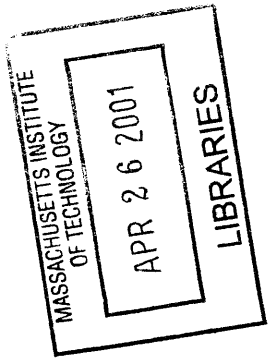

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CONTINGENT [RE]OCCUPATIONS: RESIDUAL URBAN MORPHOLOGIES

by
Robert S. Brown III
Bachelor of Design
University of Florida, 1996

Submitted to the Department of Architecture
in Partial Fulfillment of the Requirements for the Degree of

Master of Architecture
at the
Massachusetts Institute of Technology
February 2001

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RESIDUAL URBAN MORPHOLOGIES

By
ROBERT S. BROWN III

Submitted to the Department Of Architecture on January 19, 2001
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ABSTRACT

This thesis aims at establishing a dialogue between urban algorithms and individual space in Boston's Back Bay. Using the vehicle of typology as a basis, unit alteration and reprogramming are explored as urban systems. The design implications of introducing these altered forms of domestic morphology into existing urban housing environments are the basis of this thesis. Titled by this proposal as "secondary occupations," it is into the site of Boston's Back Bay as a collective prototype that these proposals of domesticity are placed.

The basis of research is a mapping of the development of the Back Bay in terms of the "individual". This rationalization starts at the scale of the housing unit or cell, then the building, the block, and ultimately the district. Secondarily, the reintroduction of the contemporary inhabitant into this region is analyzed in terms of its possible occupation and use.

At the urban scale, existing structuring rules of the city form are determined through mapping locational factors and development patterns. The alteration and analysis of these patterns becomes a locational and programmatic tool for future occupancy.

Through this mapping, a series of derivative interventions in the urban fabric emerge. These are based on the primary usages of work/domesticity through which the individual inhabits the city. Urban issues of public vs. private and ownership vs. concurrency become the languages of this occupation. Programmatically, these occupations mediate the constraints of the automobile and existing visual fields. Typologically, the morphological systems of the Back Bay become reoccupied by secondary structures of flexible spaces and movable domestic prototypes.

Thesis Supervisor: Ann Pendleton-Jullian
Title: Associate Professor of Architecture

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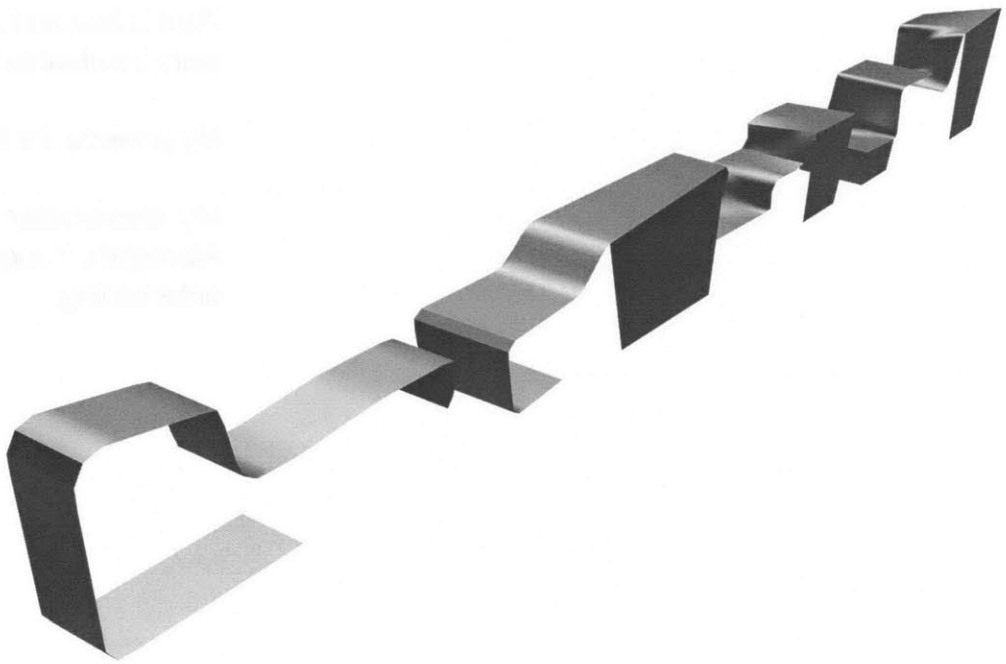

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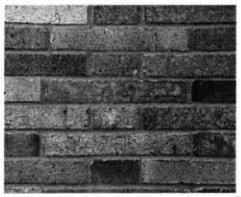

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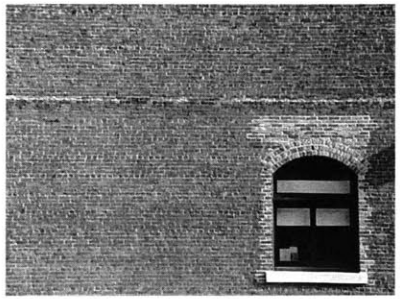


Introduction

"...strategies of the industrial city must be inverted. At an urban scale, workplaces and homes no longer need to be kept apart in separate zones. Their inter-mixture should, in fact, be encouraged. But within the live/work dwelling itself, the need for separation reemerges."[1]

Between the scales of architecture and urban design is the question of priority. The amount of influence one exerts on the other is at the basis of city form. While neither can be fully dictated by their predecessor, the coupling of their separate scales creates a medium in which rule-based structures evolve. The beauty of these structures is measured by their ability to create complex environments with a simple set of rules. How architectural interventions operate within these rules is often as a typological response to urban intents. By embedding urban intents into architecture, a non-prescribed environment can evolve based on performance, rather than large-scale formal moves.

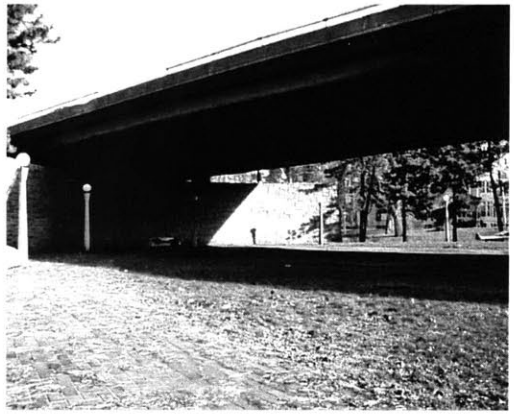
These rule-based systems call into question not only the future of housing, but also the ability of existing typologies to be altered and re-programmed. The adaptation and re-occupation of urban domestic environments is the frame of this questioning. This thesis explores the design implications of introducing altered forms of domesticity into existing urban housing environments. Titled by this proposal as "secondary occupations," it is into the site of Boston's Back Bay as a collective prototype that these proposals of domesticity are placed.

Based on the urban morphology of the town house described in Chapter Two, the Back Bay exists today as a complex mix of regional influences and individual needs. Over its one hundred fifty years, the area has been altered and reconceptualized while remain-

[1] Mitchell, William. *E-topia*. Cambridge, MIT Press, 1999, p.74

ing within it original architectural framework. As the needs of urban housing have changed in the Back Bay, occupancy and usage have become the tools of preservation. The manner in which the area will continue to sustain itself is the basis of this thesis. Formalized restrictions enforced by the Back Bay Architectural Commission have stagnated the potential of the area, and created an Euclidean zoned residential quarter in the heart of metropolitan Boston. As residential occupancy patterns continue to evolve to incorporate live/work, this and other urban neighborhoods must be redefined.

As architectural interventions have to respond to urban environents, the systematics of city form must respond to a specific time and place. How successfully these systems are altered over time is indicative of formal occupation considerations. It is the intent of this thesis to map use and occupancy to reveal the organic values embedded or rejected in the city form of the Back Bay.



[Re]Occupations of open space in the Back Bay Fens

Background

Within our cities, technological cultural and social interactions are forcing architectural space to transform itself. Conventional distinctions between public and private are becoming less apparent. This influence is being felt no where more than in the domestic realm. Changing family structures and technological introductions are opening domestic typologies to altered forms and uses.

How the townhouse typology will react to the above-mentioned influences is of primary interest to the future design of cities. The Back Bay's initial layout based on the single housing type has given way to a complex mix of single family townhouses, apartments, dormitories, and hotels. Additionally, there are temporal or nomad occupations that occur in the form of commuters and homeless people. How these occupations are able to further handle adaptation becomes an issue not only for the neighborhood, but also the city itself. As the adaptive tools of technology and zoning controls begin to further shape these cities, their formal considerations must be explored in terms of the individual occupant and its multiple uses.

Typical alleyway in block structure

The integration of this dual analysis of the city form and the occupational unit is to be a collection of individually scaled spaces / objects embedded within the urban form. These interventions are to mediate between occupationary devices and infrastructural connections. While the potential site of these interventions is based upon the urban mapping, they are constrained to the locations of open space, between space, existing enclosed space, and the ultimate recombination of these spatial systems.

The formalization of this thesis comes about through a series of concurrent operations. The largest scale of these operations is the data collection and analysis in relation to "place" and "program." The more intimate scale of the methodology explores possible and emerging fabrications and constructions. The representation and codifying of these two separate methodologies is a combination of collage and construct. These two modes of representation exist both in the computer (software) and in the physical (embedded). The spatial configuration of this research is a two-dimensional urban analysis, three-dimensional proposals, and the retranslation to two-dimensional regulating structures.

Typology as Urban Form
The Townhouse in Boston's Back Bay

Within contemporary cities, individual environments affect or are affected by urban form. The development language of this form was the building, the street, and the block. With these objects and the ideals of city formation, the 19th century's expansion of city form modeled itself on a combinatory system, that of the natural shaped into the rational. The latter growth related, the former being measurement related. How this model has adapted to contemporary occupancy patterns is evidence of individual economic needs and domestic desires. Locating an example city form such as this is nowhere more apparent than in the development of Boston's Back Bay. The area's creation of land itself based on an ideal system is of such a high formal order that the natural no longer exists, and therefore has become planned. It is in this plan that we can find the influence of typology and rules on urban form, and how these evolved to create the contemporary residential quarter.

The Physical Description of the Back Bay

The Back Bay area today is commonly defined as the urban region bordered by the Public Garden to the east, the Charles River to the north, the Fens to the west, and the South End District to the south. Within this area, a grid of streets was laid out in a 20° southeast to northwest orientation. Running east to west are the streets: Beacon, Marlborough, Commonwealth, Newbury, and Boylston. Running North to South are streets named in alphabetical order from Arlington at the Public Garden to Hereford and Massachusetts Avenue at the west.

Architecturally, this district contains an impressively coherent urban typology of Victorian townhouses primarily built in the second half of the Nineteenth century. While based on a generic typology, these townhouses became specific to the district due to environmental factors and occupancy patterns. It is from the grouping of these townhouses that a urban morphology emerges in the Back Bay.

The Topological History of the Back Bay

The history of the Back Bay is a complex result of environmental, economic, and social factors. Much of the information presented here is derived from Bainbridge Bunting's 1967 definitive history of the area titled "Houses of Boston's Back Bay." Rather than summarize his work, this paper relates the topological history of the place to an architectural typology and expansionist attitude. The manner in which these factors developed has established the present flux of stasis and change in the district.

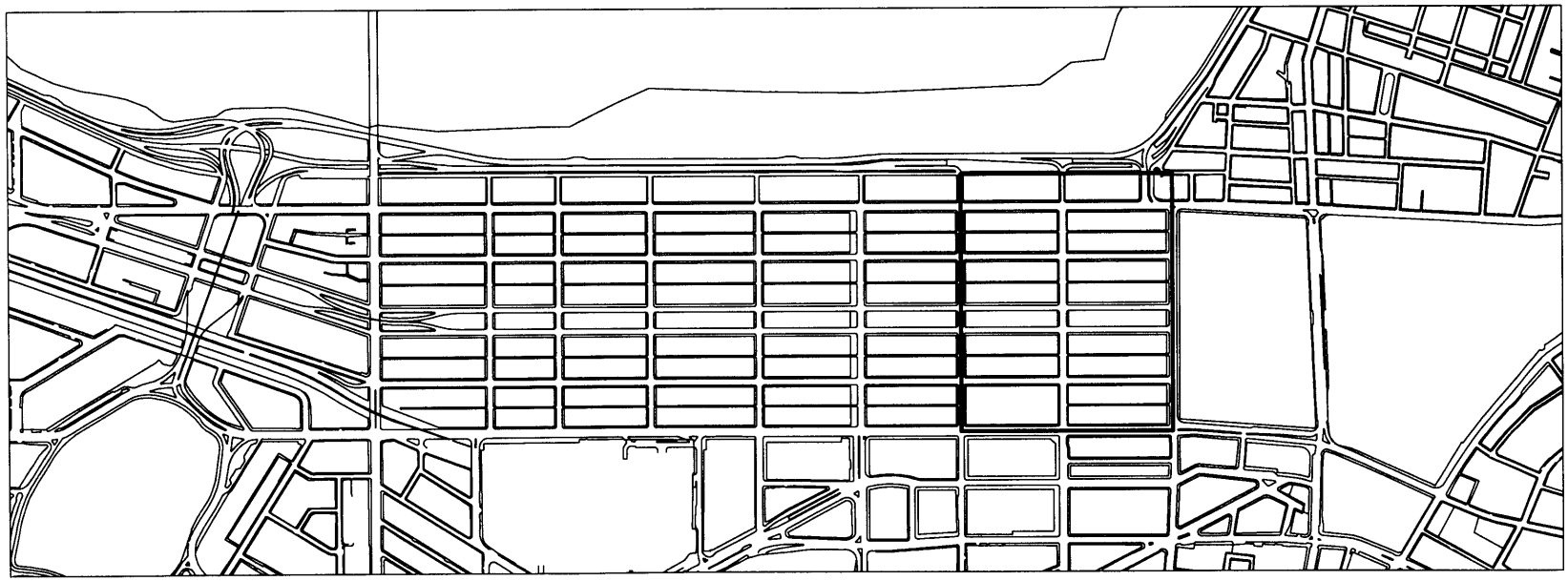
Topologically, the Back Bay is the formal result of a massive land fill project. The project started in 1814 with the construction of a long milldam by the Roxbury Mill Corporation, underneath the present day Beacon Street. This dam closed the Charles River tidal flats off from the river's channel. The dammed off estuary, was further divided into the Full Basin and the Receiving Basin. Used as a means to harness the 9-foot change in tides for the milling of grain, the dam failed to fulfill potentials. This was due to the rise in steam power usage, as well as the addition of railroad lines crisscrossing the bay, which impeded the flow of water. As Boston's population began to grow exponentially, the need for land was insatiable. Additionally, the growing population had the effect of causing the stagnate, sewage laden water of the Back Bay

to become a major health hazard and nuisance.[1]

In 1856, the Roxbury Mill Corporation entered an ownership agreement with the Commonwealth of Massachusetts and the City of Boston to begin filling the Back Bay Flats with gravel imported from pits located nine miles away in Needham. This agreement awarded the Mill Corporation a two-hundred-foot wide strip of land ownership parallel and north of the milldam. The Commonwealth was awarded a rectangular plot of one hundred and eight acres in the lower basin, with a subsidiary of the Mill Corporation owning the remainder of the two basins. Within the land granted to the Commonwealth, the City of Boston was awarded two and three quarter acres. This grant to the city added to land holdings already owned adjacent to the Boston Common, which allowed for the creation of the Public Garden in 1860.[2]

In September of 1857, the filling operations began. The average depth of the fill was over twenty feet and covered an area of more than 450 acres. The land that was created began at the eastern end of the bay and continued for over 42 years until the last few acres of the Fens had been covered. All streets of the new area were filled to the elevation of the milldam at seventeen feet above mean low tide. To reduce fill and minimize future excavations for basements, the lots were only filled to twelve feet above mean low tide.[3]

Financing of the initial fill was arranged by allowing contractors and large firms ownership of completed land. Once this land was parceled and sold to individual owners, the Commonwealth began performing auctions to finance fur-



Back Bay block structure and analysis focus area

ther operations. These auctions began with the first in 1860 and the last in 1879. By tracing the economic history of these auctions, one can determine the faith the public deemed on the new area as well as variations in its value. In the first auction, minimum prices were established by the Commonwealth at:

$1.375 per square foot for land fronting Marlborough and Newbury Streets

$1.62 per square foot for corner land on Marlborough and Newbury Streets

$2.25 per square foot for land fronting Commonwealth Street

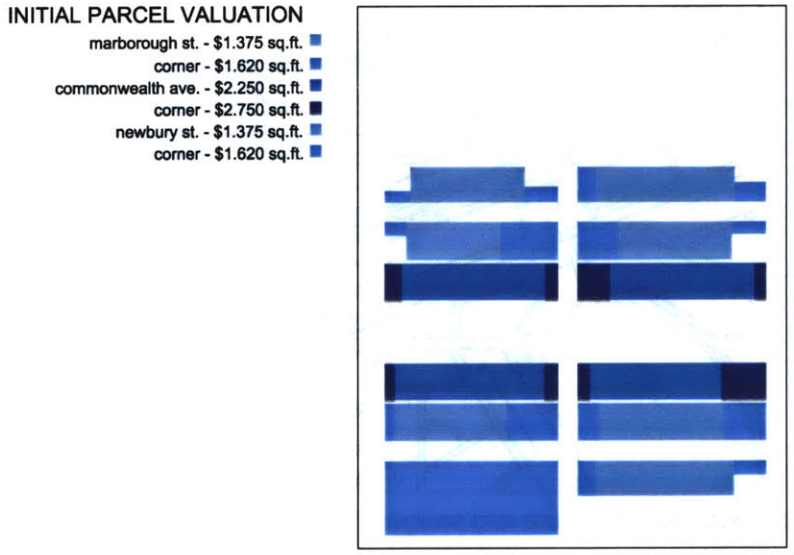
$2.75 per square foot for corner land on Commonwealth Street

By 1868, these minimum values were raised almost 10 percent. The Commonwealth disposed of the last of its properties in 1886 for over four times the price it received thirty years earlier.[4]

These amounts reinforced the socio-economic gradations Bostonians were classified into based on the street in which they lived. These classifications became: the old rich on Beacon, the old poor on Marlborough, the new rich on Commonwealth, and the new poor on Newbury. Even further hierarchies still exist today, based on the "sunny" side of Commonwealth and the "water" side of Beacon.[5]

The Townhouse Typology

While the filling of land can be explained through functional and economic based factors, the urban structure of today's Back Bay was entirely dependent on the adaptation of the townhouse topology. Already existing in the Beacon Hill area, the townhouse found its ultimate realization as the basis of an expansionist attitude of linear urban systems. The

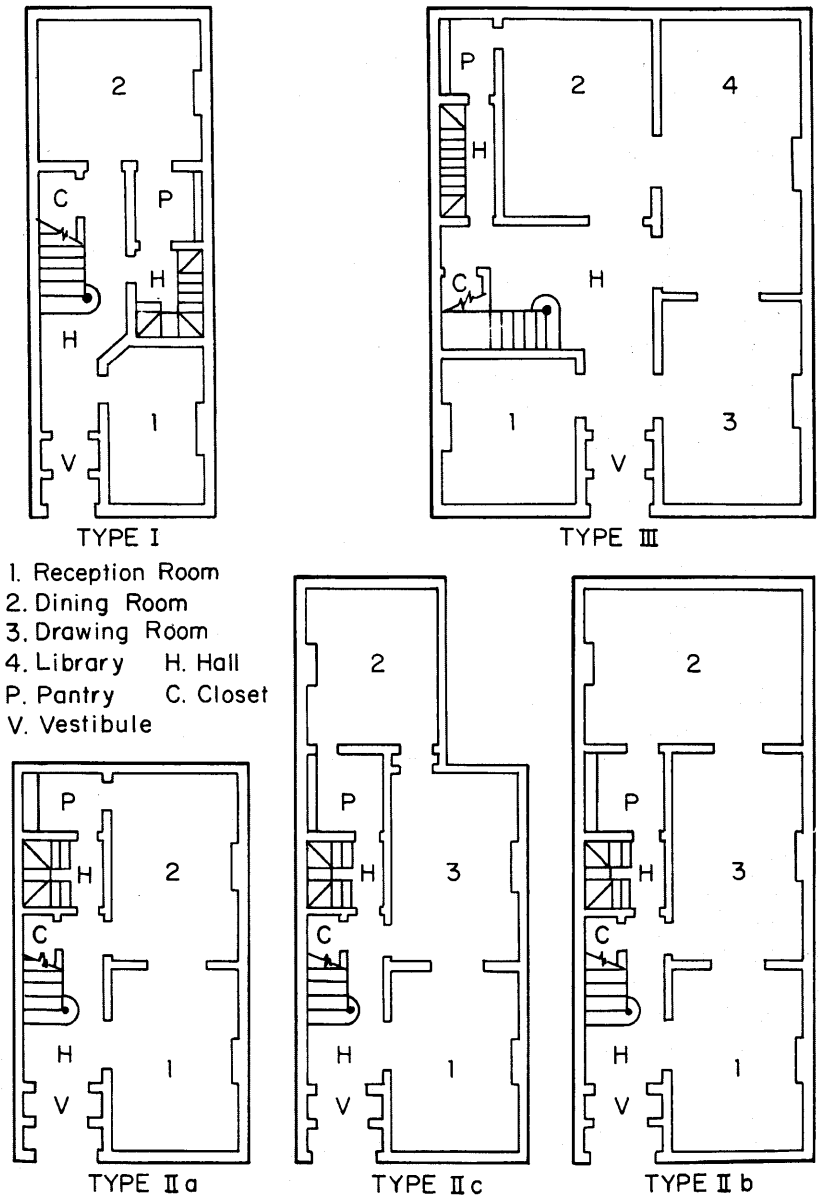


primary factors dictating the use of the townhouse were lot sizes, labor costs, and the habits of the wealthy Urbanites of the time. How the topology was made specific in the area was based on environmental factors and architectural styles of the time. Once the topology was specific in the area, it became an urban form as development of the region continued its use.

As parcelation began in the Back Bay, three primary parcel widths of less than twenty feet, twenty-three to thirty-five feet, and more than thirty-five feet became common.[6] These widths in turn affected the specific townhouse floorplan. Primary variations in the specific floorplans relate to parcel widths, while commonalties are based upon environmental and social factors.

The environmental needs of light and ventilation for each primary space within the pre-electric townhouse forms the common dumbbell plan. This plan allows primary spaces at either frontage access to light and ventilation, while being served by a central space. The entirety of the townhouse developed with a multiplication of this floor plate. However, differing uses were defined within the townhouse by the division of the floors. Most commonly, the primary entrance was onto the level above the street, which often contained a reception room and a dining room. Above this was a minimum of two levels of bedrooms, topped by an attic space. The attic, along with a basement below street level containing a kitchen, was the realm of the servants.

As mentioned earlier, the parcels were only filled to a level five feet lower than the streets, and twelve feet higher than mean low tide. As this level is only three feet higher than the mean high tide, flooding of the basements was common in times of extreme high tides. It is for this reason that the



Typical townhouse floorplan types

entrance and dining spaces were on the next floor. However, since the basement space required no high ceilings, there were few entrance stairs on the street. Often, the basement space had only one exterior entrance located on the back-side of the townhouse. Used for service related activities, this entrance stepped down to an unlandscaped back yard. By not placing a basement access on the street side, the elevations were free for a more plastic architectural manipulation.[7]

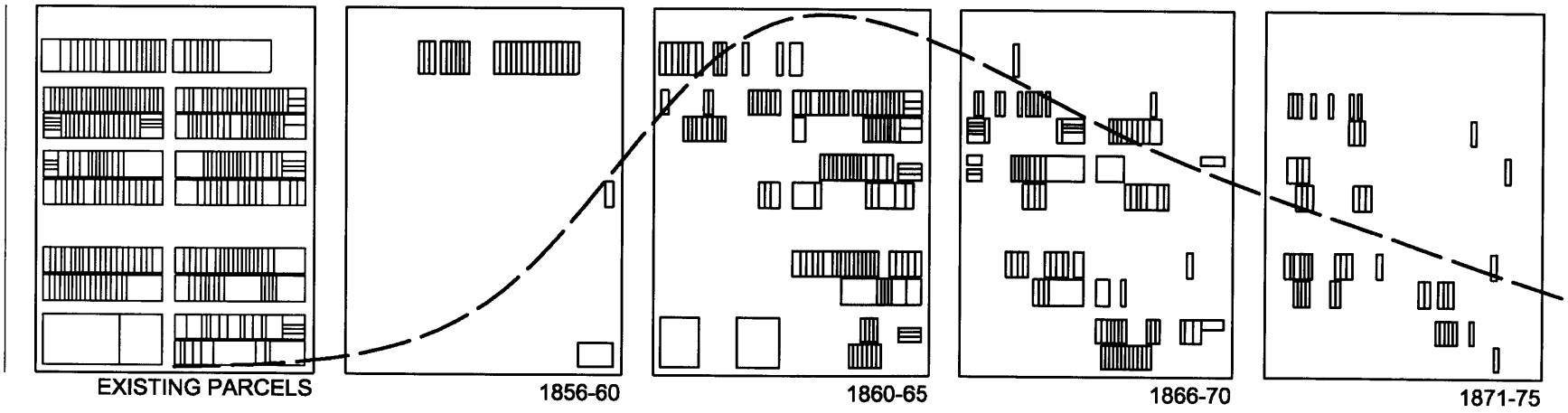
Internally, the townhouse contained two sets of stairs for vertical circulation. There was a public staircase that went from the first floor to the attic, and a servant's staircase that went from the attic to the basement. The service required to maintain such a vertical household was only feasible due to cheap immigrant labor. The rise in household labor prices was one of the factors that eventually lead to the townhouses being divided into multiple units.[8]

Mention should also be made of the manner in which Bostonians occupied their townhouses. As the townhouse was often a second home for winter months, individual townhouses rarely contained any outdoor space in the form of loggias, balconies, or lawns. As the new area was mostly residential and devoid of social buildings, entertaining was performed within the house, often on the entire first floor for large functions, and in the parlor for small functions. Additional, the head of the household often had to perform work at home, necessitating the need for a study.[9]

Townhouse Types

The integration of these separate spaces within the typology varied according to the above mentioned parcel widths. Bainbridge Bunting has defined three primary floor plan types shown below. Of these variations, Type I is the most common of early townhouses. As it is for narrow lots, rear eels were not included, as that would not have allowed light to all the primary spaces. Additionally, the necessity for a certain amount of space required this type to often be six levels.[10]

Type II allows for both a front and rear room with a side hall. This type is further divided into three subcategories. Type IIa is the basic and most often used type with two



Parcel deveopment by year

rooms deep and a continuous side hall. Type IIb is three rooms deep with a side hall. Before electric lighting, this type is never used as it disallows natural lighting for the middle room. Type IIc is a variation of the prior two sub-categories with a rear eel that still allows a window for the center room. This type was often developed as an addition to an existing Type IIa. Most examples of Type II townhouses are five levels.[11]

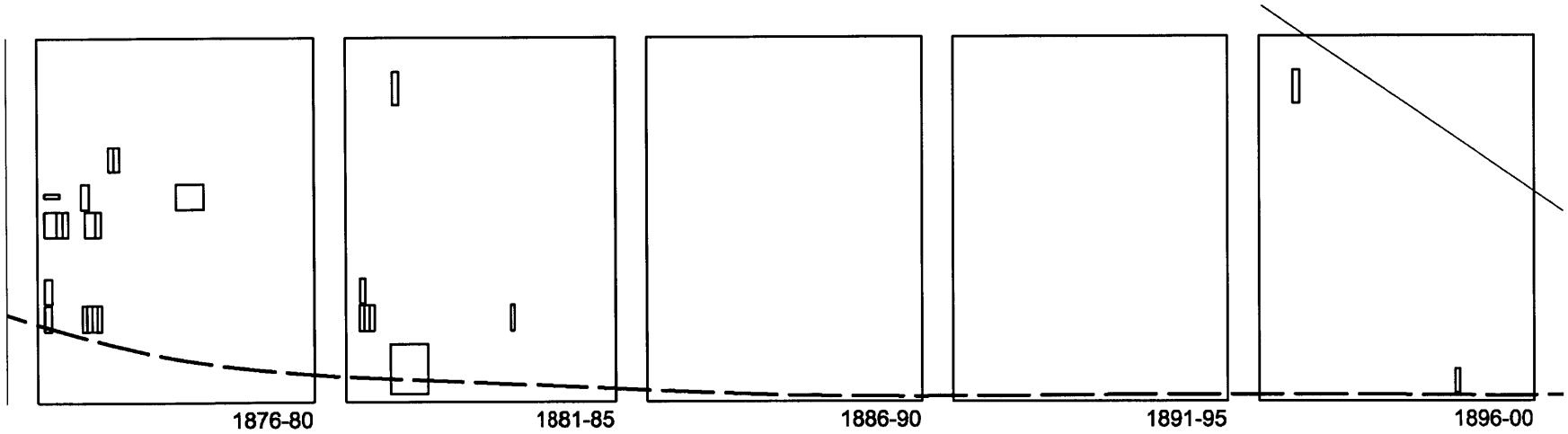
Type III houses are for large parcels more than thirty-five feet wide. This type contains four corner rooms with a central hall. Due to the large plate sizes of this type, fewer floors and appendages are required.[12]

While all of the types are primarily adapted to a middle block condition, their use is also commonly adapted to corner conditions. Except for the addition of widows in the sidewall and a possible side entrance, early corner buildings are rarely differentiated from other buildings. This establishes a morphological variation in the region whereby the corner townhouse had to orient inside to either the primary street or the side street.

Urban Block Morphologies

While individual townhouses followed this formula for their spatial definition, their combination with other townhouses forms the structure for the urban definition of the region. The townhouse typology implies a grid structure that has to maintain a level of efficiency, while allowing ease of access. By stacking townhouses next to each other with zero-lot lines, a directional street corridor is created that predicates the unity of the whole to the design of the individual building. This street corridor is freed from service usage by the creation of alleys between the backsides of two facing parcels. Further, perpendicular streets are placed at a average of every 17 to 27 parcels to ease traffic, allow access to alleys, and connect with existing streets to other areas of the city.

While the manner in which each block turns a corner is varied, large buildings most often define these zones. As the geometry provides more access to light and ventilation, the introduction of the elevator allows corner buildings to grow in levels to justify their higher parcel square footage cost.



Parcel deveopment by year continued

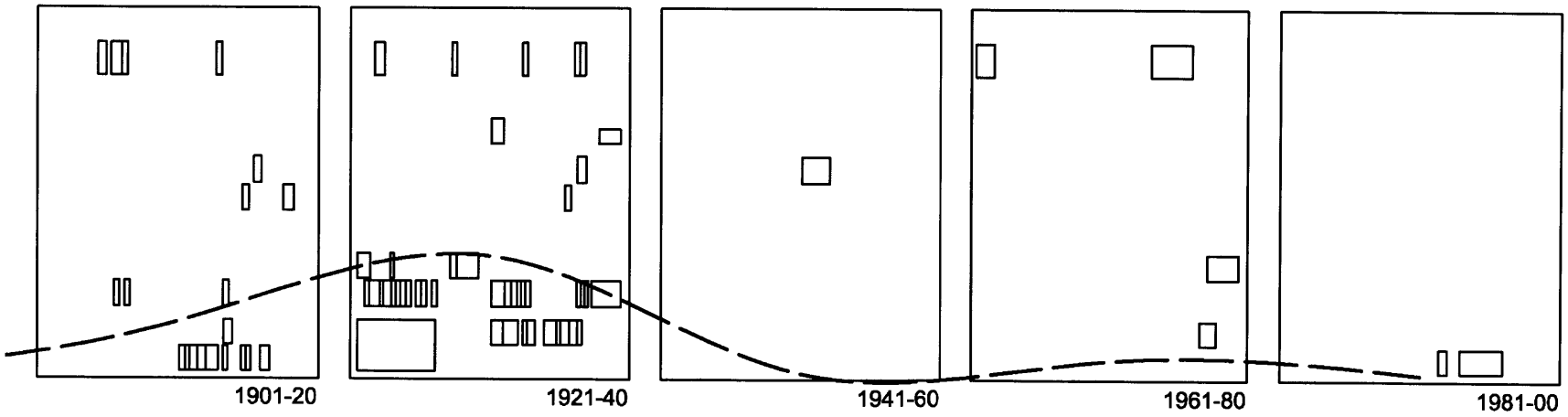
The present day block typology existed as an architectural frame between a cellular and linear system. As the corner lots on most block face the minor streets, the alley zone maintains a sense of closure at each of its ends. Contrary to this enclosed system is the linear homogeneity of the public street system. As individual buildings conformed to the deed restrictions, the resulting planar street walls establish an unending visual corridor.

History of the Urban Plan

While there were multiple proposals as to the design of the new district, it is most advantageous to focus on the evolution of the adopted plan attributed to Arthur Gilman. The first two proposed maps of 1854 and 1856 suggest a street system for the area with a generalized rectangular grid system that covers the entirety of the fill. These maps allow for no explanation of how the grid will meet the irregular existing streets of Boston or how the two diagonal crisscross rail lines will be handled.[13]

Eventually, the 450-acre fill began to be broken down into four different regions. The first of these regions is what is now known as the Back Bay and runs parallel to the Charles River with a dominant axis of Commonwealth Avenue. South of this is area IV, divided from area I by Huntington Avenue and running parallel to the Boston Providence Railroad, merging with the old South End. This can be see in the 1861 plan showing the street layout for the eastern filled areas. However, western development is vague and only suggests that streets run unending until they hit a railroad or existing land. In 1881, the second area is expressed as the western extension of the first to Gravelly Point (now Kenmore Square) and includes Fenway Park. The third and last area is defined 1884 by the Boston and Albany Railroads purchase of a right of way. The fill for this area is bounded by the Fenway Park, the original shore line of the old South End, area IV, and the rail line.[14]

Of these areas, the one that became known as the Back Bay is of most interest to this paper. The definition of the east west street system is further defined with Common-



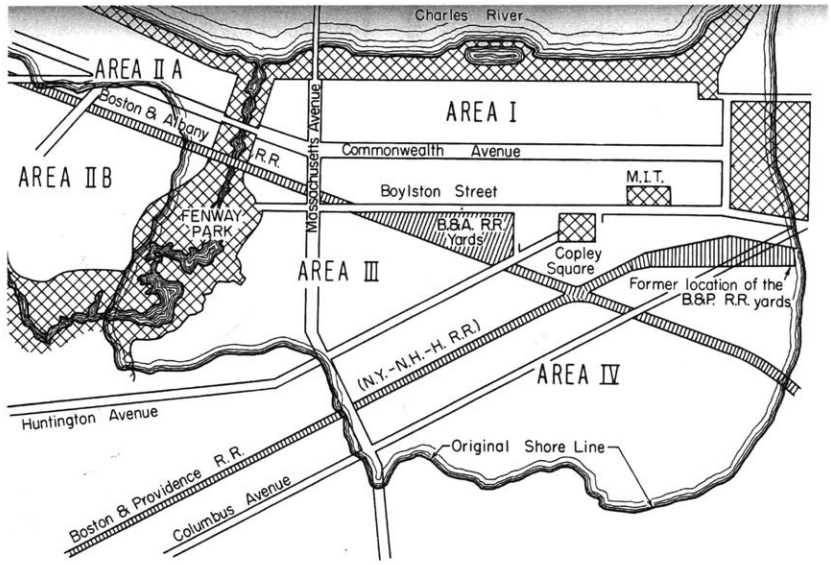
Parcel deveopment by year continued

wealth Avenue as a major axis. Later, public alleys are incorporated and Commonwealth is widened to include a central linear park. Other main streets are later defined that become Massachusetts and Huntington Avenue. No definitive reason can be found for the width of blocks set by north-south streets between the Public Garden and Massachusetts Avenue.[15]

Within the rectangular block plan for this area, initial plans show the intent to include as many as three public squares. The first of which is now known as Copley Square. While the specific evolution of this square is beyond the scope of the paper, it is important to note the manner in which this square broke from the history of enclosed English residential squares. While initially planned for several different locations as a rectangular block by the Commonwealth, Copley Square came to its present location by way of incremental appropriations. The initial block locations planned for the square where donated to various public institutions including the Massachusetts Institute of Technology, the Museum of Natural History, and the Museum of Fine Arts. With the deeding of these blocks to institutions, there was now no rectangular block location for the square. In 1883, after the Commonwealth donated the site of the present Public Library, the city purchased the triangular plot in front of the library formed by the intersection of Huntington Avenue, Dartmouth Street, and Boylston Street. In 1885 the opposing triangular plot in front of the Trinity church was organized and became part of what was named Copley Square. Bordered by three churches, a museum, a library, and a school, Copley Square became the only non-residential component of the homogenous area. Further, by the haphazard manner in which it was developed, and its shift into the intersection, Copley Square became an open spatial component rather than a secluded residential park.[16]

The other two open spaces originally planned for the area were abandoned due to the location of Copley Square and economic necessity. The first of these parks was intended for the block filled by the above mentioned Massachusetts Institute of Technology and the Museum of Natural History. The other park located on Exeter between Marlborough and Beacon was intended to have access to the river. In 1870, the principle connection to the South End was changed from Exeter Street to Dartmouth Street. To accommodate the increased traffic that Dartmouth Street would have to handle, its width was increased to its present double width. It is most probable that the decrease in the Commonwealth's buildable land by the widening of Dartmouth Street resulted in the elimination of the proposed park.[17]

The Back Bay as it exists today shows other specific alterations in the generic rectangular grid proposal. The sub-



Diagrammatic map of the Back Bay fill districts

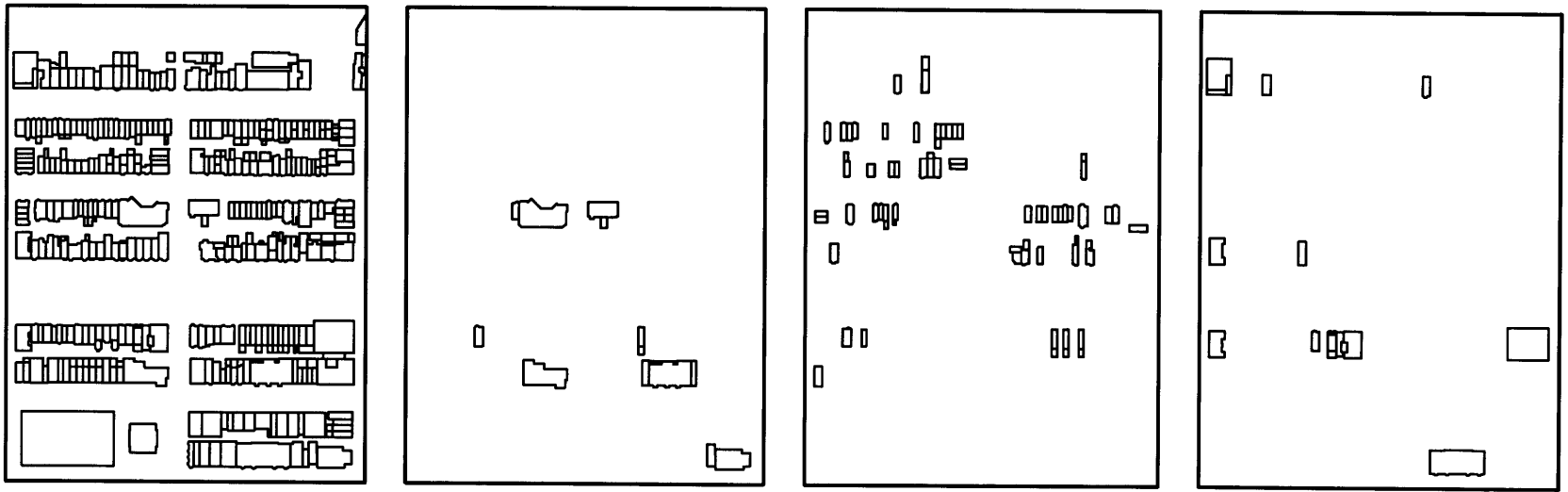
tlest of which is the manner in which Frederick Law Olmsted handled the extension of Commonwealth Avenue to the Brookline shore. As described above, the areas of the Back Bay followed either the orientation of the river or the railroad. Olmsted made use of this shift by bending Commonwealth Avenue just west of Massachusetts Avenue to reorient it with the Brookline Shore. This had the effect of creating a conceptual and visual termination to the broad expanse of Commonwealth Avenue.[18]

While Commonwealth Avenue served as the dominant east-west axis, Massachusetts Avenue became the dominant north south Axis. Connecting from the South End residential area, through the Back Bay and across the Harvard Bride to Cambridge, Massachusetts Avenue evolved to become a western edge to the district. It is in the block between Massachusetts Avenue and the Fens to the west that the most dramatic alteration in the street system occurs. It is here that Newbury Street becomes a back alley, Marlborough Street shifts and is dead-ended, and Commonwealth Avenue shifts and eventually crosses Beacon Street.

The other definitive edge to the district is Boylston Street. Most of the north south streets dead-end into Boylston due to the vast area to the south formed by rail yards that now are the Prudential Center and the sunken Massachusetts Turnpike. In addition to these boundaries, Boylston Street has seen the most dramatic changes in terms of its use, scale, and building typology in the area.

Development Rules

While parcel sizes determined the townhouse typology and floor plan layout, their articulation, materials, and use were regulated by a series of rules. Fire codes, deed restrictions, and social arrangements became the regulating factors for architectural manipulations. Initially, the only restric-



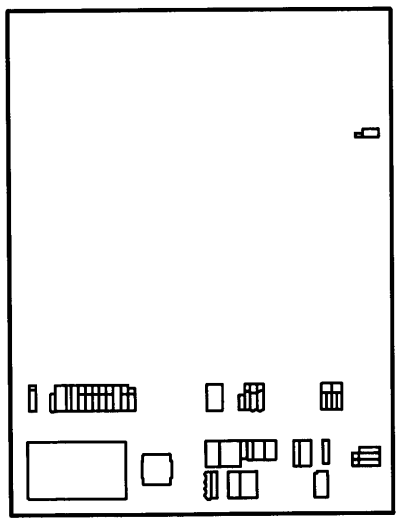
Existing Buidings | Use - Church | Use - Single Family | Use - Condo

Existing buidings by use continued

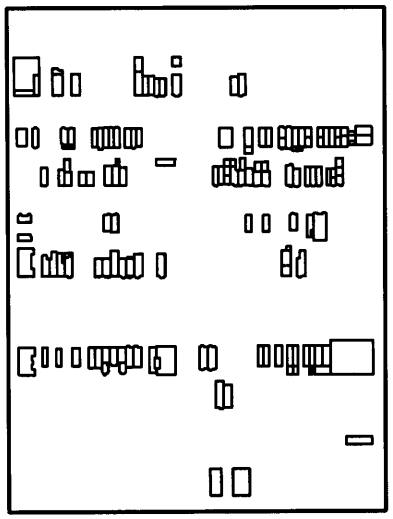
tions enforced on property owners were the deed restrictions passed on with the transfer of land from the Commonwealth. Set to encourage to establishment of a spatial residential quarter; the most apparent of these rules was a mandatory setback of twenty-feet from the sidewalk on all public streets. Projections were allowed beyond this setback line in the form of balconies, stairs, and bay windows. The allowance of bay windows provided the individual unit an additional 30-40 square feet per floor, as well as provided more sunlight and views. It was in this manner that the Commonwealth ensured a spacious residential quarter with a high amount of architectural articulation.[19]

Other deed restrictions included: no manufacturing allowed in the area, commercial uses permitted only on certain parts of Commonwealth Avenue and Boylston Street, all buildings had to be a minimum of three stories tall, and all constructions were to be of masonry. While there was no formal restriction on private stables, there was a gentleman's agreement not to place a stable in the backyard if the neighbor objected.[20]

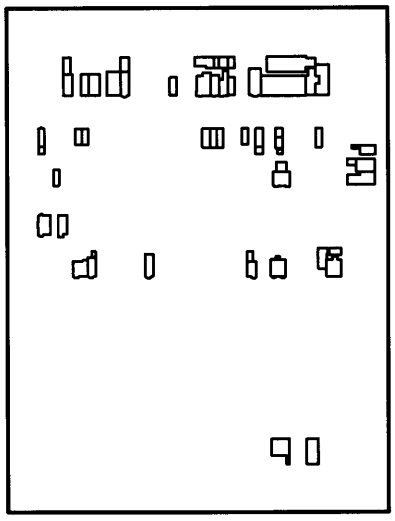
Other restrictions that developed included the Boston fire codes of the early 1870's. While these regulated all phases of construction, the most evident are those affecting the exterior appearance of buildings. The primary regulation required party walls to extend a certain height above adjacent roofs. Other regulations included a cornice separation between townhouses, mansard roofs could only extend one story, and noncombustible materials were required above the first floor. These regulations had the effect of breaking the continuity between multiple townhouses that existed before 1870.[21]



Use - Commercial



Use - Multi-Family



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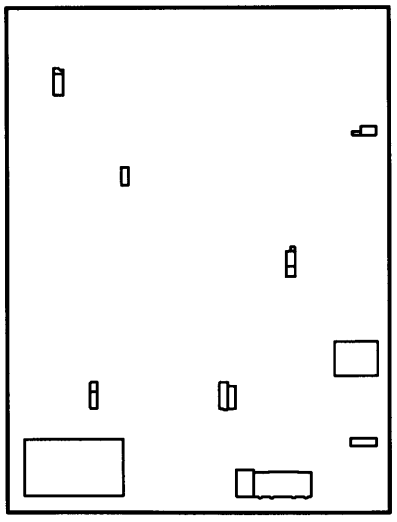
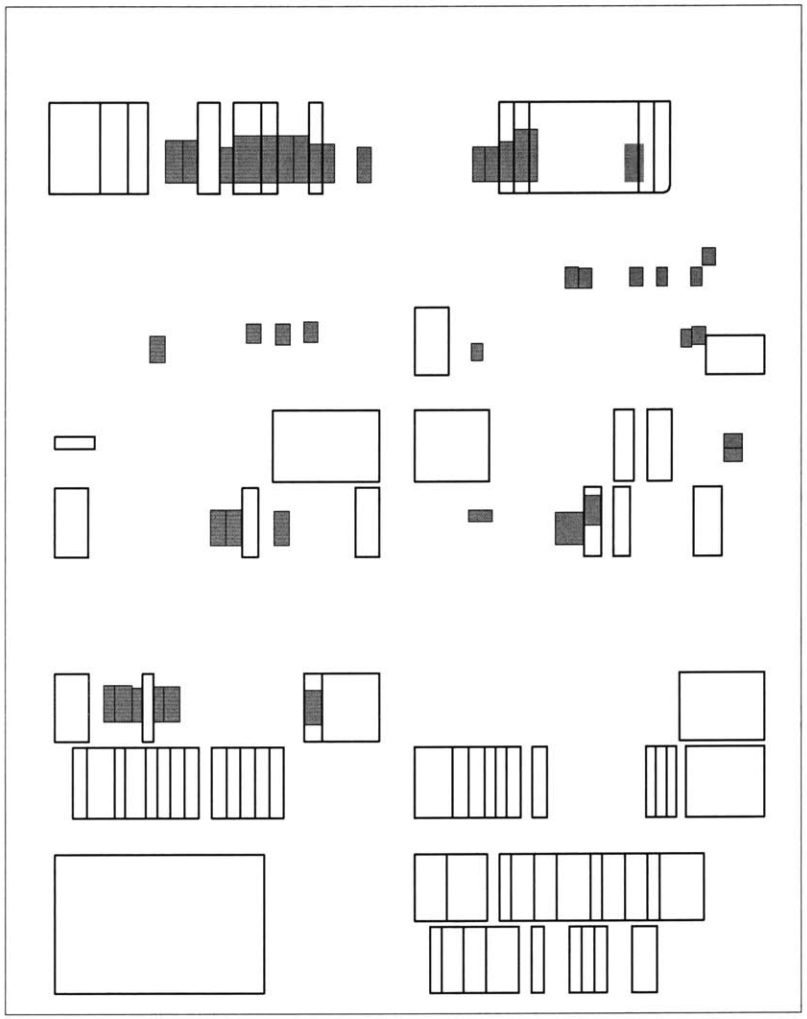


Use - Multi

Existing buidings by use continued

Typological Alterations

While these regulations affected architectural character, others changes occurred that affected the urban environment. While all cities change over time, the manner in which they change provides information as to future possibilities and missed opportunities. The urban changes that have altered the Back Bay over its 150 year history include: changes in use, replacement of original buildings, additions to existing buildings, the maturation of landscaping, and the introduction of the automobile.



Building replacements by parcel and penthouse additions

The masked changes that have occurred in the past 150 years in the Back Bay area relate to the manner in which residents occupy townhouses and the urban environment. As single family townhouses became less economically feasible, they were divided up to become condominium or apartment buildings. Although not the most efficient form for apartments, the townhouses have proved to be a flexible typology. This is most evident in the change of use of Newbury Street from residential to commercial. More dramatic is the above mentioned changed typology and scale along Boylston Street.

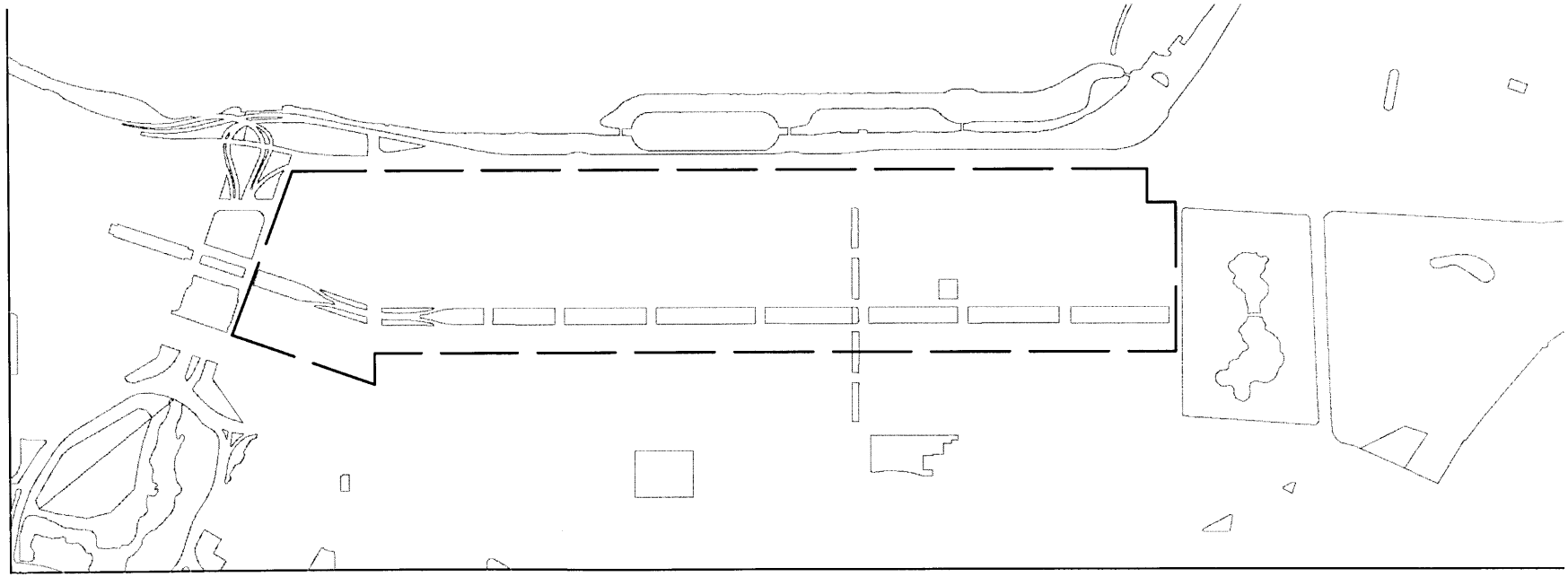
Parcel alterations have also been occurring in several different ways. The most extreme of these is the replacement of the entire building. Such has been the case with most of the buildings on Boylston, and some of the buildings on the waterside of Beacon. Between these two streets, replacement buildings have been occurring following no particular pattern. With the replacement of buildings, parcel sizes have grown due to multiple adjacent lots combining. Further, replacement building are now beginning to be replaced, illustrating a building life of roughly 50 years.

Less apparent than the entire replacement of buildings is the addition of accessories structures. These have most often taken the form of penthouses, rear eels, and free-standing garage apartments. Penthouses are the least apparent from the street as they are often set back from the cornice. Rear eels have been made possible by the creation of electric lighting systems that satisfy the above mentioned

problematic of natural light and ventilation. The freestanding garage apartments appearing in the alleyways have the typological advantage of preserving the form of the original structure, providing a small open space between the two structures, allowing for automobile storage, and increasing square footage.

As the Back Bay was a tableau rasa with no natural foliage, landscaping had to be placed in a manner fitting to such a residential quarter. The location landscaping has occurred is in the setbacks, street edges, and parks. The planting of the small setbacks and street edges has reinforced the expansionist system of the public streets by defining linear zones between the townhouses and the public street. The two public parks in the area are the Commonwealth Avenue linear park and the Esplanade along the Charles River. The Commonwealth Avenue linear park also reinforces a linear system by the axial planting of trees at street edge as well as statues centered on the one-mile long pedestrian path. The Charles River Esplanade, created in 1893 by constructing a 100-foot wide concrete promenade beyond the original seawall, has served to provide river access to all of Boston as well as act as a back yard for the Back Bay. Now separated from the Back Bay by the regional highway Storrow Memorial Drive constructed in1951, the Esplanade has developed independently of the formal systems of the Back Bay. The present condition of these separate landscaped zones has caused the Back Bay to become what Bainbridge Bunting referred to as being "choked with trees."[22] This can be seen in the stark architectural contrast of early photos of the area.

No other factor has more greatly altered the Back Bay than the automobile. Once the fill was completed to the Brookline shore, the area had to accommodate regional traf-



Existing open space and Back Bay Residential District boundaries

fic levels as well as provide for automobile storage. Minor attempts to manage this traffic included passing Commonwealth Avenue under Massachusetts Avenue and changing area streets to one-way. When these attempts did not handle the traffic levels, more dramatic measures were taken including the placement of an elevated roadway directly above Olmsted's Fens and adding the above mentioned Storrow Memorial Drive.[23]

In addition to providing for regional and local traffic levels, the Back Bay had to also accommodate automobile storage. As parking was not originally planned for in the area, it has had to be accommodated by other means. The first of which is the small amount of on-street parking that proves an average of one space per building. The second is the emergence of parking in the alleyway backyards, which provides another two to three spaces per building. Additionally, several underground parking structures have developed, but to no great regional reduction in need. The demand for parking has continued to increase in the Back Bay first with the conversion of townhouses to apartments, second with the change from residential to commercial uses, and ultimately with increased densities occurring in the area.

The Back Bay Architectural Commission

The amount of change in the Back Bay came to a halt in 1966 with the creation of the Back Bay Residential District, and the Back Bay Architectural Commission (BBAC), a board of design review within the Boston Redevelopment Authority. Basing the need for their creation on the existence of architectural and zoning controls on the development of the original Back Bay Lands, the BBAC initially sought to block development in the area. It was their belief that the encroachment of incompatible uses and densities into the District would spoil the original character of the area that they sought to preserve as well as increase property values.[24]

The creation of the BBAC has both preserved and limited the potentials of the Back Bay. While they have been able to stop heavy handed development proposals for the area, the limit of the BBAC's control is so extreme as to mandate details and colors for every building in the Back Bay. Contrary to this level of preservation is the manner in which the Back Bay sustained its character before the creation of the BBAC. With the conversion of the large townhouses to tiny apartments as well as the amount of colleges in the area, the Back Bay became what has been referred to as "one big college campus." The benign neglect of this era allowed for buildings to become shabby, but rarely be replaced.[25] The economics of this type of housing permitted the area to evolve, but within the limits of existing structures and without governmental regulations.

Conclusion

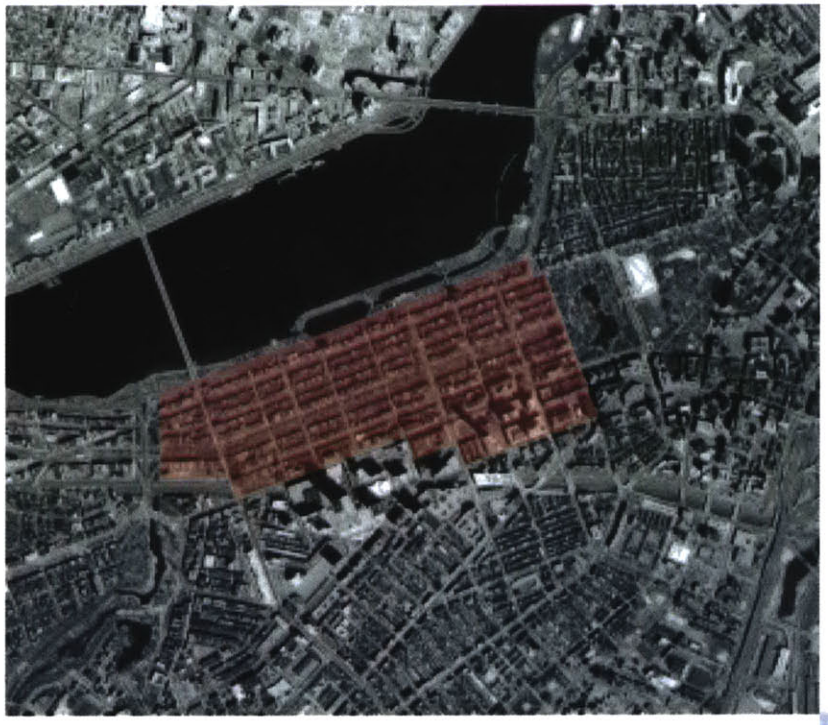
Contained within the present Back Bay is the realization of an expansionist ideal of development as well as opportunities for future preservation and change. While it evolved as an open ended urban form, at its base is a typological system of space defined by environmental needs and governing rules. As the matrix of buildings and blocks grew, diversity began to occur for ideal and specific reasons. This diversity defines the area not as secluded English residential quarter, but as an insular region demarcated by its present urban boundaries. The manner in which these boundaries continue to exist and preserve the area has been in a form of stasis for the past 35 years due to the creation of the BBAC

and its level of control. How the region will change over the next 150 years is hopefully in a manner that allows it to evolve without becoming an urban museum or a memory.

Notes for Chapter II

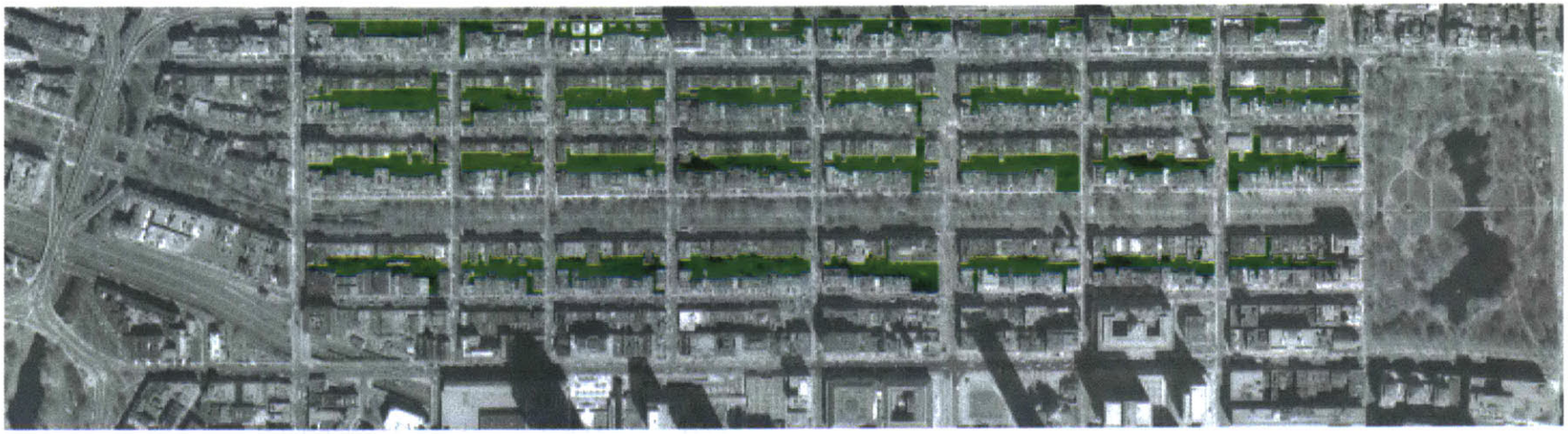
[1] Bainbridge Bunting, Houses of Boston's Back Bay (Cambridge: Belknap Press, 1967), pp.361-363
[2] Ibid., p. 364
[3] Ibid., pp.365-366
[4] Ibid., p.368
[5] Ibid., p.20
[6] Ibid., pp.130-132
[7] Ibid., pp.133-134
[8] Ibid., p.137
[9] Ibid., pp.129-130
[10] Ibid., pp.130-132
[11] Ibid., pp.132
[12] Ibid., p.133
[13] Ibid., p.371
[14] Ibid., p.374
[15] Ibid., p.378
[16] Ibid., p.380
[17] Ibid., p.380
[18] Ibid., p.384
[19] Ibid., pp.351-353
[20] Ibid., p.391
[21] Ibid., pp.250-251
[22] Barbara W. Moore and Gail Weesner. Back Bay - A Living Portrait. (Boston: Centry Hill Press, 1995), p.30.
[23] Bunting, pp.384-386
[24] The Back Bay Architectural Commision. Back Bay Residential District - Guidelines for Exterior Rehabilitation and Restoration. (Boston : Back Bay Architectural Commission, 1968), pp.8-9.
[25] Moore, p.32.

Urban Intent : Architectural Typology



Extend of Back Bay block structure

Within the insular boundaries of the Back Bay, the residual space of the alleyway is reconceived as the primary site of intervention. As these spaces have developed from service yards to parking lots, reprogramming their use has both a need and an economic benefit. The question of how and how much to intervene has to be rooted in a system that allows for a rapid analysis and valuation of schemes. Using typological morphologies as the catalyst, the block structure around the alleyway is analyzed in comparison to urban intents. Using the duality of increased public open space and increased density as intents, block level algorithms are constructed using the individual unit as their basis. The manner in which these algorithms construct morphologies bases themselves on localized conditions and environmental constraints. Once a satisfactory iteration is produced, the morphologies are adjusted architecturally to provide public/private access.



Proposed residual space alteration and [re]occupation

The multiplication of the block alterations bases itself on larger scale urban factors and specific block conditions. Constructed as a rule based structure, the mapping of interventions onto the area moves from generic to specific with each block level iteration. That is to say, a dialogue begins to exist between a block level intervention, and the ultimate urban plan.

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Code used for density based algorithm

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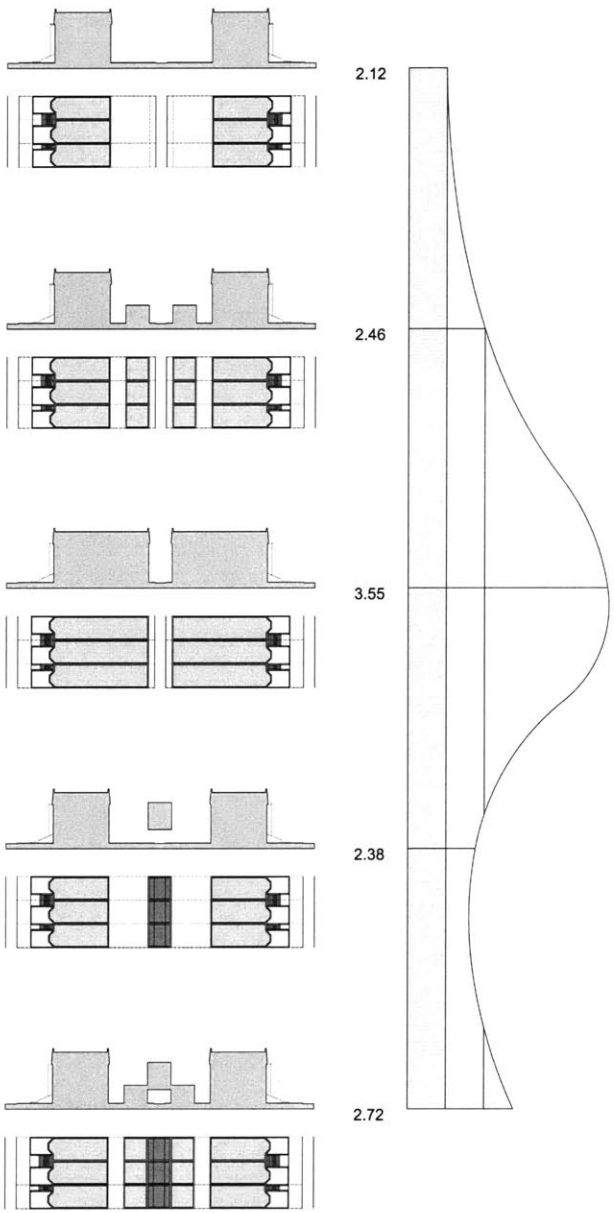
Density Based Algorithms

In order to design for both increased density and open space in the alleyways, optimum sections and plans have to be determined. As the assumption is being made that any increase in density has a corresponding increase in parking needs, existing parking must be preserved and expanded. Sections through the alleyways in the area show multiple variations that are refined down to the two existing extremes. While most townhouse backyards are used for parking, the minimum density is found on these examples. A variation of this typology exists when garage apartments are placed on the back-side of the unit. It is in the alleyways behind primarily commercial uses that the parking is removed in favor of increased square footages. Somewhere between these conditions, an optimum density can be set that allows for both increased parking and square footage.

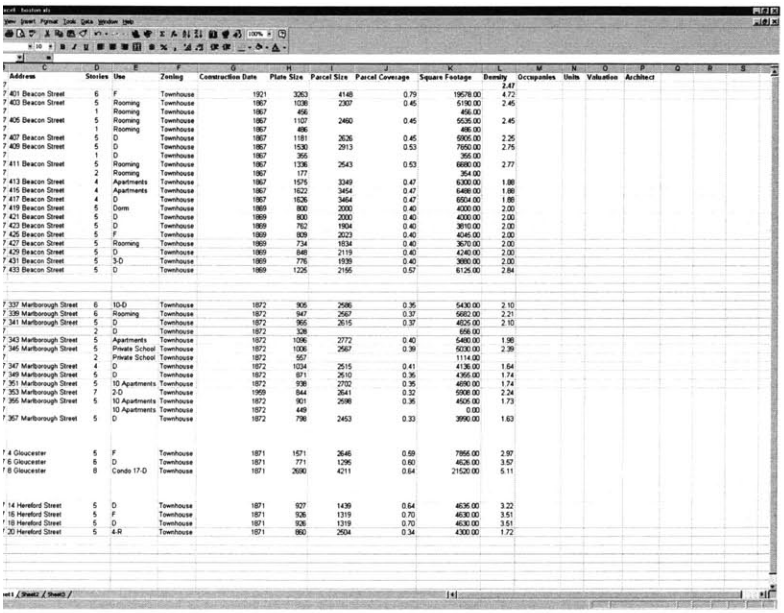
Typical Back Bay block elevation

The first proposal suggests a third structure to be placed over the air rights of the alley. While this satisfies the need for preservation of existing parking, the density increase is minimal. By combining the air rights structure with the garage apartment in the second proposal, increased density occurs, while allowing for preservation of existing parking.

In order to determine the optimum density, each block must be analyzed in terms of its existing floor-area-ratio. Once this is input into a spreadsheet, optimum densities can be factored as a variable that is easily changed. This factor can then be used as the basis for a design proposal using the above mentioned air rights proposal. This proposal establishes three zones, the air rights structure and the two side garage apartments. As the locations of the garage apartments are on private property, their design is not considered. However, to encourage their development, the air rights structure is conceived of as a catalyst that serves both as an infrastructural spine and formal organizer for multiple garage apartments.

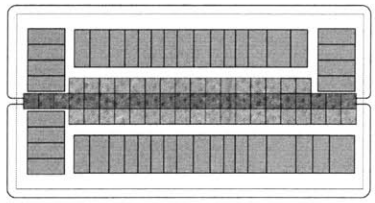


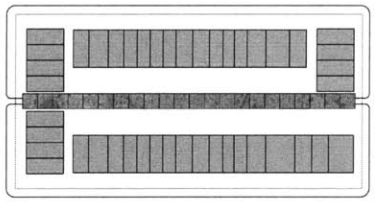
Typical density analysis and proposal

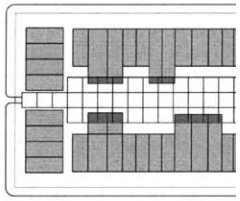


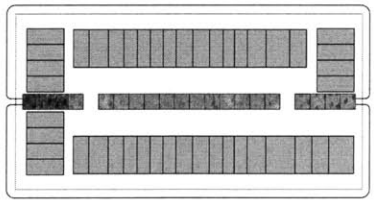
Address	Stories	Use	Zoning	Construction Date	Plate Size	Parcel Size	Parcel Coverage	Square Footage	Density	Occupancies	Units	Valuation	Architect
									2.47				
401 Beacon Street	6	F	Townhouse	1921	3263	4148	0.79	19578.00	4.72				
403 Beacon Street	5	Rooming	Townhouse	1867	1036	2307	0.45	5180.00	2.45				
	1	Rooming	Townhouse	1867	456			456.00					
405 Beacon Street	5	Rooming	Townhouse	1867	1107	2460	0.45	5535.00	2.45				
	1	Rooming	Townhouse	1867	496			496.00					
407 Beacon Street	5	D	Townhouse	1867	1181	2626	0.45	5905.00	2.25				
409 Beacon Street	5	D	Townhouse	1867	1530	2913	0.53	7650.00	2.75				
	1	D	Townhouse	1867	366			366.00					
411 Beacon Street	5	Rooming	Townhouse	1867	1336	2543	0.53	6680.00	2.77				
	2	Rooming	Townhouse	1867	177			354.00					
413 Beacon Street	4	Apartments	Townhouse	1867	1575	3349	0.47	6300.00	1.88				
415 Beacon Street	4	Apartments	Townhouse	1867	1622	3454	0.47	6488.00	1.88				
417 Beacon Street	4	D	Townhouse	1867	1626	3464	0.47	6504.00	1.88				
419 Beacon Street	5	Dorm	Townhouse	1869	800	2000	0.40	4000.00	2.00				
421 Beacon Street	5	D	Townhouse	1869	800	2000	0.40	4000.00	2.00				
423 Beacon Street	5	D	Townhouse	1869	762	1904	0.40	3810.00	2.00				
425 Beacon Street	5	F	Townhouse	1869	809	2023	0.40	4046.00	2.00				
427 Beacon Street	5	Rooming	Townhouse	1869	734	1834	0.40	3670.00	2.00				
429 Beacon Street	5	D	Townhouse	1869	848	2119	0.40	4240.00	2.00				
431 Beacon Street	5	3-D	Townhouse	1869	776	1939	0.40	3880.00	2.00				
433 Beacon Street	5	D	Townhouse	1869	1225	2195	0.57	6125.00	2.84				
337 Marlborough Street	6	10-D	Townhouse	1872	906	2586	0.35	5430.00	2.10				
339 Marlborough Street	6	Rooming	Townhouse	1872	947	2567	0.37	5682.00	2.21				
341 Marlborough Street	5	D	Townhouse	1872	966	2615	0.37	4829.00	2.10				
	2	D	Townhouse	1872	328			656.00					
343 Marlborough Street	5	Apartments	Townhouse	1872	1096	2772	0.40	5480.00	1.98				
345 Marlborough Street	5	Private School	Townhouse	1872	1006	2567	0.39	5030.00	2.39				
	2	Private School	Townhouse	1872	557			1114.00					
347 Marlborough Street	4	D	Townhouse	1872	1034	2515	0.41	4136.00	1.64				
349 Marlborough Street	5	D	Townhouse	1872	871	2510	0.35	4355.00	1.74				
351 Marlborough Street	5	10 Apartments	Townhouse	1872	936	2702	0.35	4680.00	1.74				
353 Marlborough Street	7	2-D	Townhouse	1959	844	3641	0.32	5908.00	2.24				
355 Marlborough Street	5	10 Apartments	Townhouse	1872	901	2598	0.35	4505.00	1.73				
		10 Apartments	Townhouse	1872	449			0.00					
357 Marlborough Street	5	D	Townhouse	1872	798	2453	0.33	3990.00	1.63				
4 Gloucester	5	F	Townhouse	1871	1571	2646	0.59	7856.00	2.97				
6 Gloucester	6	D	Townhouse	1871	771	1295	0.60	4626.00	3.57				
8 Gloucester	8	Condo 17-D	Townhouse	1871	2690	4211	0.64	21520.00	5.11				
14 Hereford Street	5	D	Townhouse	1871	927	1439	0.64	4635.00	3.22				
16 Hereford Street	5	F	Townhouse	1871	926	1319	0.70	4630.00	3.51				
18 Hereford Street	5	D	Townhouse	1871	926	1319	0.70	4630.00	3.51				
20 Hereford Street	5	4-R	Townhouse	1871	860	2504	0.34	4300.00	1.72				

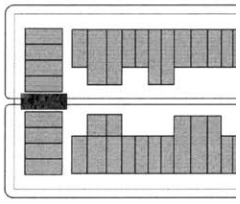
ting block density database









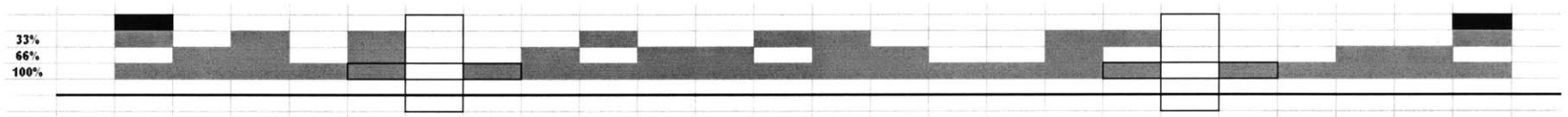


Residual space reoccupation rules and zoning

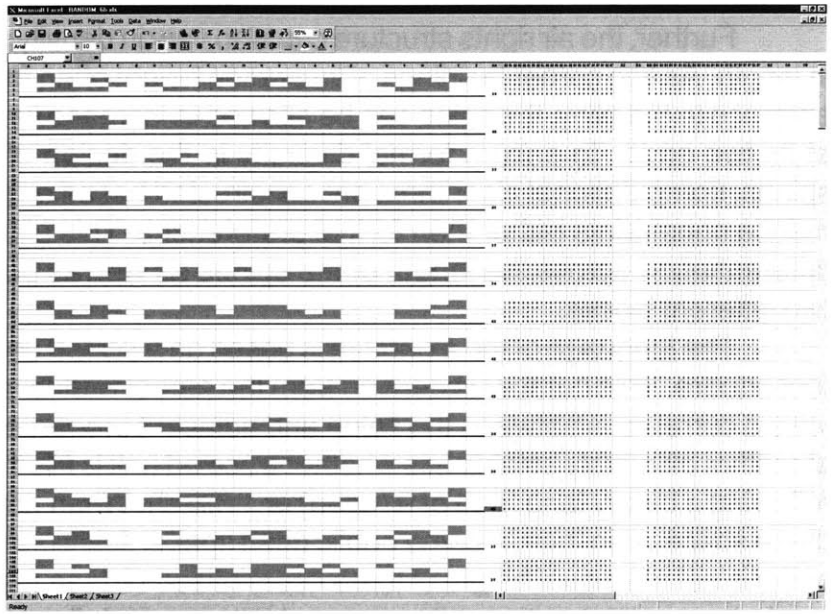
Further, the air rights structure can also vary in density across in length. As two corner buildings of increased height often form the entrance to the alley, the spine can be allowed to increase its height at its two ends. To ensure formal diversity in the design of these spines, computational algorithms are constructed based on performance constraints rather than formal preferences. This allows for differentiation across the length of the spines as well as between two different blocks.

The language of the algorithm is based on a scaled unit of 21 foot square. This number is derived from the parcel widths, and allows a correlation between the spine and adjacent properties. The algorithm ultimately establishes whether a scaled unit is filled or not, following a binary language of 0 (open) or 1 (filled). When not filled, these spaces can then become public open space. Additionally, the spine is set at a usual height of three floors raised sixteen feet from grade to preserve automobile access. Units on each floor have a different percentage of being filled, the intent being to increase open space with height. Internal to the system, two vertical open spaces are also included to allow for circulation.

The blocks that the spine is intervened into must also meet a rule-set. In order for the spine to physically fit into the residual space, a zone of 21 feet is required over the alley. In addition to this zone, two other zones are established to the immediate north and south at 21 feet. Intended to act as buffer zones as well as possible space for additions, these zones become the limiting factor of possible block alteration. If existing townhouses impede into these zones, the



Density percentage elevation diagram



Algorithm constructed elevations

proximity between structures becomes too tight. Therefore, blocks with townhouses that due not impede into these zones can be altered to the morphology described by this thesis.

An algorithm is set for each different block to process combinations to determine one that meets a variable criteria of open space and density. Possible combinations of from one to three units were also constructed to analyze relationships and remove unsatisfactory iterations. Once programmed, up to three units can combine to form a larger unit. This combination is not part of the algorithm, but rather is allowed for by means of flexible spaces that occupants can establish and appropriate.

Unit combination possibilities

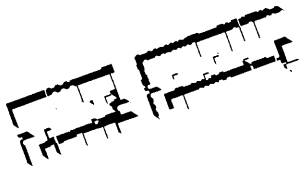
Design Constraints

Two primary constraints were established for the design to conform to. These are access to natural light and preservation of existing parking / open space. The manner in which these two factors shape the design is based on a sectional idea derive from the density analysis.

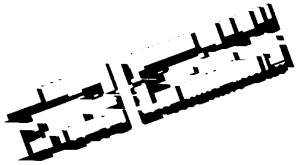
Natural Light

Shading analysis's were done to determine existing access to natural light in the alleyways. In all cases, the south-facing wall primarily receives direct sunlight. As the Back Bay block structure is shifted 20° from the east west axis, the north-facing wall also receives a small amount of sunlight in late afternoons. It is the intent of this design to not only retain this shading pattern, but to increase the amount of natural light reaching the north-facing wall throughout the day.

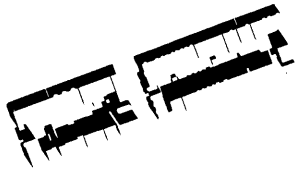
Block Shade Analysis



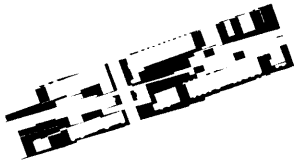
June 20th - 10am



June 20th - 4pm



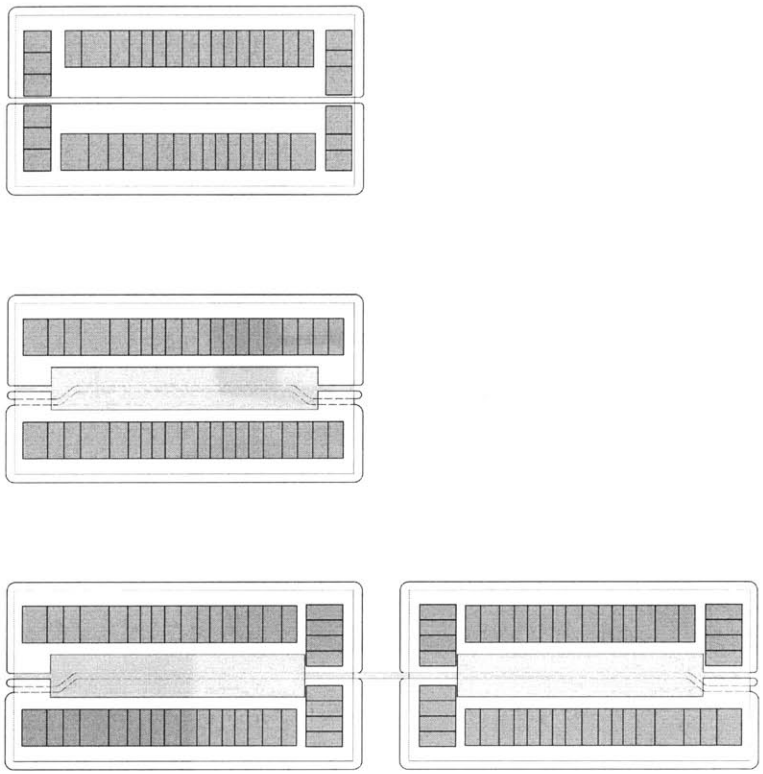
September 20th -10am



September 20th - 4pm

Preservation of Parking / Open Space

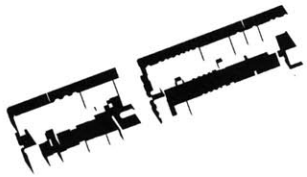
By lifting the spine 16 feet above the ground, existing parking and automobile circulation can be preserved. To accommodate the need for additional parking, underground structures are introduced. The manner in which these underground parking structures exist have to due with the type of block they are introduced into. In order to allow for both a parking down ramp, and an alleyway access, a width is required that exceeds the normal distance between two end buildings. Therefore, structured parking can only occur where there is enough space to allow for both types of access. Further, as the circulation system will be one-way, an exit point must also exist and conform to this requirement. In some cases, this has to occur by extending the structured parking between two blocks.



Structured parking typologies

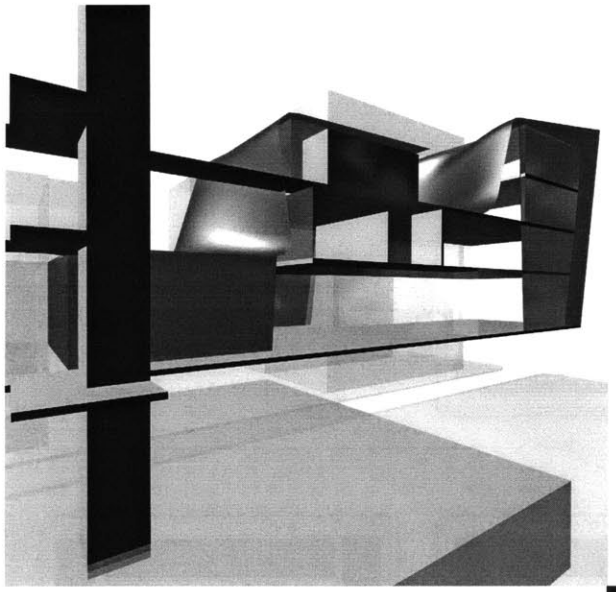
December 20th - 10am

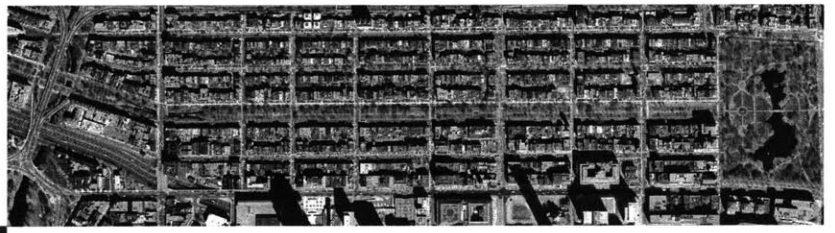
December 20th - 4pm

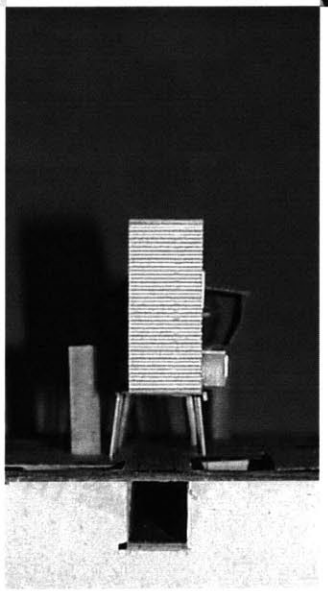


March 20th - 10am

March 20th - 4pm







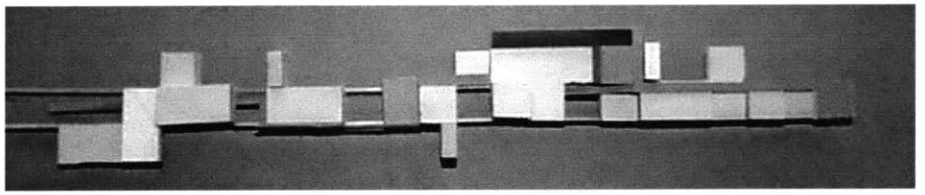
Design Iteration One

Algorithm generated elevation

The last section of this thesis will document the process undertaken in the design of one block morphology. The end product should not be viewed as a final iteration, but as a possible outcome of the urban/individual algorithms.

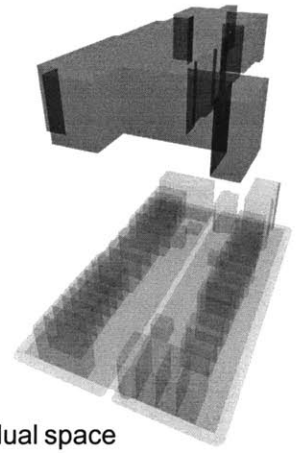
A specific block was chosen as a site to place an intervention. The block selected is between Beacon Street, Marlborough Street, Gloucester Street, and Hereford Street. This block was chosen as it does not border a public open space, and therefore has a higher potential for reoccupation.

Once the algorithm evaluated possible combinations, an elevational base was chosen and modeled. Using the filled spaces as units, open spaces become public zones. The manner in which these zones are connected together is by circulation systems. The combined circulation systems and open spaces become a block level infrastructure into which individual spaces connect.



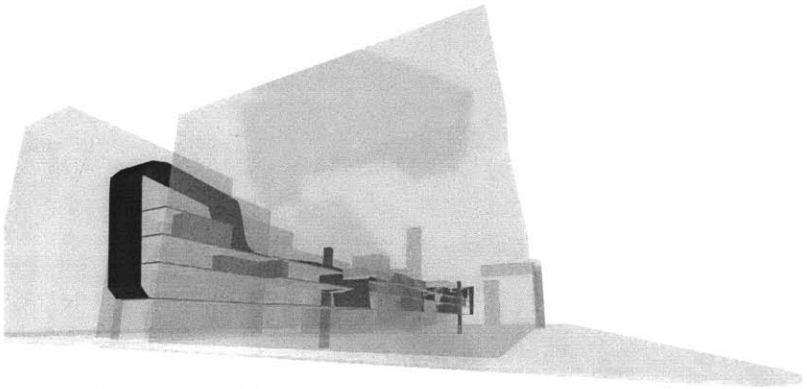
Study model

As the ends of the spine are allowed to reach a higher density, their placement between existing buildings becomes the morphology's frontage. Additionally, as the structure is raised above the alleyway, the bottom becomes a public face. As the combined open spaces form a continuous system that moves between levels, their surface becomes another elevation perceived from within the intervention as well as in existing structures.

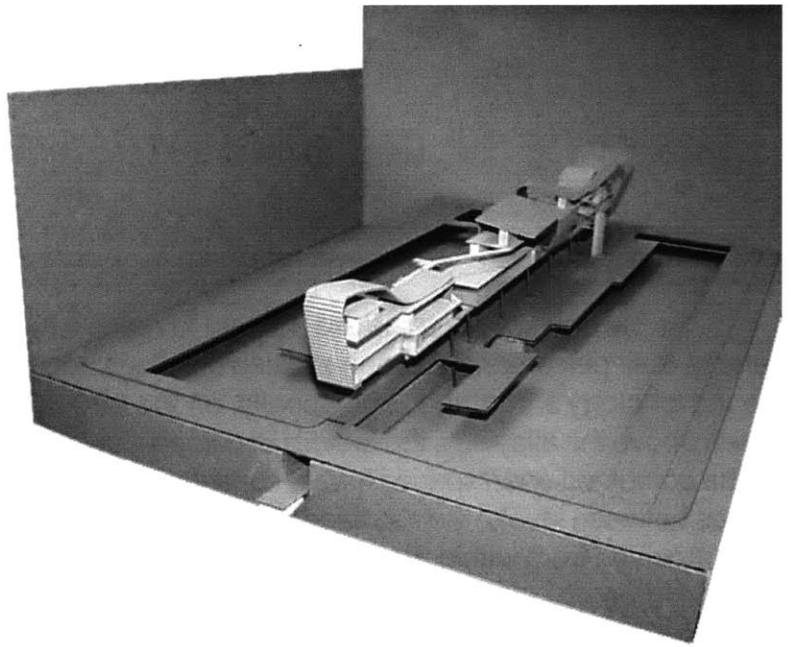


Block residual space

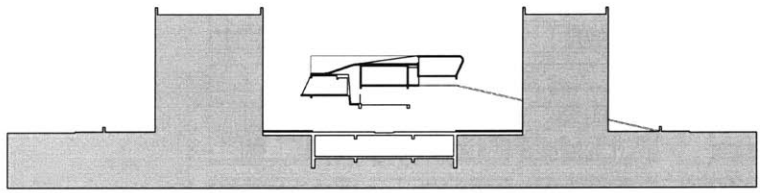
Proposal site in urban context



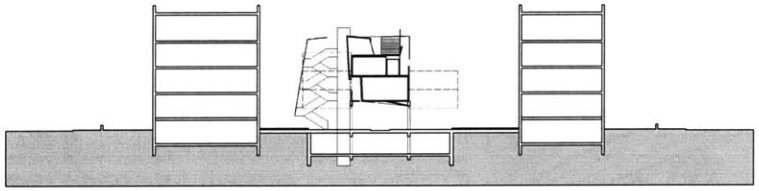
Street view of proposal



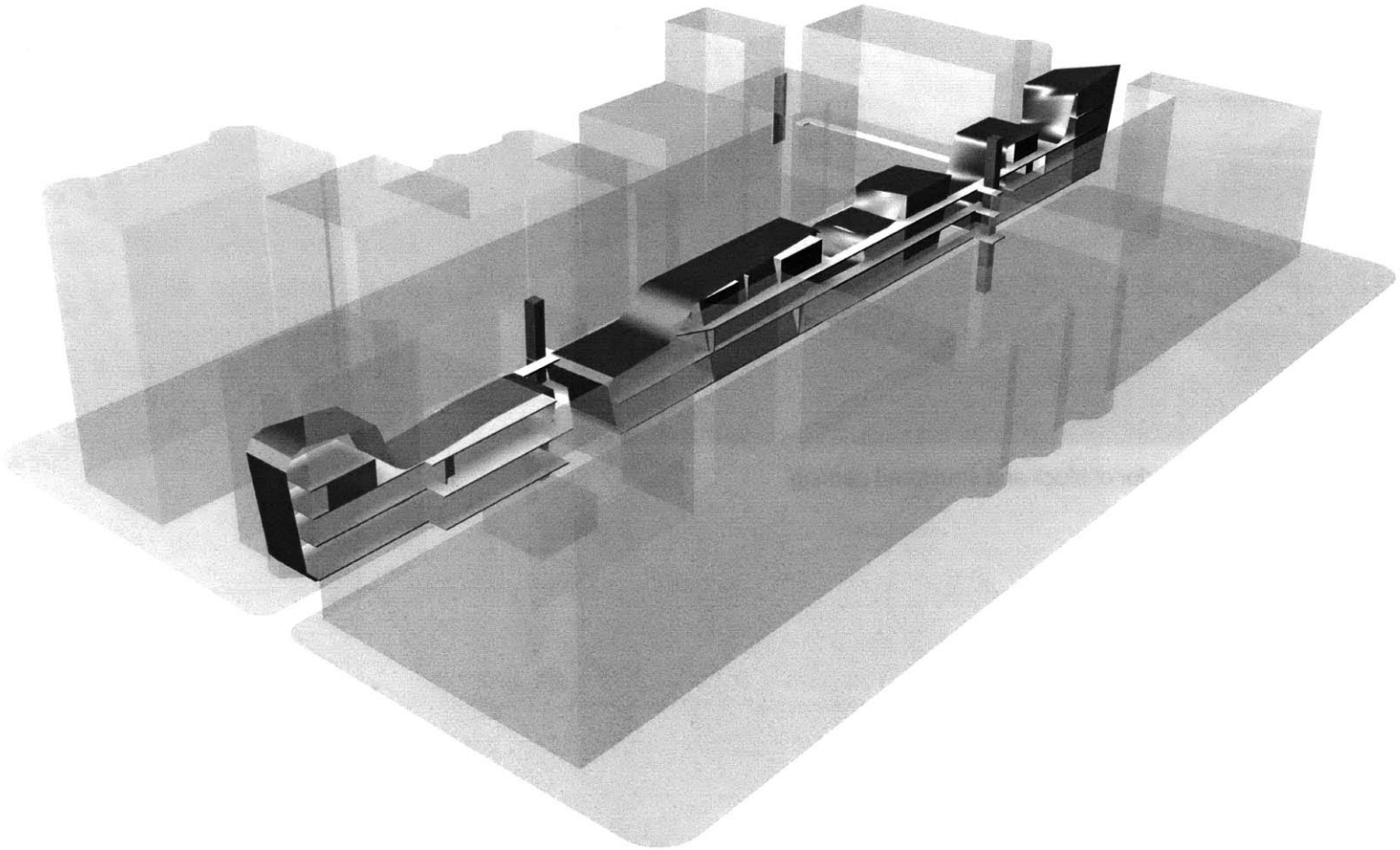
Model view from northwest



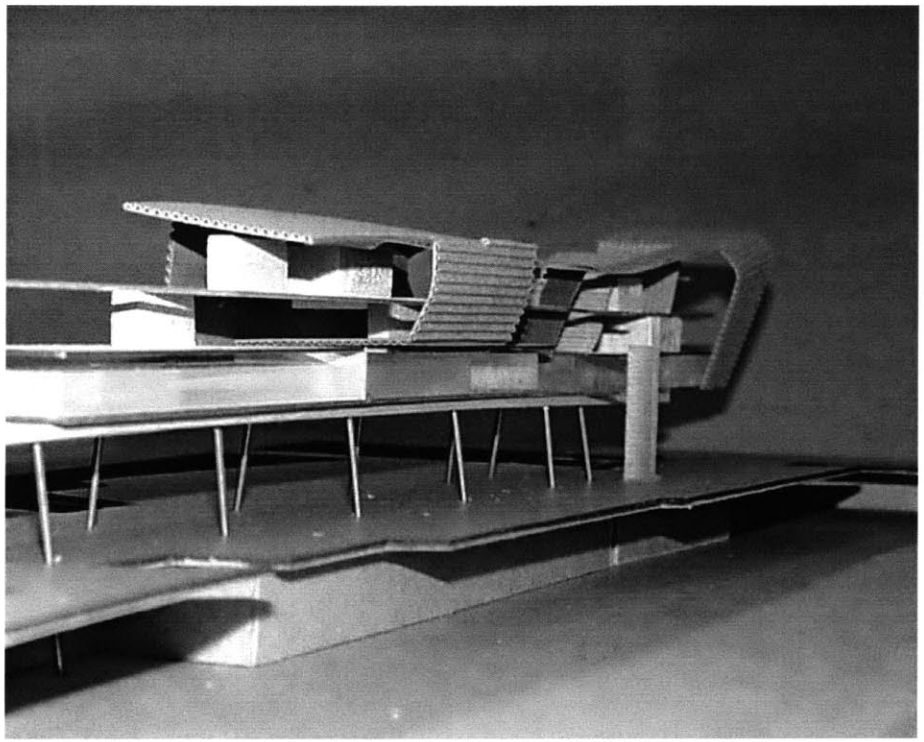
Initial north-south section



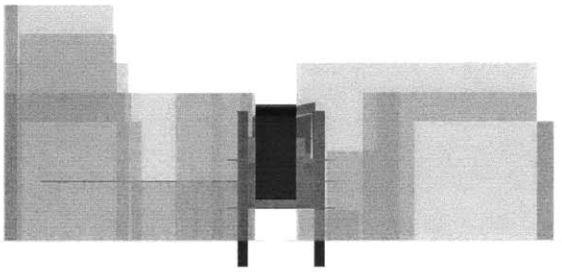
North-south section (revision 1)



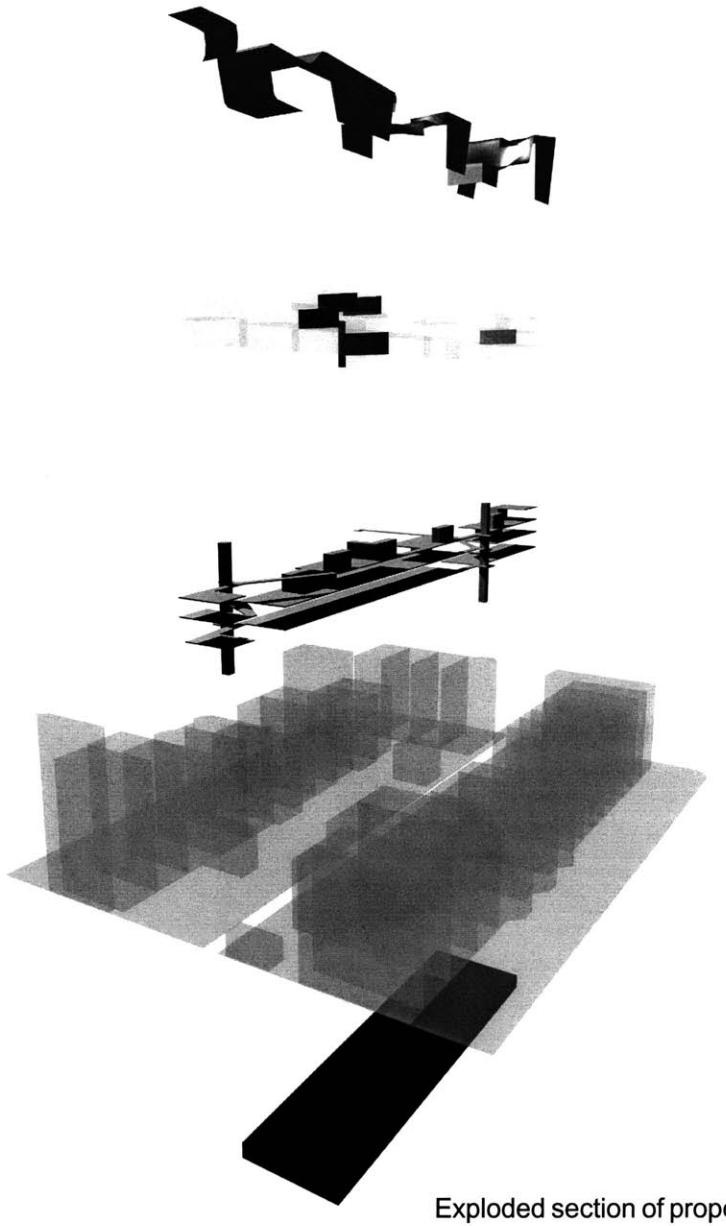
Proposal view from north-west



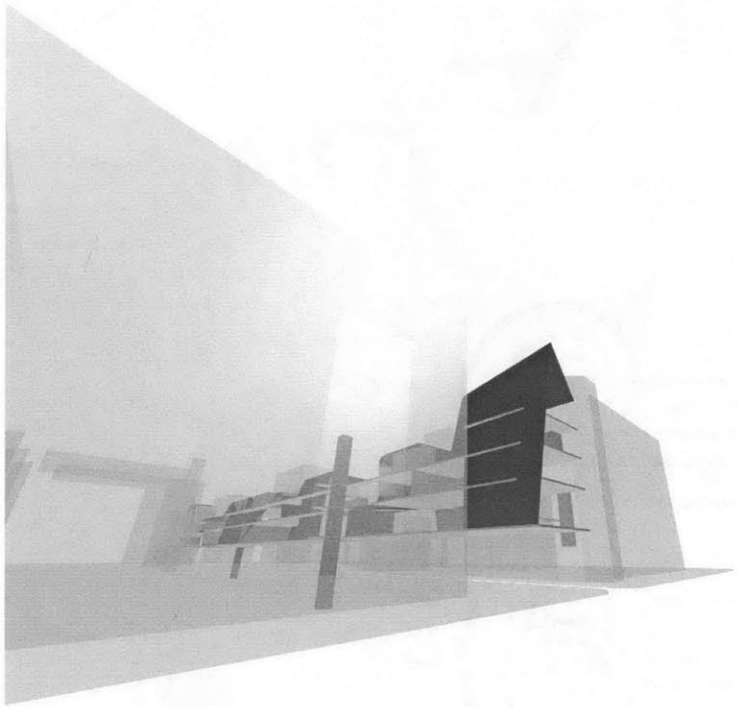
Model view showing interior of block and structured parking



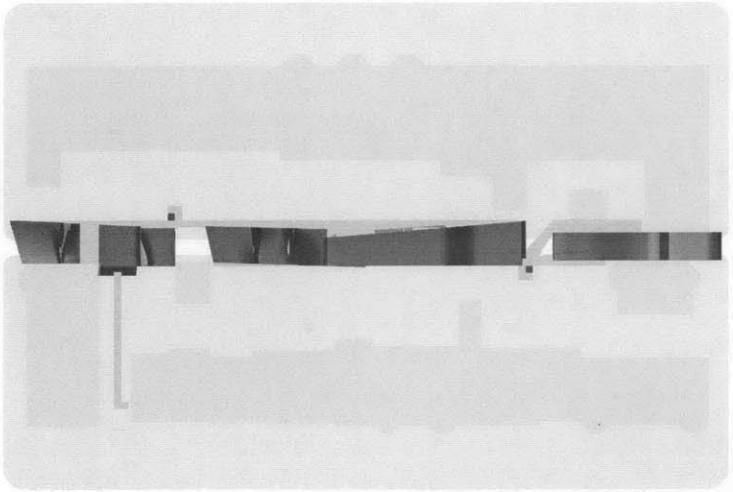
Proposal elevation



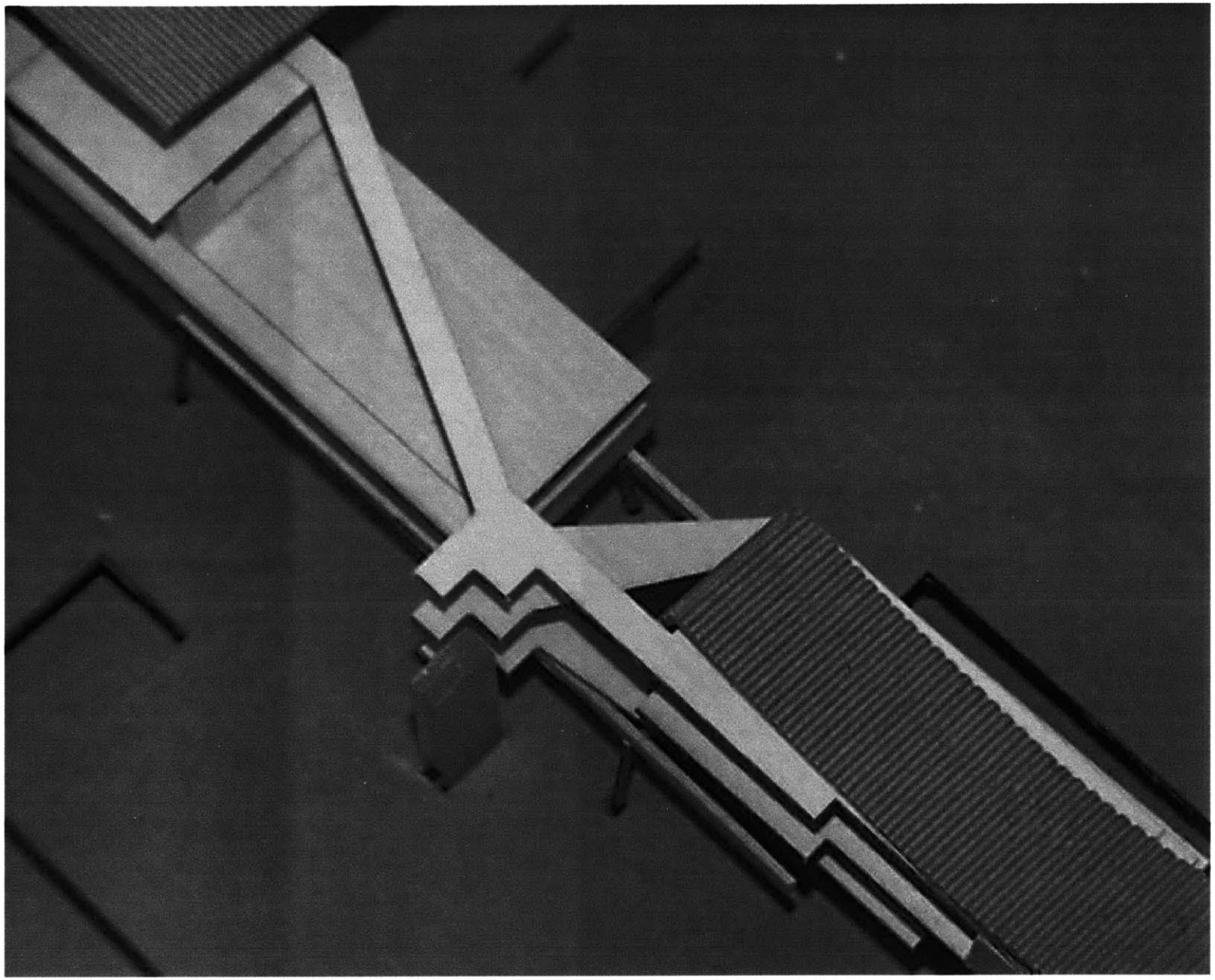
Exploded section of proposal



Proposal street view

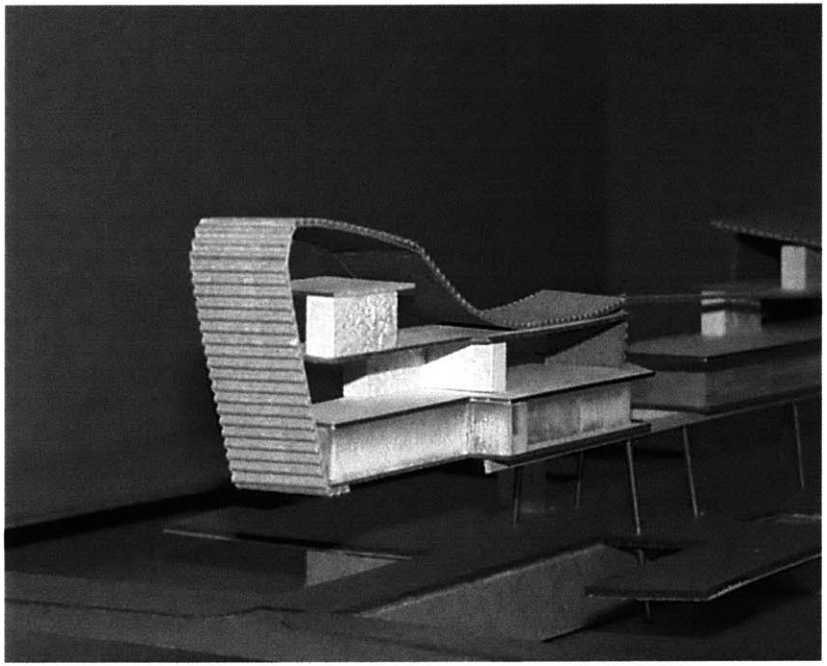


Proposal roof plan

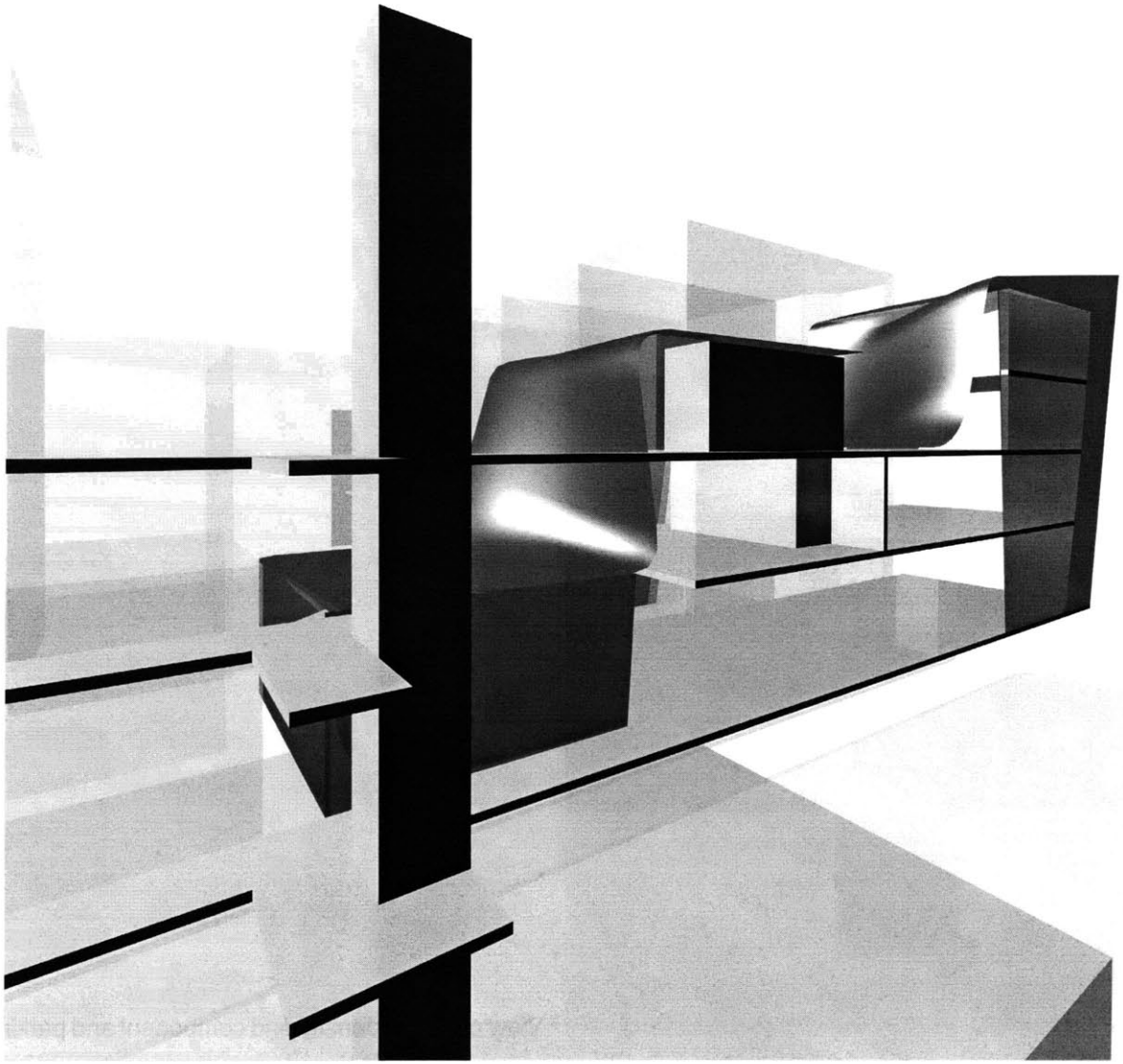


Detail view of vertical circulation void

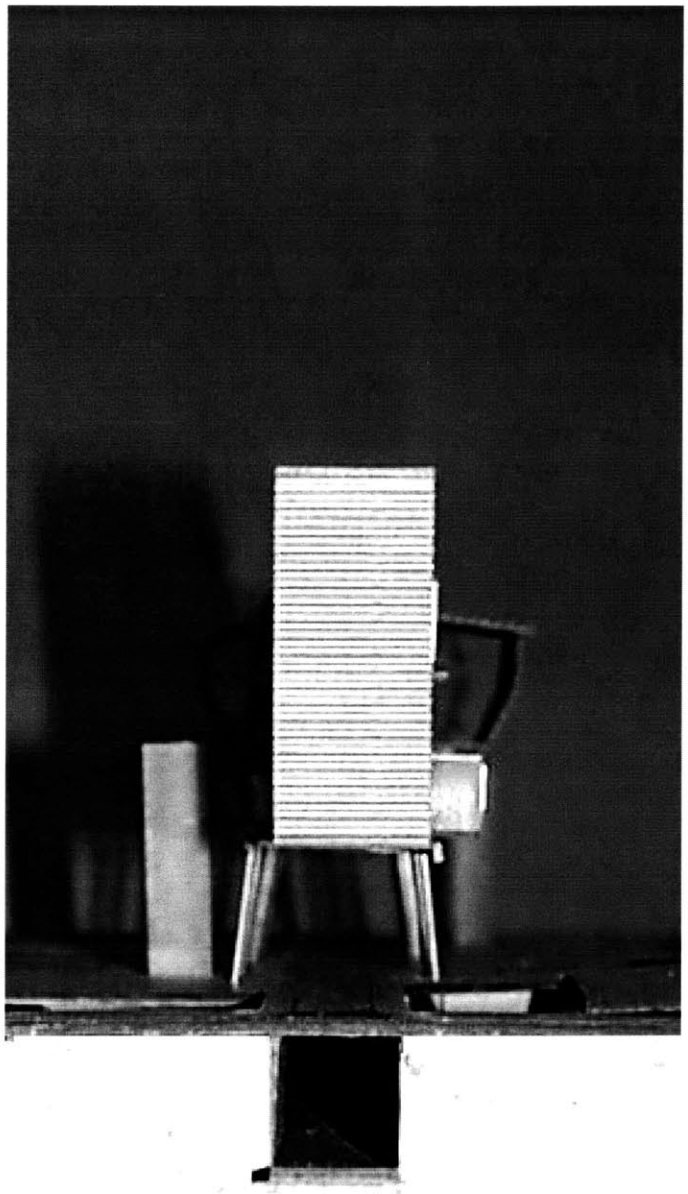
Collage of alleyway entrance



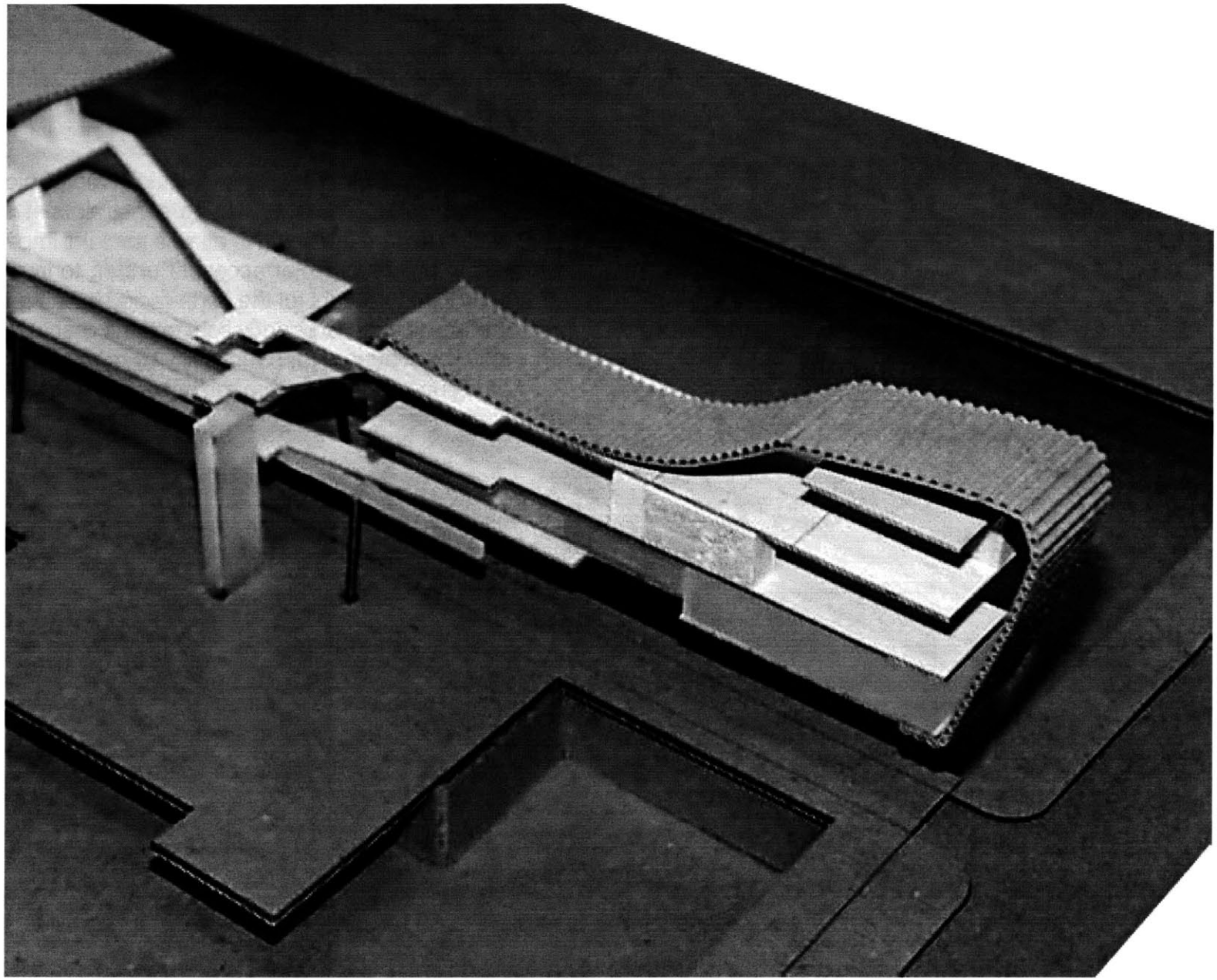
View of higher density end component



Detail view of roofscape and vertical circulation

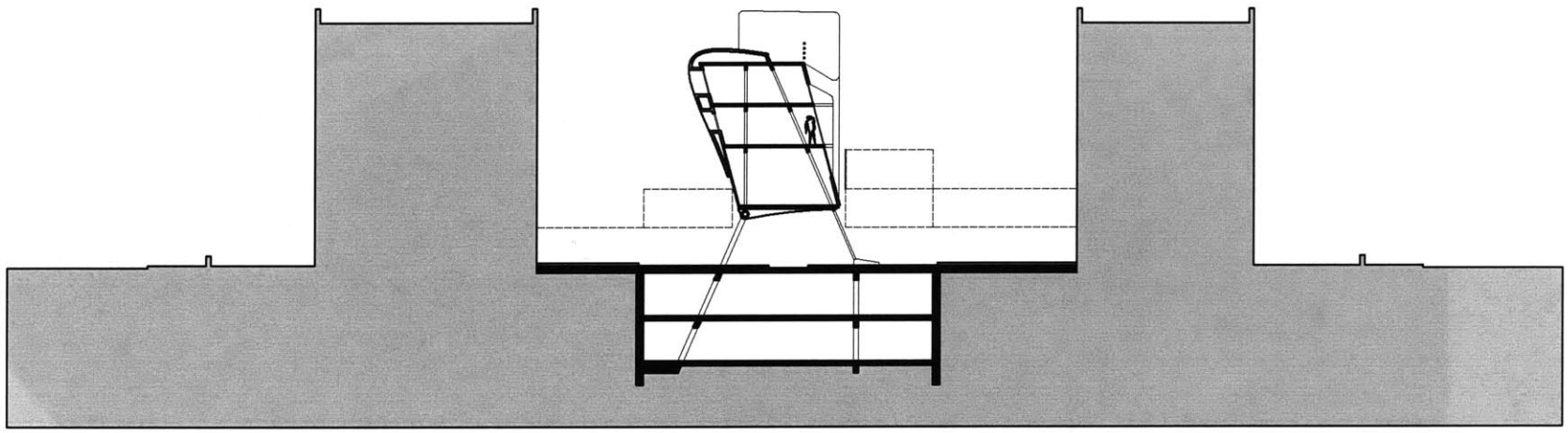


View of higher density end component and parking entrance



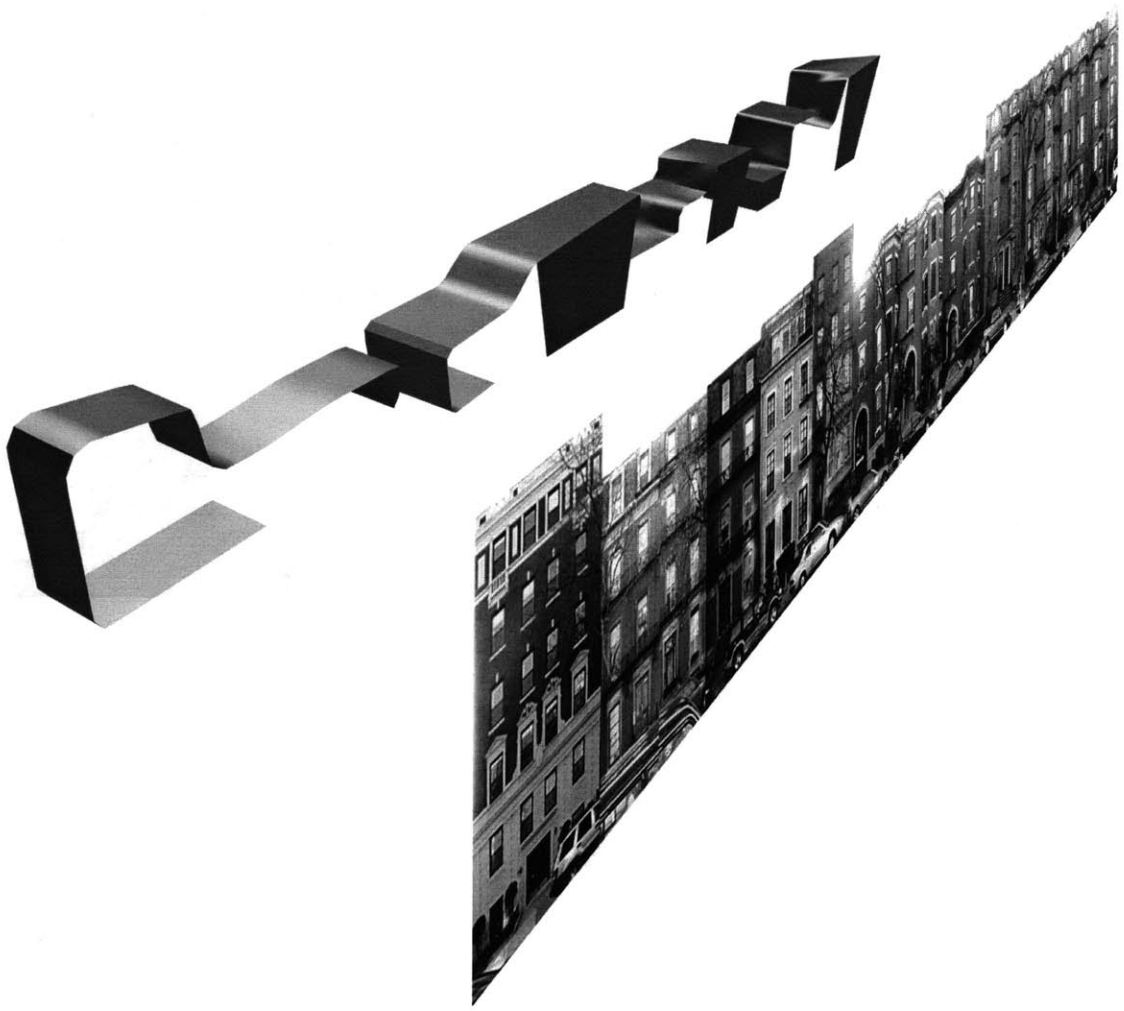
Model view from south-east

The typical section of the block morphology is further refined to incorporated design constraints. The section is shifted toward the south to allow a minimal impact on south-facing buildings' solar access. Further, to improve the access to natural light for the north-facing buildings, a reflective surface is used to bounce light into the residual space. This shift is accounted for structurally by countershifting the column supports that go through the underground parking.

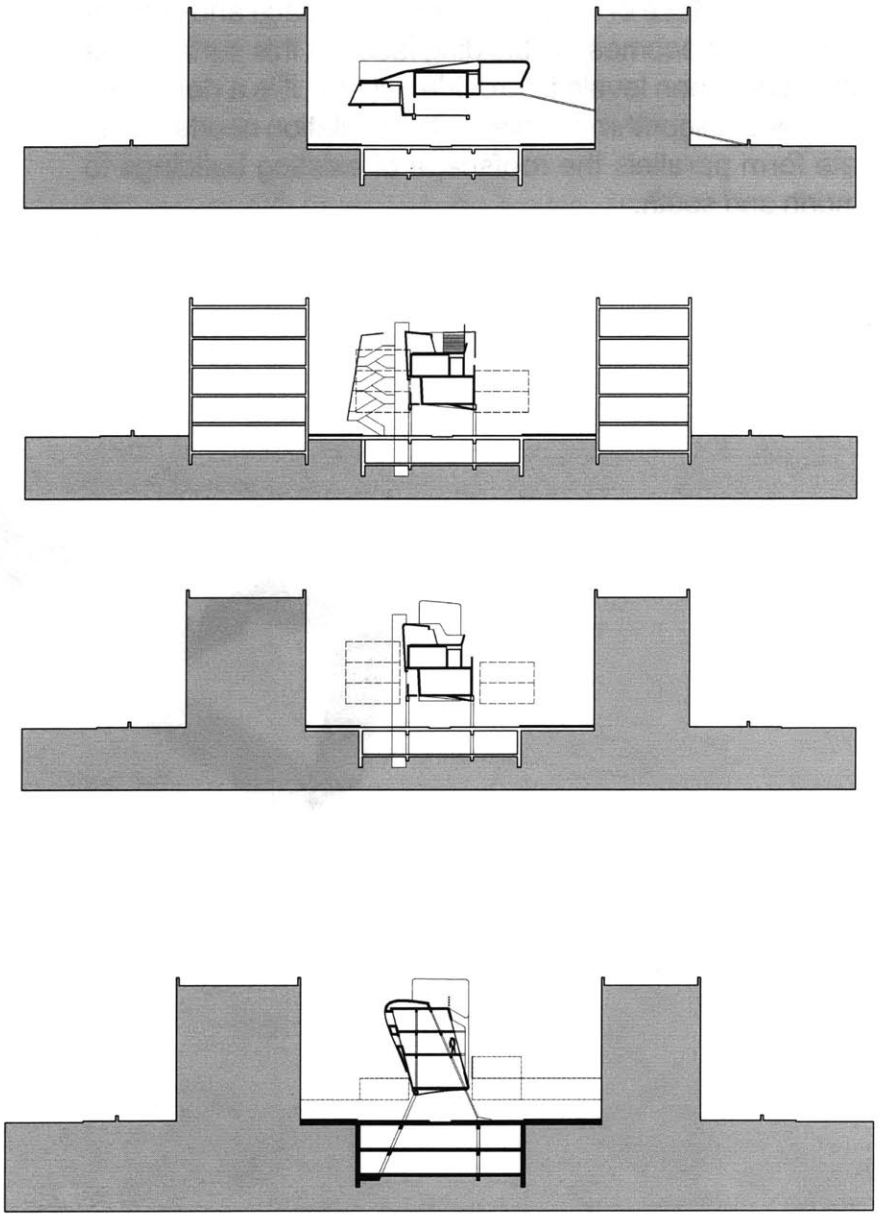


Final north-south typical section

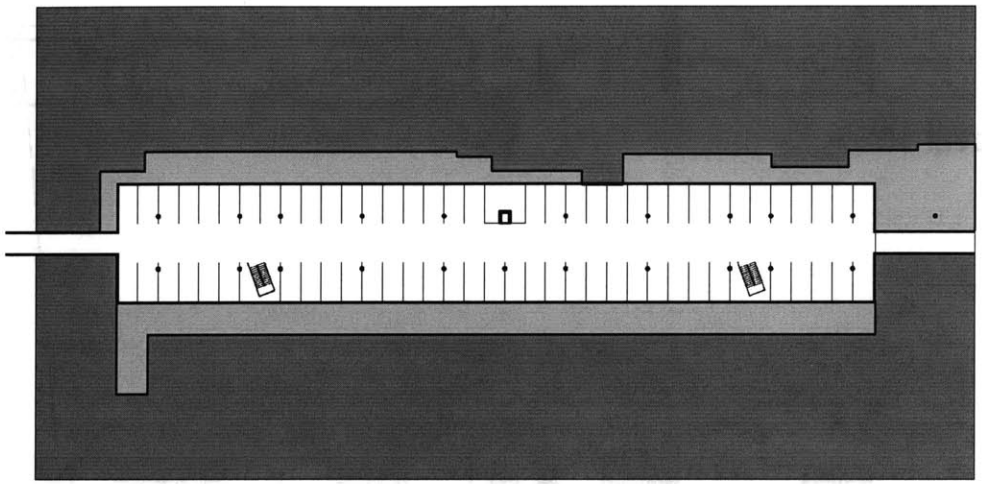
The surface of the combined open space and circulation structure becomes the building face. As this surface has to adjust between levels to provide access, it is a derivative of the design algorithm coupled with circulation needs. Its ultimate form parallels the roofscape of existing buildings to the north and south.



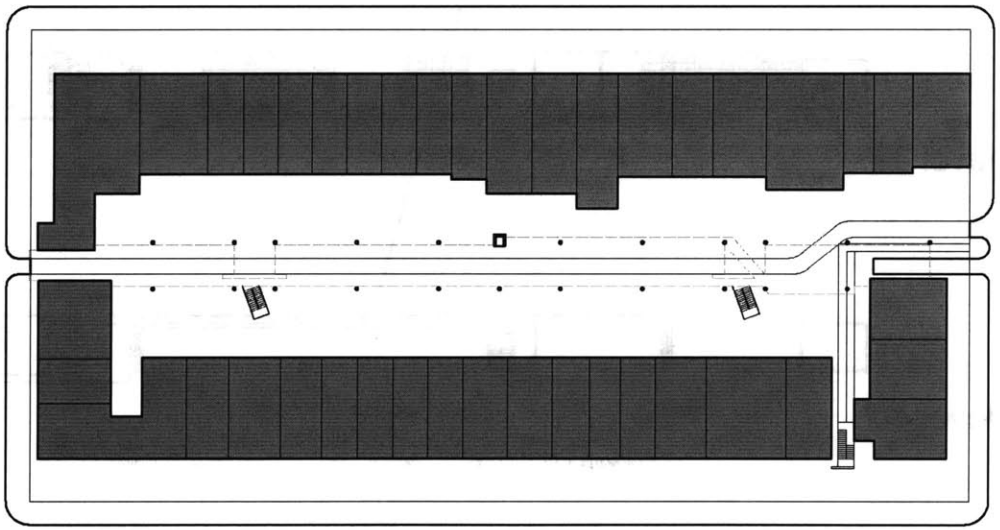
Roofscape / open space collage



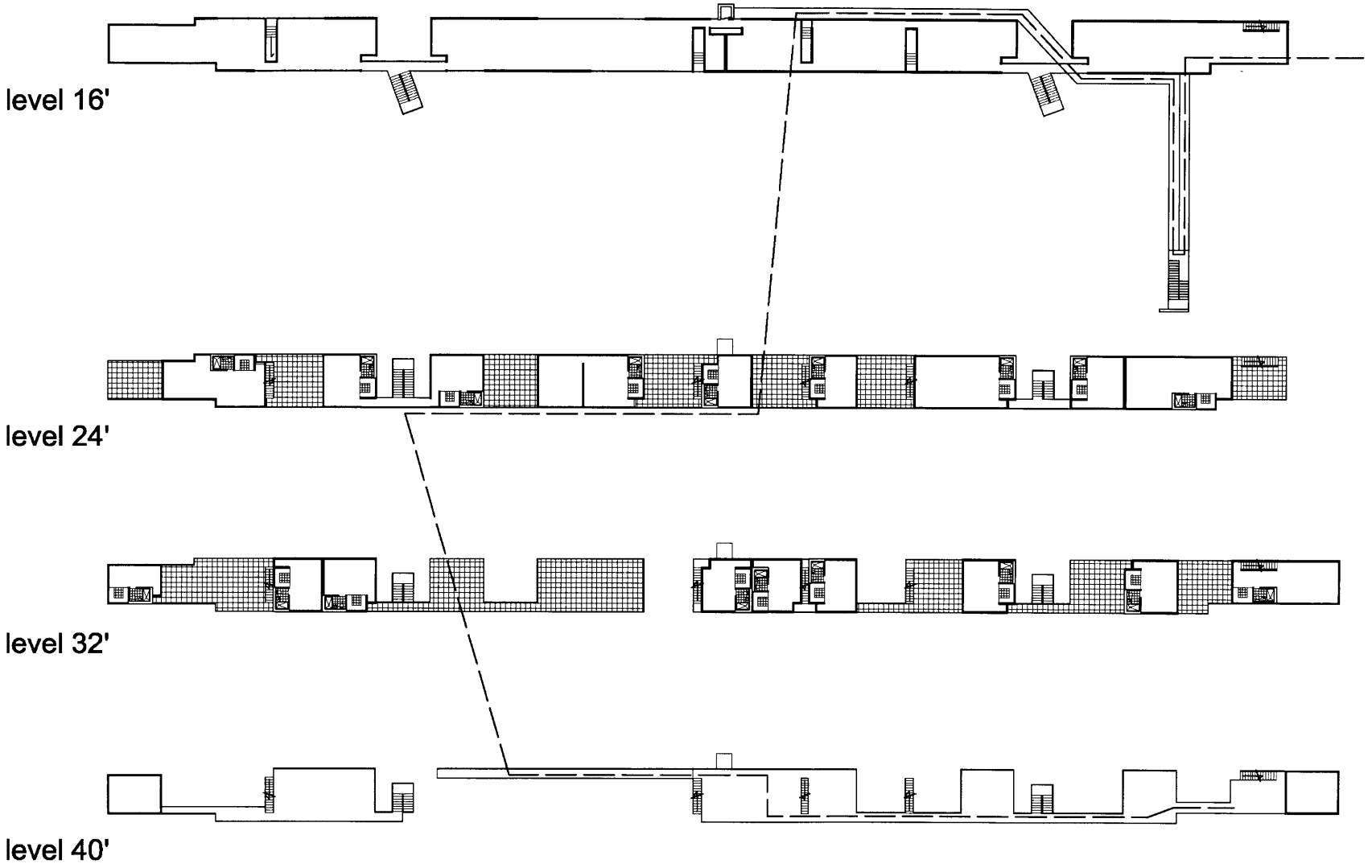
North-south section iterations



level -12'



level 0'

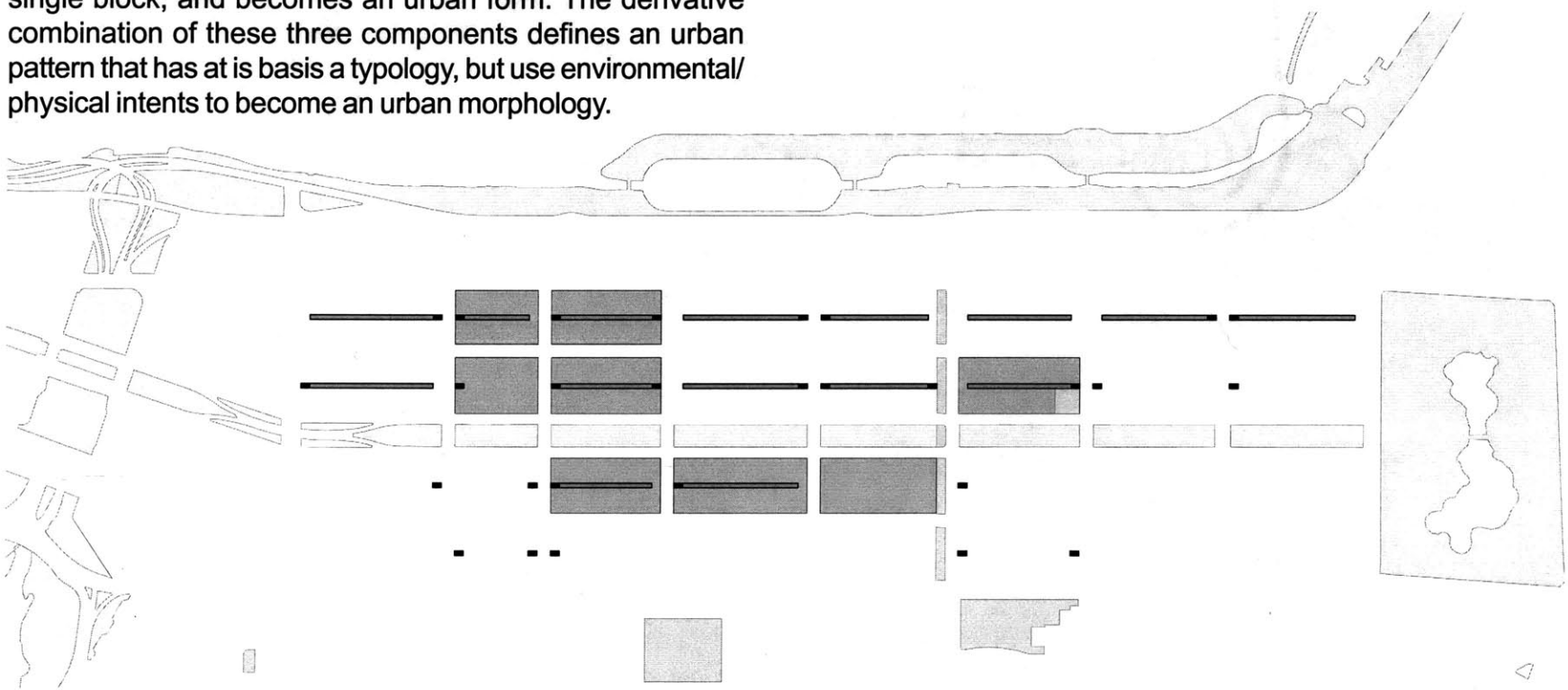

level 16'
level 24'
level 32'
level 40'

The individual spaces within the block morphology are defined by bath/kitchen components. The open spaces adjacent to these individual units are used as semi-public access points. Circulation occurs both horizontally and vertically, as the combined open spaces on different levels become pubic circulation. Primary vertical circulation occurs through ramps and stairs located at the two voids in the structure. Internal to the units, staircases are used as both access points and possible locations of connections to other units. The floor to ceiling heights defines functional zones within the section. The first level is primary a flexible work space that allows for public and private access. The upper levels are primary residential, with a public circulation infrastructure weaving though their residual spaces.

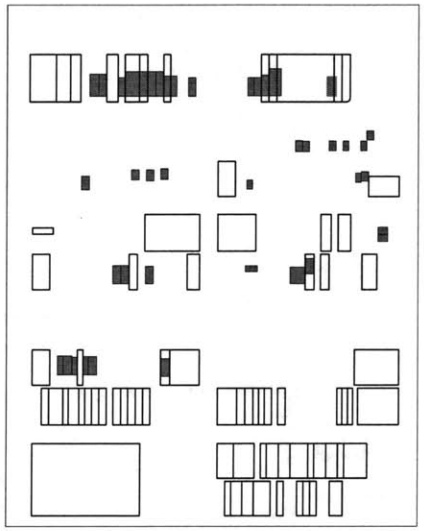
Collage of possible future urban intervention

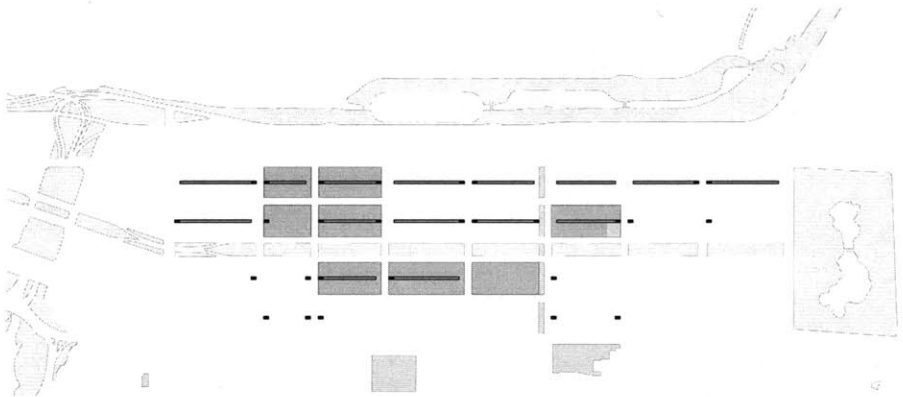
Siting multiple interventions into the urban scale requires a combination of rule-sets. Their placement within the block is contingent on the rules outlined regarding a 21-foot buffer zone on either side being satisfied. The outcome of this rule is that most interventions occur between Beacon and Marlborough Street, as well as between Marlborough Street and Commonwealth Avenue. In those situations where the entire intervention cannot fit, the higher density end pieces may still be incorporated. The only constraint on these is that

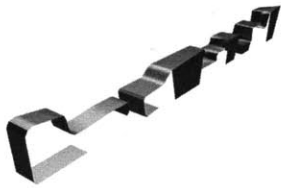
they do not block the primary window elevation of a building. The parking for these structures must also satisfy the physical constricts outlined regarding access points. The outcome of these rules is a pattern formation that extents beyond the single block, and becomes an urban form. The derivative combination of these three components defines an urban pattern that has at is basis a typology, but use environmental/ physical intents to become an urban morphology.



Urban site plan and existing open space







Conclusion

Buying analyzing the built form of the Back Bay, I have come to understand a relation that can exist between architectural typology and urban intents. The programming of rules of the existing environment and the proposal of derivation morphologies has redefined my ideal of the role of the urban architect. While I have allowed myself to design both the research and proposal, I have attempted to do so in a non-form-based manner. This approach allows for further research on both the subject of contingent [re]occupation and the place of residual urban morphologies.

Illustration Credits

All images not otherwise cited are by the author. Reference is by page number.

Page 17 Bunting, Bainbridge. Houses of Boston's Back Bay,p.131 Cambridge: Belknap Press, 1967.

Page 21 Ibid p.375

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