integrate this neighborhood with the East River Park and the waterfront. All public open spaces shall be anchored by various community facilities and together they would create a safer public environment and attract diverse users. Another level of smaller community facilities shall be provided for each individual buildings in common areas or roof terraces. 37.63% building ground coverage on 65 acres of land would create 24.5 acres of roof space. All this roof spaces shall be utilized as allotment farms that would be managed by individual buildings. This would create employment opportunities for high number of single mothers and seniors living in the neighborhood. This would also create opportunities for education and social interaction and serve our goal of environmental sustainability by reducing heat gain effect, urban run-off and energy consumption.
11. IMPLEMENTATION
11. Implementation

Redevelopment of these neighborhoods shall be done in an incremental manner. Garnering political support for this project is very critical and for that it is essential to address the concerns of various stakeholders. As gentrification and displacement are the biggest fears of existing tenants and supporters of public housing, they have to be addressed in a proper and trustworthy manner. While I have taken care in design strategies not to cause gentrification and displacement, implementation of this design proposal should also be done with the same spirit.

11.1. Phasing

Incremental development of these neighborhoods has been envisaged over the next thirty years in five phases. Although the phasing strategy does not take into consideration cash flow and other funding requirements, it focuses on minimization of temporary displacement, temporary relocation of the tenants within the site, and quality of life and safety during construction.

- Phase One (2013 - 2018): This phase shall focus on infill on vacant land and parking lots. To facilitate this, a new street shall be created by extending Rivington Street into Baruch Houses neighborhood. This phase would create 734 new
units. These units would be used as transition housing stock for people relocated from the buildings that would be retrofitted and enlarged in subsequent phases. Two green fingers would also be established along with cross over bridges across FDR Drive.

- **Phase Two (2019 - 2024):** Second phase shall aim to start creating a sense of place by developing a strategic area around the intersection of East Houston Street and Avenue D. This will create a new continuous street frontage along the Avenue D. Along with the development in this area and other locations, this phase shall create 557 new housing units, shall retrofit 666 existing units and demolish 130 existing units. This phase shall also create five new streets and two green fingers. But the main highlight of this phase would be the establishment of the transit corridor along Avenue D.

- **Phase Three (2025 - 2030):** This phase aims to start creating the new skyline along the East River. It will also start the capping of FDR Drive, develop a stretch of waterfront boulevard along Baruch Houses neighborhood and develop seven major housing towers along the East River. This phase shall create two more green fingers and retrofit 796 existing housing units. Selective demolition of some the existing building shall be done in a major way, in which six
existing buildings shall be demolished. This will reduce the existing housing stock by 442 units which will be compensated by new housing units and there would be a surplus of 798 new units.

- **Phase Four (2031 - 2036):** Waterfront boulevard shall be completed in this phase and two waterfront plazas shall be developed along the East River Waterfront. While one of the plazas shall accompany a new ferry landing, the other shall have a marina. The BRT system on the transit corridor shall be converted into LRT system. This phase will also see a major selective demolition activity that would erase 579 existing housing units. This loss would be compensated by new housing units and there would be a surplus of 666 new housing units. At the end of this phase 2755 new housing units shall be added this will a 45% addition to the existing stock.

- **Phase Five (2037 - 2042):** The final phase shall complete the rest of skyline along the waterfront and retrofit the rest of the existing buildings. This phase shall add another 446 new housing units taking the new housing stock to 3201 (52%).

Phase Four: 2031 - 2036
- Completing the new waterfront boulevard & Plazas
- Conversion of BRT to LRT
  - New housing - 666 Du
  - Units vacated & Retrofitted - 505
  - Units demolished - 579
  - Total after Phase 3 - 2755 (+45%)

Phase Five: 2037 - 2042
- Retrofit of remaining buildings
  - New housing - 446 Du
  - Units Retrofitted - 1492
  - Units demolished - 170
  - Total after Phase 3 - 3201 (+52%)

Phase Four
Phase Five
11.2. Public Private Partnership and Management.

Although NYCHA owns the entire land, they do not have the apparatus to develop and construct housing and other buildings. Also, since this is a large scale development it would be advisable to involve multiple agencies. These can be non-profits, community development agencies or affordable housing developers. Subdivision of large superblocks also facilitates this kind of approach as each small block or a part of it can be taken up by an agency and developed along with retrofit and enlargement of existing buildings. There can be number of ways for the developer to make profits, either by directly getting paid by NYCHA or selling a portion of housing in free market. This partnership may end upon completion of the project or may be continued further for management of the newly developed neighborhoods. Unlike the existing system of managing large low income neighborhoods, new development shall have multiple management entities managing smaller mixed income neighborhoods. This will result in better management and control.
12. CONCLUSION
12. Conclusion.

Transforming distressed, under-performing and underdeveloped public housing neighborhoods is an urgent need and a challenge for all major American cities. While declining quality of life in public housing neighborhoods combined with rising need for affordable housing makes it necessary, stiff political opposition and funding problems creates obstacles in the path of this much needed transformation.

Through this thesis, I have tried to demonstrate that it is possible to overcome these impediments and bring about a positive change in the urban environment.

In this thesis, I have demonstrated this possibility and its benefits through a redevelopment proposal for three large public housing neighborhoods in the Lower East-side of Manhattan. Alongside many other important factors, I analyzed the history of urban form of this critical land mass and studied its transformation over the years. Although the present Towers-in-the-park superblock neighborhoods are legacy of a failed policy, the city can not demolish this mammoth built environment like it was done during the urban renewal era. This approach would have serious legal, financial, political and environmental ramifications. Therefore, I have proposed preservation of this built environment and its careful integration into the urban fabric.

This proposal envisaged augmentation of affordable housing stock by developing excessive open spaces and utilizing the large amount of unused development rights (FAR) while preserving the existing public housing - buildings as well as tenants, and avoiding displacement and gentrification. It also employed urban design principles that integrated these isolated neighborhoods into the urban and social fabric of the city. It also created an efficient and robust public realm by creating meaningful well designed, well programmed and well managed public spaces, and improving street life and safety of the neighborhoods.

Through this exercise, it is possible to create on the same properties additional 3200 (50%) housing units, a host of new amenities, and retail and commercial facilities and yet have 50% open space which would be more functional and productive. While a major portion of these new housing units would go to affordable housing stock, a considerable portion shall be sold in open market. This market rate housing stock would generate enough revenue to fund this whole redevelopment project and also to finance other development and maintenance activities of the cash strapped NYCHA.
While all American cities are struggling to halt the onslaught of suburban sprawl, reduce auto-dependency and grow sustainably, underdeveloped public housing neighborhoods situated in strategic locations in large cities like New York can be great opportunities not only to transform and re-urbanize them but also to utilize the real potential of these precious urban lands for an equitable and larger benefit of the city.
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14. APPENDIX
Appendix 1: Zoning Analysis

1. What is R7-2 Zoning District?

R7 districts are medium-density apartment house districts. The height factor regulations for R7 districts encourage low apartment buildings on smaller zoning lots and, on larger lots, taller buildings with low lot coverage. As an alternative, developers may choose the optional Quality Housing regulations to build lower buildings with higher lot coverage. Regulations for residential development in R7-1 and R7-2 districts are essentially the same except that R7-2 districts have lower parking requirements.

2. Article 02 Chapter 03 - 23-711 - Standard minimum distances between buildings

R1 R2 R3 R4 R5 R6 R7 R8 R9 R10

In all districts, as indicated, the required minimum distance between the portion of a #building# containing #dwelling units# and any other #building# on the same #zoning lot# shall vary according to the height of such #buildings# and the presence of #legally required windows# in facing #building# walls.

Such minimum distance shall be, in feet, as indicated in the following table.

<table>
<thead>
<tr>
<th>Wall Condition*</th>
<th>Maximum #Building# Height above #Base Plane# or #Curb Level#, (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall to Wall</td>
<td>20 25 30 35 40 Over 50</td>
</tr>
<tr>
<td>Wall to Window</td>
<td>30 35 40 45 50</td>
</tr>
<tr>
<td>Window to Window</td>
<td>40 45 50 55 60</td>
</tr>
</tbody>
</table>

3. Article 07 Chapter 03 - 73-621 - Enlargement, change of use, or extension within buildings containing residential uses.

For a complying or #non-complying building# existing on December 15, 1961, or in R2X, R3, R4 or R5 Districts on June 30, 1989, and containing #residential uses#, the Board of Standards and Appeals may permit an #enlargement#, a change of #use# or (in the case of a #mixed building#) an #extension#, provided that such #enlargement#, change of #use# or #extension# shall not create any new #non-compliance# or increase the amount or degree of any existing #non-compliance# except as provided in this Section. In the districts and for the #buildings# for which an #open space ratio# is required, the #open space ratio# permitted under this Section shall not be less than 90 percent of the #open space ratio# required under the applicable #bulk# regulations set forth in Article II or III of this Resolution.
In the districts and for the buildings to which maximum lot coverage applies, the maximum lot coverage permitted under this Section shall not exceed 110 percent of the maximum lot coverage permitted under the applicable bulk regulations set forth in Article II or III of this Resolution. In all districts, the floor area ratio permitted under this Section shall not exceed the floor area ratio permitted under such regulations by more than 10 percent. In R2X, R3 or R4 Districts, the additional floor area permitted pursuant to this Section may be computed using a base floor area ratio including the floor area permitted under a sloping roof with a structural headroom between five and eight feet when such space is provided in the building.

4. Article 07 Chapter 03 - 73-641
Integration of new buildings or enlargements with existing buildings

For any such new building or enlargement, subject to the required findings set forth in this Section, the Board of Standards and Appeals may permit modifications of the applicable regulations in Sections 24-38, 33-28 or 43-28 (Special Provisions for Through Lots), or in Sections 24-51 to 24-55, inclusive, Sections 33-41 to 33-45, inclusive, or Sections 43-41 to 43-45, inclusive, relating to Height and Setback Regulations, or in Sections 24-61 to 24-65, inclusive, Section 33-51, or Section 43-51, relating to Court Regulations and Minimum Distance between Windows and Walls or Lot Lines, provided that on December 15, 1961, the applicant owned the zoning lot or any portion thereof, and continuously occupied and used one or more buildings located thereon for a specified community facility use, from December 15, 1961, until the time of application. As a condition of granting such modification, the Board shall find:
(a) That such modification is required in order to enable such use to provide an essential service to the community;
(b) That without such modification there is no way to design and construct the new buildings or enlargements in satisfactory physical relationships to the existing buildings which are to remain upon the site, so as to produce an integrated development; and
(c) That such modification is the minimum modification necessary to permit the development of such integrated community facility, and thereby creates the least detriment to the character of the neighborhood and the use of nearby zoning lots.