

Boston's Back Bay

The Urban Framework and its Visual Organization

by

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B.S.A.D. / Massachusetts Institute of Technology
1978

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Submitted in Partial Fulfillment of the Requirements For
the Degree of Master of Architecture at the Massachusetts
Institute of Technology, June 1981.

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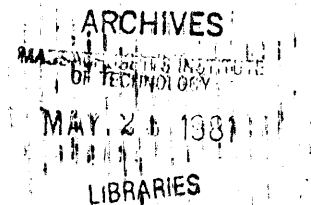
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ABSTRACT

Vision is our main guidance for interaction with the physical world. In the built environment, human actions transform the natural site, creating ever-changing relations among buildings and open spaces. The extent to which these relations can be comprehended by the observer, affects his/her ability to enjoy and function in a given environment.

Broadly states, this study is concerned with the affects of order and variety on environmental perception. Specifically, it attempts to define the concepts of *visual richness* and *spatial legibility*, and to describe the physical relationships that provoke their perception in one urban environment: Boston's Back Bay.

The theme of the study is that the simultaneous perception of order and variety is essential for visual satisfaction and that, therefore, the provision for the evolution of variety within a perceivable spatial order may serve as the basis for the visual organization of urban environments.

Following an introduction and definition of basic concepts, the analysis of the Back Bay, a residential neighborhood originated in the nineteenth century, is guided by the following hypothesis: visual richness and spatial legibility derive from a certain relationship between order-provoking and variety-provoking features of the

environment. The physical organization of the Back Bay is presented as an "Urban Framework", composed of four "levels". At each level, the investigation identifies the sources of redundant (order-provoking) and variable (variety-provoking) visual information.

The findings lead to refined definitions of the two visual concepts, as well as a critique of the Back Bay's physical organization. Operational criteria for visual organization of urban environments are suggested.

Thesis: Supervisor: Imre Halasz

Title: Professor of Architecture

Acknowledgements

To Professor Imre Halasz, whose comments prevented this study from becoming a tourist guide. To Professor John Habraken, whose enlightened rationalism I suspiciously admire. To Professor David Ashley, for his direction in methodological considerations and support.

To Kevin Lynch and Edwardo Lozano, whose comments on Visual needs in the built environment were indispensable for my understanding of what I was doing.

To fellow students, whose perceptual systems did not shut off in the face of redundancy as well as new information (see Chapter 2). Special thanks to James Moore, whose patience equalled his editing skills; and to Charles Treister, with whom this process molded friendship.

To Pazit, for everything else.

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chapter 1

Introduction

Coherence and richness are the most striking qualities of Boston's Back Bay. The consistent pattern in which buildings of variable size, styling and configurations are aggregated into rectangular blocks results in a vivid play between individual interventions and their unifying spatial order. It is the intuitive sense of visual richness within a clear spatial structure that motivated this study: what provokes this feeling in the Back Bay? What was the process which led to the present appearance of the area? What can be learned from it as a morphological and visual system?

These questions are concerned not merely with aesthetic evaluation, nor with architectural history. Rather, they arise from a general interest in the relation between physical organization and visual quality in the built environment, and from the notion that identifying this relation in the Back Bay may provide useful insights for my future work.

The clarification and agreement on visual objectives and their design implementation is, without a doubt, one of the weakest stages of the planning process. This design shortcoming is reflected in the product itself; few of the large scale projects built in the last decades are able to evoke satisfactory aesthetic responses from the lay public or the critics, and it is possible to advance the hypothesis that this visual dissatisfaction is part of a major conflict between man and the new built environment. In contrast with the negative feelings evoked by contemporary urban design, there is widespread consensus on the positive visual qualities of many urban creations of the past, suggesting that the present inability to deal with the aesthetic issues must be traced either to major changes in the nature of cities or major changes in the process of planning and design - and most likely to both factors.¹

The importance of visual satisfaction in the urban environment goes beyond its aesthetic value. In reaction to the present situation, a growing body of research has focused on the effect of environmental perception on human behavior. Despite a wide range of interests and a

1. *Lozano (1974), p. 353*

general lack of tangible proof, there is a wide spread agreement that the appearance of the environment interacts with biological, psychological, social and cultural aspects of the human experience.

In particular, a strong link was found between environmental perception and two fundamental human needs: spatial orientation and variety of visual stimulation. Other findings have shown the importance of the built environment as means of expressing territorial control and cultural affinity. And a recent school of thought has centered its polemics on architecture as a means of personal expression and collective communication.

The present condition of large portions of modern cities leaves little room for doubt about the need to improve their visual performance. This need has been repeatedly stated both in psychological and aesthetic terms.² It becomes increasingly clear that what Rob Krier (1978) and others³ call "the deterioration of urban space" is inherent to the present modes of urban development, and that this process can be changed only through incorporation of explicit visual objectives to the agenda of urban design⁴

This study is concerned with implications of knowledge about human perception on the visual organization of built environments. Drawing on a number of sources,

2. *Gibson (1966) has become a classic reference about environmental perception. Lozano (1974) and Prak (1977) provide an extensive summary of research about visual perception of the built environment. See also Lynch (1960), Lan (1977) and Gombreich (1979).*
3. *For example Rowe and Koetter (1979), Rational Architecture (1978), Lugo (1980) and Bloom and Moore (1977).*
4. *Methods of arriving at agreements about collective objectives for intervention in the environment have been developed by a number of authors. See for example SAR '73 (1977), Alexander (1975) and Lynch (1978).*

it assumes that visual satisfaction should be an essential objective of urban design, since it is directly related to the human need for orientation and variable stimulation. The study is based on the premise that visual satisfaction depends in large part on comprehension of variety within a unifying order, and that these two dialectic qualities of a satisfying environment result from a range of redundancies in position, dimension, configuration and other features of built-up and open-space elements in a given environment.

Scope of investigation

These premises grew out of both general reading and specific observation of the Back Bay. Thus, as much as they provided a framework for the final presentation, they were informed by the data gathered in the course of the investigation. In this sense, the Back Bay served as a testing ground for clarifying general concepts regarding visual quality in the built environment.

Beyond its appeal to my personal taste, the Back Bay seemed a good place in which to start with such clarification: It has a consistent pattern of physical organization, which lends itself for a systematic evaluation. It is a "mature" environment, in which morphology and use have been partially transformed while an overall visual order is still apparent; thus, relying on a well re-

corded history, the effect of the evolutionary process on the visual characteristics of the area can be studied.

The investigation focuses on the primary elements of the Back Cay's morphology and the principles of their physical aggregation ("Urban framework"). Its specific objective is to establish the effect of this framework on the perception of visual richness and spatial legibility. Based on the premises mentioned above, the inquiry is guided by the following hypotheses:

1. In a man made environment, visual satisfaction is derived from the observer's ability to construct a unified image of that environment and to simultaneously comprehend variety within that image. A sense of order is provoked by recurrent patterns of aggregation and similarity among built-up and open-space elements; a sense of variety is provoked by dissimilarities among elements which conform to a unifying order.

2. A sense of visual richness and a sense of spatial legibility are both related to the perception of variety within a unifying order. Each is provoked by certain relations between the whole and the parts of an environment, regardless of the specific architectural styling of those parts.

Chapter 2 develops the concepts which underlie the observations; it discusses the relation between the visual satisfaction, the human needs for orientation and variable visual stimulation and the nature of human perception; it makes a connection between visual richness, spatial legibility, the perception of order and variety, and visual satisfaction. Chapter 3 describes the Back Bay's urban framework and its visual content; the effect of the framework on the perception of order and variety is related to the extent of redundancy among its elements. Chapter 4 illustrates the visual impact of 5 Back Bay interventions. In conclusion, Chapter 5 reviews the major findings, leading to refined definitions of visual richness and spatial legibility. Implications of the findings for urban design are suggested.

Background



Fig. 29. Three repetitions are sufficient if the repetitive element consists of a single line only. Repetitions of groups (middle) contain more information; to make decoding still relatively easy, additional redundancy is desirable, which is obtained by repeating the group more than three times.



Fig. 30. The tendency to increase redundancy is so much a part of the visual system that even entirely irregular rhythms look as if they had some regularity.

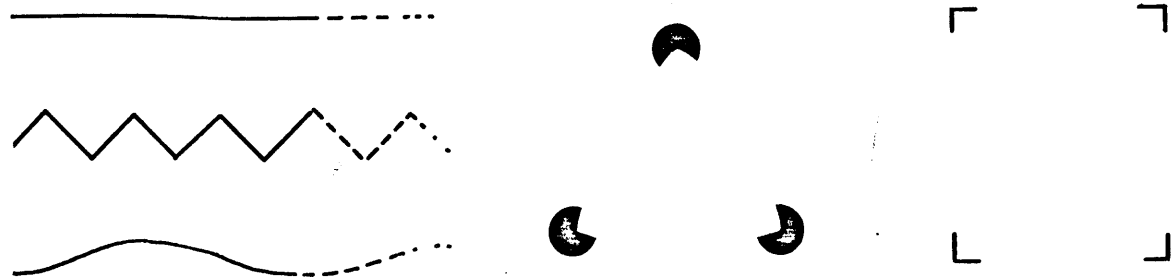
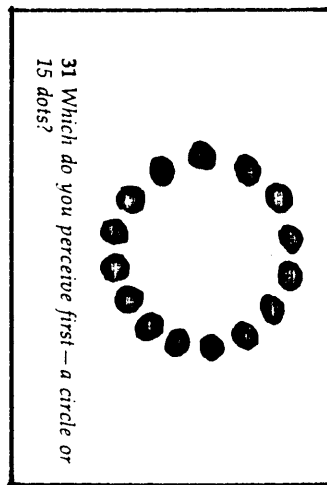


Fig. 18. Continuity and closure. Perception has a tendency to continue lines as they started: a straight line as a straight line, a zigzag as a zigzag, a wavy line as a wavy line, for such continuation does not add information. Closure is shown on the right: the four angles are sufficient to perceive a rectangle, though only a minor portion of its total outer edge is drawn. Information is concentrated at the corners, where the edge changes its direction. The intermediate parts of the edges are filled out by the law of continuity. Center: closure works, even if the edges are not straight, as in this 'triangle' with its quasi-bent edges.

The Built Environment

Recent years say a growing concern for the negative effects of modern development on both the visual and behavioral aspects of urban environments. Nevertheless, the wide gap between professional and lay concerns on one hand, and the continuation of the criticized development pattern on the other, point to two fundamental difficulties in attaining visually more satisfying environments. First, they suggest the problem of defining and agreeing on a desirable visual quality. Second, they suggest the present inability to devise a process which would facilitate the emergence of such quality over time.

The complex relation between the built environment and the human experience denies the possibility of utilizing morphology by itself to solve the visual needs of the inhabitants. The built environment is neither a tool nor an object. It is not merely a product but also a process. In its totality, it is a phenomenon that has as many dimensions as the culture in which it exists.

The only stable elements of an environment are the natural site and its climate. Other elements such as de-

cision power, inhabitants, territorial structure, functional needs, formal preference, technology, and buildings are all partial and changing factors in its continuous transformation. In this context, the human need for spatial orientation, for self-expression, and for visual stimulation are rather minor incentives for those who participate in shaping urban environments.

Furthermore, even if designers were to recognize these needs as priorities, the dependency of human perception on an individual's knowledge, expectations and associations raises questions as to the method of incorporating these needs to the agenda of urban design.

The relationship between the physical world and man is established through the visual psychological process of perception and cognition. However, this process involves a socio-cultural dimension ... resulting in the subjective and cultural relativity of perception and cognition ... (s)elective screening of sensory data admits some things while filtering others, so that experience as it is perceived through one set of culturally-patterned sensory screens is quite different from experience perceived through another.⁴

The appearance of built environments cannot be separated from their transformation. Through time, new interventions join previous ones in the dual role of the built environment: individually each intervention is a *product* of human action; collectively they shape the *arena*

2. Lozano (1978) p. 354

in which human actions occur. In this duality, the appearance and process of an environment converge, through perception, in our memory. It is in this convergence that visual organization becomes an integral, unavoidable part of the human experience.

Premise one: Visual criteria for an urban environment must account for, and rely on, the process through which it is developed; should reflect its physical and functional organization, as well as the technological determinants the social connections that have influenced its evaluation.

Implications for study: evaluate the effect of the development process and technological constraints on the visual quality of the Back Bay.

Human Perception and the Environment

Bainbridge Bunting (1967) makes an interesting comparison between the Back Bay and the South End.² He suggests that the lack of reinforced directional predominance and the repetitive swell-front facades are the major contributors to the South End's spatial ambiguity, "droning plasticity" and monotonous presence. In contrast, the Back Bay exhibits a wide range of formal differences, all

2. Bunting (1967) p. 67-75.

of which are accomodated by a clear spatial order, obeying and reinforcing a strong directional predominance. It is the presence of variety and diversity within an imageable whole that provokes the perception of the Back Bay as a "rich" environment as opposed to "boring", "ambiguous" or "chaotic".

While these observations may provide a personal account of the different visual qualities of the Back Bay and the South End, they do not amount to an explanation of the physical relationship which facilitate these different perceptions. As pointed out by Lozano³, terms such as "rich" and "boring" are valuable as impressionistic reactions to a given environment, but fail to serve as operational criteria for evaluation of visual effects: they do not identify causal factors, resulting effects, and explanatory reasons for attaching positive or negative reactions to a given environment. To arrive at those, one must understand the perceptual process and its stimulation by the surrounding environment.

As an information processing organism, the human being is adapted to the perception of differences and changes. By a process of "forward-matching", the human body and its perceptual system continuously form expectations (perceptual hypotheses) which are then either supported or refuted by the ongoing act of perception. Rid-

3. Lozano (1974) p. 353

ing a horse, one gets used to the rhythmic motion of the horse's back as one is able to anticipate its characteristic cycle. However, when one's instinctive "forward matching" with the same motion is refuted, e.g. when the horse changes speed or direction, one must increase attention and readjust his expectations to the perceived change. Experienced riders are much less conscious of such changes than a novice; not only are they familiar with the motion cycle at various speeds, but their perceptual systems can form accurate expectations about the "feel" of the horse as it changes speed and direction.

A similar process characterizes visual perception: as the relationships between perceived images become more familiar they require less attention, thereby falling into the periphery of our perceptual memory and becoming context for unfamiliar images. Stated in terms of informational theory, the visual system interprets predictable elements as "redundant" and unpredictable elements as new "information".

This process, however, is not based on an "either or" discrimination. "Continuity-probing" registers changes on many levels, as to allow the sensory apparatus to focus on the most critical changes in the surrounding environment. We are able to concentrate on an individual object without losing track of its field. As Gibson puts it: walking or driving toward an object on ground level and fixing our

eyes on the "target", we not only see it increase in size: we also perceive the "panoramic flow" of the surroundings which open up before us and swing round in a regular pattern.⁴

The capability of the perceptual system to comprehend varying degrees of repetition and change reflects the fundamental human needs that it serves. In the realm of vision, these can be summarized as the need for visual inputs that will lead to a satisfactory sense of both orientation and variety.

A sense of orientation is derived by successful forward matching between the [cognitive] image of the environment stored in the observer's memory (i.e. his perceptual hypothesis) and the visual clues that he perceives. In operational terms, orientation is defined as

The sense of location in a given environment, involving awareness of relative direction and distance to specific objects and the ability to understand and predict options for movement in that environment.

While ample examples have shown the negative impact on human behavior of a lack of orientation,⁵ it serves more than the function of reaching particular places. Its importance "should be found at the psychological level, in the sense of reassurance and enjoyment experienced by a well oriented observer"⁶ as opposed to the sense of unmanage-

4. Gibson cited in Gombreich (1979), p. 130.

5. For extensive review, see Lynch (1960) p.

6. Lozano (1974), p. 355

able uncertainty and distress caused by disorientation.

A sense of *variety* derives from an awareness of an incomplete match between the cognitive image and the actual perception of a given environment. Operationally, variety may be described as:

A range of visual stimuli, the perception of which supports comprehension of differences within a recognizable visual field.

The functional need for variety is related to the proven negative effects of excessive monotony on human behavior. However, the importance of variety in the built environment encompasses a larger set of concerns. Those are manifested in the preference of most people for complex formal systems rather than simplistic ones,⁷ and in the enjoyment one derives from new discoveries in a familiar environmental setting. Relying on several studies of visual needs and environmental perception, Lozano (1974) states:

The human being has deep needs for a combination of different visual inputs from the environment. Some visual inputs must construct a simple order, easily understandable, that would result in a continuity of fully anticipated experiences - fulfilling the orientation needs of the observer. Other visual inputs must construct a complex order, only partially understandable, that would result in a sequence of partially of fully anticipated experiences - fulfilling the variety and surprise needs of the observer. Thus, the environment must generate a set of visual inputs of

7. *Prak* (1977), p. 59-81

varying complexity defined by different levels of visual orders.... The different visual inputs are not conflicting or exclusionary; on the contrary, they are complementary and have to be combined in the same environment. The absence of one type of visual input handicaps the effects of the other visual input: environments organized on a very low (simplistic) order exclusively, would not result in a satisfactory orientation, but in misorientation - due to lack of visual "clues" and/or to sensorial rejection of a monotonous image; environments organized on a very high (complex) order exclusively, would not result in a satisfactory variety but in confusion - due to lack of visual "commonalities" linking the succession of experiences and/or to sensorial rejection of a chaotic image. Thus, both types of visual inputs need each other for a satisfactory performance, actually reinforcing mutually in their visual roles.⁸

Premise two: The visual organization of urban environments should aim at satisfying the human needs for orientation and variety. Visual satisfaction is achieved when visual clues from the environment constitute a sufficient balance between redundant (familiar, predictable) and new (variable, surprising, unpredictable) information, thereby satisfying the biological limits of human perception.

Implications to study: evaluate the extent of redundancy and variability among the morphological elements of the Back Bay.

8. Lozano (1974), p. 354

Order and Variety

A city must be regarded as a forest ... the essential beauty of a park is precisely the multitude of roads, their width, their alignment. But this does not suffice in itself: it needs a landscape gardener ... so that we find there at one and the same time order and fantasy, symmetry and variety ... when we traverse it, we must find there "Order" and a kind of confusion.⁹

M.A. Laugier

...Legibility is the degree to which a resident (or anyone) can clearly identify the elements of a settlement, connect them in a coherent spatial and temporal structure, and link those elements and the structure to his concepts ... "There must be diversity of parts, rich and complex, connections, regions to be explored..."¹⁰

K. Lynch

A valid order accomodates the circumstantial contradictions of a complex reality. It accomodates, as well as imposes ... If order without expediency breeds formalism, expediency without order, of course, means chaos ... There are two justifications for breaking order: the recognition of variety and confusion at all levels of experience; and the ultimate limitations of all orders composed by man ...¹¹

R. Venturi

9. Cited by Delevov in *Rational Architecture* (1978) p. 16

10. Lynch (1960, 1978) cited in an MIT study (1979, unpublished).

11. Venturi (1966) p. 40-47

A functionally complex and visually simple spatial continuum has to replace the contemporary system of disintegrated functions and buildings (prescribed by the two-dimensional medium of zoning) ... there is a necessary dialectical relationship of building typology and morphology of urban space and inside that dialectic the correct relationship of monuments (public buildings) and the more anonymous urban fabric (buildings for private use).¹²

L. Krier

Curiously, the wholesale inhuman "social" manipulation of urban form by twentieth-century architectural and planning offices has put a disproportionate emphasis on originality on the unique. Rather, we believe, the design of the environment is a choreography of the familiar and the surprising, in which a major function of the surprising is to render the familiar afresh. The most satisfying places we know are ... places like Boston's Back Bay, or the canals or Amsterdam, or Georgian cities across the Western world, where a broad area of human concern establishes an urban scale against which civic acts of vigor and congenial daring might leap into the public memory.¹³

K. Bloomer & C. Moore

The dialectic need for both a recognizable order and the challenge of complexity finds its expressions in many writings about architecture. The allusions to order/variety (familiar/surprising, thematic/non-thematic, simplicity/complexity, integration/differentiation) seems to be a central theme in architectural theories, even if writers

12. *Krier in Rational Architecture* (1978) p. 39-42

13. *Bloomer and Moore* (1977) p. 132

are many times unaware of the perceptual reasons for the intuitive appeal of this dialectic.

The unconscious search for order in the visual field is explained by Lam (1977): "Since the mind can only formulate one complete perception at a time from a given set of stimuli, [the] quality of classification according to the highest perceptible form of organization allows us to comprehend several objects simultaneously when all are clearly interrelated and form a single message or gestalt. ... Very complex visual environments are easily comprehended if all the available information is interrelated and clearly synthesized ... an extremely complex Gothic portal is neither confusing nor difficult to understand, because of the clarity of its overall organization." ¹⁴

E.H. Gombrich (1979), in his extensive essay on methods and perception in the decorative arts, discusses the aesthetic aspects of order. He writes: "with hierarchies that we can master and reconstruct, we can take the subordinate as read while we concentrate on the larger form." And, at the same time, "the very ease of reconstruction allows us to go on and to enjoy that unity in diversity that has always appealed to ... pattern makers."¹⁵ As described, the nature of human perception provides an explanation for this appeal: our sensory and mental faculties set definite limits on the amount and intensity of information that we can handle at a time. In terms of informa-

14. Lam (1977) p. 41

15. Gombrich (1979) p. 9

tion theory our perceptual system tends to shut down in the face of too much redundancy as well as in the face of too much new information.

This increasingly-favored interpretation of the perceptual mechanism provides a clue to the relationship between perception of the whole and its parts: our anticipations are borne out as far as overall form is concerned but are upset by variations among its subelements. This reaction, in turn, regulates subsequent expectations.

Both spatial and temporal patterns [orders] converge in our experience. Our ability to perceive variations in the context of their underlying order determines the extent to which we may enjoy that experience. It is in this sense that Gombreich writes: "Delight lies somewhere between boredom and confusion."

In combination with additional concepts, explanatory concepts of flat-form perception can be extended to explain space perception. In particular, Prak (1977) shows that many Gestalt laws of form perception apply to perception of the built environment.¹⁶

Thus, Gombreich's statement can apply to visual satisfaction in the built environment as well: with environments that we can (visually) master and reconstruct, recurrent features of the prevailing morphology support the perception of visual order. At the same time, the ease of

16. Prak (1977) p. 46

reconstructing the unifying order of such environments allows us to enjoy the presence of variety and surprise amongst the elements which comprise that order.

This interpretation of aesthetic appeal provides a psychological reason for the convergence of design theories on the theme of order and variety. It also explains why environments which evolved in different periods and under different stylistic influences may provoke similar sense of visual satisfaction, despite their different images.

The range of visual differences among objects in the environment varies between the two extremes of monotony and chaos. For our purposes, it is useful to distinguish three points along the continuous scale of visual differentiation:

VARIATION is defined as a degree of incongruence achieved by a group of similar but not identical elements, all of which are manifestations of a common typology, the recurrent features of which unify the group.

DIVERSITY implies a greater degree of incongruence than variety. It is achieved when a unifying order contains several building typologies, which share fewer features than in the case of variety, but which are still perceived as belonging to the same order.

CONTRAST implies singularity. While both variety and diversity imply a multitude of differences among elements

which belong to a common order, contrast is achieved when a single element stands out in the prevailing morphology of an environment. Contrasting elements are most likely to be associated with special building typologies in a given context.

The strength of the perceived visual order does not depend only on the extent of similarity among its *elements*: it depends at least to the same extent on the *relationship* between these elements. In fact, the previous discussion suggests that positional and dimensional patterns of aggregation have significant effects on the perception of order: they determine the overall form which contains the specific visual context of the aggregated elements.

The relationship among order, variety, diversity and contrast can be illustrated by the following example. A line of standing people creates a unified visual order; the alignment (relationship, pattern of aggregation) of similar bodies (elements) creates the upper level in the visual hierarchy of the formal organization: the line. The second visual level is created by the repetition of similar types of elements at similar intervals: legs, arms, torsos, and heads. At each level of formal organization, variety is created by differences in the physical manifestation of the elements: the range of heights and widths of the bodies, the range of lengths of the limbs, the style and color of clothing, the range of facial fea-

tures. Interjecting three adults into a line of twenty teenagers would introduce diversity into the visual composition. Adding one giant to a line of dwarfs would create contrast. Placing four lines in groups of two would introduce a higher level of formal organization, the elements of which would be the lines themselves.

Premise three: The perception of visual order in the built environment is provoked by hierarchical aggregation of similar morphologies, which consist of both built-up and open-space elements. The sense of variety is provoked by a range of dissimilarities among elements, which conform to a unifying visual order. Both are needed in order for an environment to provoke the sense of visual satisfaction. The human mind, which always recognizes the highest level of organization first, interprets redundancies as sub-elements of a higher visual level, thereby satisfying the unconscious search for order in the visual field. Dissimilarities, or non-redundancies, prevent a complete match between the visual hypothesis and actual perception, thereby revealing hierarchical relationships and defying monotony.

Implications for study: analyze the sources of redundant and non-redundant visual information at each level of the Back Bay's urban framework. Identify the relationship between order-provoking and variety-provoking elements in the hierarchy of its physical organization.

Visual Richness

Comprehending variations within the matrices of an underlying order seems to be a characteristic of many types of aesthetic experiences: in music we derive pleasure from relating variations to their theme; in nature we look for the biological structures which produce variety of species; in poetry, rhythms, rhymes and stances provide a scaffold for the expression of impressionistic metaphors.

Beyond differences in style and medium of creation, aesthetic satisfaction is provoked by a combination of fulfilled anticipations, unpredicted variations, and a certain degree of suspense. Many times it requires a certain perceptual conflict between "boredom and confusion", "familiar and surprising", "clarity and ambiguity", "order and fantasy", etc. To achieve a pleasing aesthetic response, "there must be a conflict, or at least a tension, between the two functions of perception: perceiving things and perceiving order."¹⁷

Premise four: In the built environment, aesthetic pleasure, as one expression of a positive visual response, derives from mental interpretation of perceived informa-

17. Gombreich (1979) p. 153

tion. The satisfying duality, to which the above expressions allude, can be explained by the preference of the human mind for a "plurality of visual inputs"¹⁸ of varying degrees of redundancy. This explanation provides the perceptual basis for the definition of visual richness in the built environment.

A sense of visual richness is related to the perception of order and variety in the visual field. It is likely to be provoked by environments, in which there exists a sufficient degree of dissimilarity among the elements which comprise a perceivable visual order.

Implications for study: identify the type of relationships between order-provoking and variety-provoking elements which result in the perception of visual richness in the Back Bay.

Spatial Legibility

Legibility can be defined as a comprehensible relationship between individual elements and their context. It depends on the ability of an observer to attach meaning to the objects in his perceptual field. As defined by Lynch (1960), legibility is the property of the environment which provokes the environmental image. The fundamental function of the environmental image is to support

18. Lozano (1974) p. 361

way-finding (orientation) in the environment. "But the image is valuable [also] as a general frame of reference within which the individual can act, or to which he can attach his knowledge ... it is an organizer of facts and possibilities".¹⁹

As pointed out by Lynch, legibility depends on the identity of elements in an environment; on their visual relation to temporal patterns and the containing spatial structure; and on the ability of an observer to attach meaning to objects in the visual field and connect them with his/her image of that environment.

In the context of this study, spatial legibility refers to that property of a given morphology which provokes the awareness of specific locations and directions within its spatial structure. It does not refer to more temporary features which enhance legibility in the built environment, such as signage, use-patterns and cultural conventions.

Premise five: Based on the preceding discussion, the sense of spatial legibility can be related to the need for orientation, and therefore to the perception of order and variety in the built environment. A sense of spatial legibility depends on the ability of an observer to identify specific locations within the spatial structure of an environment. It is likely to be provoked by environments in which not only the elements are aggregated in a sufficiently-redundant pattern, but in which there also exists suffi-

19. Lynch (1960) p. 126

cient contrast between few elements (orientators) and the rest of the prevailing morphology.

Implications for study: identify the relationship between order-provoking and variety-provoking elements which enhance the perception of spatial legibility in the Back Bay.

Differentiation and Integration

The visual appearance of the built environment is a result of human actions. Thus, as much as it should be understood as an object of perception, it must be understood as the manifestation of a process. In this process new interventions create new relations between physical objects, which in turn, produce new visual information. In a given environment, most interventions are likely to contain elements of varying degrees of congruence with the prevailing morphology. Compared with that morphology, the resulting visual information will be similar or different, or a combination of both. The extent to which such information changes the balance between redundant (familiar, predictable) and non-redundant (unfamiliar, unpredictable) visual content will determine the impact of the new intervention on the perception of order and variety.

In terms of visual impact, we can distinguish between two types of physical interventions in the built environ-

ment: *Integration* is the act of adding common visual elements (increasing redundancy) in a given context. *Differentiation* is the act of adding different visual elements (increasing variety) to a given context.

One major reason for the "disintegration of urban space", or the "poor aesthetics of modern cities" is the lack of appropriate integration among interventions. On one hand, the development of large, isolated structures organized haphazardly around spatially-undefined distribution systems prevents the mental reconstruction of a unifying spatial order. On the other hand, industrialization and economization of the construction process have led to increasing uniformity in the appearance of individual buildings, to minimization of possibilities for change once the building is completed, and therefore to decreasing low-level variety in the built environment. Thus, the aspects of chaos and monotony in modern urban environment can be related to both the nature of construction and the nature of the assemblage of buildings in the prevailing modes of urban development.

Premise six: In the terms of this study, the visual problem of the modern environment stems from the inconduciveness of common construction and development practices to produce an appropriate balance between order and variety. If

visual organization becomes an objective of urban development, the restoration of such balance is a fundamental prerequisite. To this end, specific visual criteria should be incorporated to the process of urban development; these should be based on operational understanding of both human perception and the "behavior"²⁰ of the built environment.

Implications for study: examine what, if any, was the nature of explicit and implicit rules which governed the extent of differentiation and integration in the Back Bay.

The Observer

People comprehend the physical world in context with other dimensions of their lives. While, technically, the mechanism of visual perception is universal to all mankind, its utilization is determined by the particular purpose and predisposition of the observer's mind. It is more than likely that the same physical environment will be perceived and valued differently by different people, depending on the individual's interest, knowledge, and previous experience with similar environments.

Many factors affect such differences, but broadly, they can be grouped in three categories: cultural predisposition, familiarity with the observed environment, and immediate purpose.

20. See Habraken (1980, unpublished)

Cultural predisposition affects the observer's ability to formulate a hypothesis about the perceived environment at first encounter. The shock experienced by people from under-developed countries on their first visit to Manhattan may serve as an extreme example of this effect: despite the regular gridiron pattern of the city, the scale and vigor of this environment demand significant effort before one can begin to comprehend visual clues. "The cultural factor bears the final responsibility of linking the visual inputs from the environment with the experiences stored in the human memory."²¹

Interventions in the built environment tend to reflect the cultural conventions accepted by the powers which created the environment. Familiarity with a local culture enables an observer to attach conventional meaning to the form and activities that are perceived, thereby facilitating easier comprehension of the environment.

Beyond a common cultural basis, specific interests and knowledge facilitate further interpretation of built form. For example, many people are offended by the connotative meaning attached to the John Hancock Building. They feel that "Office towers are manifestations of the political power of a large corporation." Therefore, they are opposed to its visual intrusion. Others simply admire the building's form and its imposing spatial presence and therefore relate to it more favorably as a landmark which also bears

21. Lozano (1974) p. 354

some cultural significance. Still others criticize the building's formal discontinuity with regard to the surrounding neighborhood.

Familiarity with the environment affects the specificity of the observer's expectation: a resident of the Back Bay may notice variations among the individual row houses while a visitor may only perceive the regularity of the block pattern.

Immediate purpose determines which part of the environment will be the focus of the observer's attention, thus pushing the other parts to peripheral perception.

The obvious overlap among these different categories can be explained by the nature of perception as discussed previously. From an operational point of view, all psychological factors which affect the individual's perception of an environment converge on the formation of his or her immediate perceptual hypothesis.

Thus, it is possible to explain the initial disorientation experienced in Manhattan in terms of the multitude of non-redundant stimuli which slide in and out of one's peripheral perception as one works to identify recurrent cultural and environmental patterns. The affect of an immediate interest on perception results from the formation of a perceptual hypothesis based only on a limited set of visual clues, with others forced into the perceptual peri-

phery. In a similar way, familiarity with a given environment increases the level of prediction, thereby allowing the viewer to comprehend a greater number of differences among individual elements.

Perception's dependency on individual cognition presented a negligible problem in previous eras. Limited mobility and traditional patterns of construction provided for a common cognitive basis for both transformation and comprehension of an environment. Environments were fairly similar and were viewed, for the most part, by people who were familiar with them.

This situation has changed drastically in recent decades as high mobility, pluralistic culture, and rapid construction increase the likelihood of a cognitive dissonance between the observer and the observed. With the increasing diversity of the cultural base from which architectural interventions derive their image, the difficulty of projecting and coordinating the visual impact of these interventions is increased. Therefore, the cultural diversity of an environment is critical to the notion of order and legibility.

"In a highly differentiated system, increasing abstractness and generality may actually reduce communication."²² Even if one, like Venturi, is interested in the way "architectural objects can interact in order to produce

22. Lynch (1960, 1975 ed),
p. 139

richness of meaning rather than clarity of meaning," one cannot ignore the need to perceive such interactions within an understandable context. The context itself must first be clearly defined if the interactions are to be perceived as "richness" rather than abortive formal manipulation. "... there must be something known to compare it to. Perceptions without redundancy are just as uninteresting as highly redundant ones."²³

The difficulties associated with the notion of "meaning" in architecture cannot be more than hinted at in this study. Our hypothesis suggests that regardless of the specific formal content of the elements, a partial solution to the problem of misunderstood environments may be found in physical frameworks that lend themselves to satisfactory "perception" by a range of individual observers. That is, these frameworks may be organized to allow the emergence of variety (and meaning), while the generic relationships between the elements conform to and facilitate the perception of a unifying order. The inability to predict specific appearances that will assure aesthetic or social approval should not prevent the designer from creating a visual organization responsive to the universal needs of human perception.

For urban living environments to be truly manageable, they should be legible to observers who have a range of familiarity with the specific environment. These environ-

23. *Prak* (1977), p. 17

ments must include clues which enhance the clarity of the spatial order at higher levels of the visual hierarchy as much as they should allow highly specific differentiation at lower levels of that hierarchy. "Clarity of meaning" at one level does not necessarily exclude "richness of meaning" at other levels.

Simplicity must be the main goal of the complexity of the urban plan, responding to constraints of topography or of an existing urban reality in general.²⁴

It is desirable that an environment evoke rich, vivid images but also that these images be communicable and adaptable to changing practical needs, and that there can develop new groupings, new reasonings, new poetry.²⁵

In accordance with the preceding discussion, it is necessary to identify the position from which subsequent observations about the Back Bay will be described. The author has been familiar with the area for a number of years, but has never lived in it. Thus, while an attempt is made to preserve an objective description of visual information generated by various elements of its morphology, this description is based on previous familiarity with the overall organization of the area but no special knowledge of either its residents or their patterns of living.

24. *L. Krier in Lotus 15 (1978)*

25. *Lynch (1960, 1975 ed.)*
p. 139

Due to the exploratory nature of this study, the lack of more "objective" tools than the author's eyes is not

seen as a serious problem. Because the study is concerned with universal aspects of human perception, it only marginally touches upon the social aspects of the Back Bay. Obviously, any conclusion arrived at through the following analysis must be substantiated on a more quantitative basis.



chapter 3

Observations

The Urban Framework and its Visual Information

The objective of the following discussion is three-fold:

1. identifying the rules which govern by the Back Bay's morphology;
2. identifying what and how visual information is generated by that morphology;
3. evaluating the extent to which different visual stimuli support the formation of spatial image and the perception of visual richness.

Each of the urban framework levels is first described in terms of its morphological rules and their physical manifestation; then, recurrent and variable components of visual information are identified in relation to their sources in the framework. The visual role of a number of typical elements of the Back Bay's morphology is illustrated by examples in Chapter 4.

The primary consideration in choosing the reference levels in the hierarchy of the urban framework was their capacity to structure a comprehensive description of the Back Bay's morphology. Based on physical scale, they are defined below.

Level One: Urban Structure

Pertains to the major geographic elements, the major urban centers of metropolitan Boston and the major transportation networks connecting these centers and other cities. In Boston, one can point to the Boston Bay, the Charles River, Downtown Boston, the Massachusetts Turnpike, Route 128, the Southeast Expressway, and others.

With respect to the Back Bay area, one of the residential districts surrounding Downtown Boston, we are also interested in smaller elements of the urban structure which either become part of or influence its internal structure. Combined, these are: the Charles River, the Massachusetts Turnpike, Storrow Drive, Massachusetts Avenue, Fenway Drive, and the eastern components of the metropolitan parks system (the Charles River park, the Public Garden, the Boston Common, and the "Green Mall" at the center of Commonwealth Avenue).

In our discussion of the urban structure, we will be concerned only with those physical elements and functions which have direct bearing on the interface of the Back Bay with the city.

Level Two: District Level

Pertains to physical elements within the defined boundaries of investigation which are either continuous throughout the area (e.g. street system) or affect it as a whole (e.g. boundaries or a major landmark).

The Back Bay existed before much of the urban structure of metropolitan Boston had evolved; consequently, a number of its internal streets now serve as city-wide transportation routes. This overlap is discussed at this level.

In order to distinguish between the streets as elements of distribution at the District level and their role as spatial entities at the Tissue level, the former are referred to as *distribution links*.

Level Three: Tissue Level

Pertains to the system of open and built-up spaces, which together, form the characteristic spatial pattern of the Back Bay.¹ This level in the hierarchy of the urban framework governs the position and allowable envelope dimensions of both the public and the private domains. Its manifestations in the district reflects both explicit rules (e.g. zoning regulations and deed restrictions) as well as implicit rules (e.g. architectural styles, buildings typology, technological constraints). The Tissue level is the focus of subsequent discussion regarding Differentiation.

1. Although borrowed from the S.A.R. methodology (SAR '73), the term "Tissue" is used in a slightly different meaning. There it refers broadly to "an intermediate level (of decisionmaking) between a town and a building"; here it is referred to as "the rules which govern the aggregation of individual buildings and the generic forms and functions of open space in the Back Bay."

Level Four: Lot Level

2. *The lot was the basic unit of property in the formative years of the Back Bay's morphology. Subsequent changes have led to two other basic modes of ownership that now prevail in the district. One is the condominium-type ownership, in which a single existing structure is subdivided into apartments, each belonging to one household; in this case, the ownership of open spaces of the lot, as well as of the common circulation sectors in the house, is shared by all its residents. The other evolving mode of ownership occurs by combining a number of individual houses under one owner. This was typically the case after World War II, when a large number of Back Bay houses were converted to function as schools and dormitories. This pattern has been discouraged in recent years, in an attempt to stabilize the area's population. Two other modes of ownerships, namely apartment houses and public buildings, both of which were practiced in the formative years of the Back Bay, are discussed in the body of the study.*

Pertains to the arrangement of built-up and open spaces on the typical (original) unit of property in the Back Bay.² In the context of this discussion, we are concerned primarily with the interface between the Lot and the Tissue levels; the internal organization of the lot will be discussed only in diagrammatic manner. The purpose of using the term "lot", as opposed to "building", is to include all rules concerning private territory under one level of the urban framework.

The Urban Structure

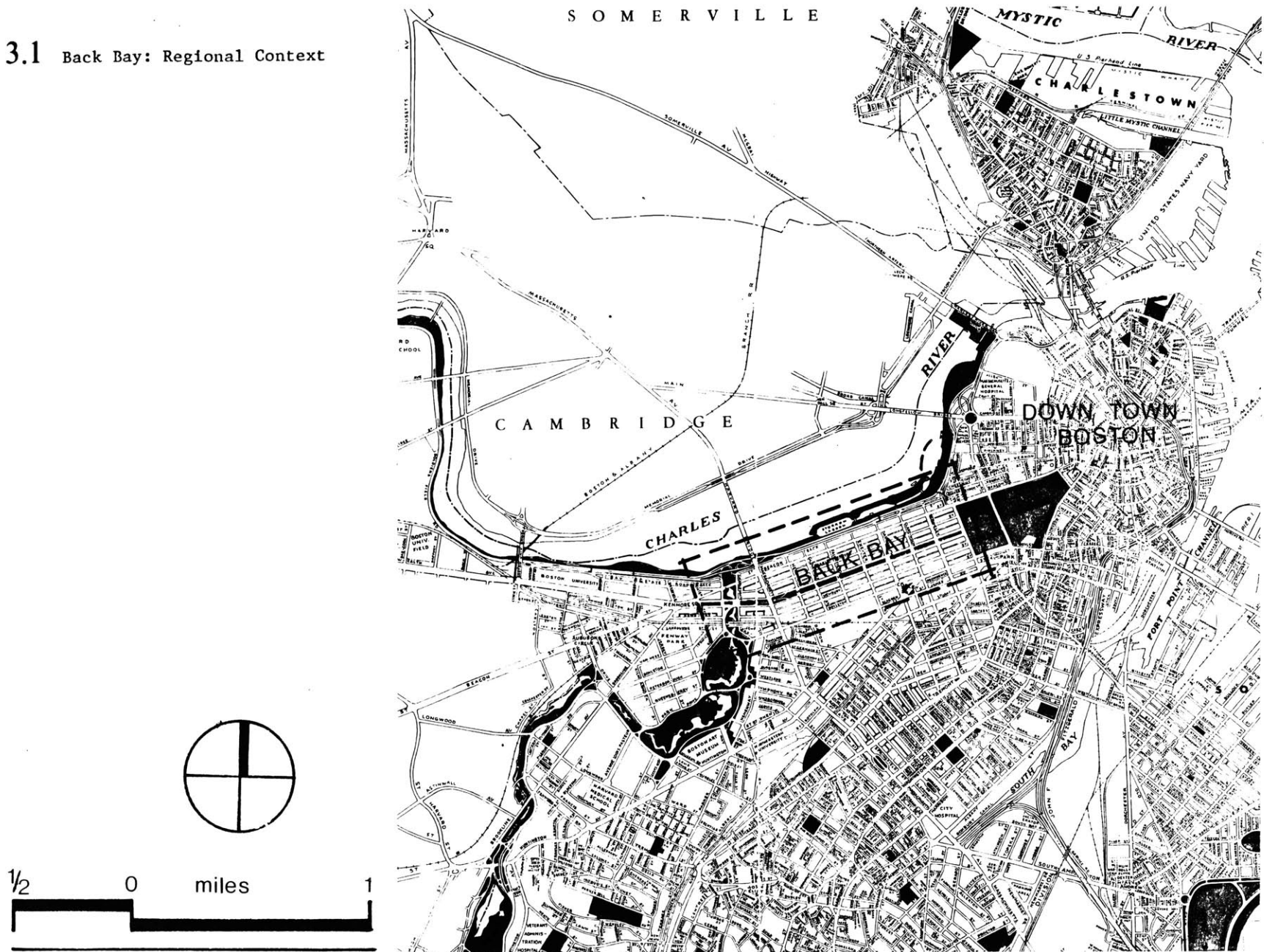
The Back Bay area was developed in the second half of the 19th century, when the area now called metropolitan Boston was composed of small towns with few connecting roads facilitating horse-drawn traffic.³

Nevertheless, the urban structure in the vicinity of Back Bay continues to be governed primarily by the location of Downtown Boston and the course of the Charles River. For both historic and functional reasons, all the major arteries that either bound or penetrate Back Bay lead to Downtown Boston; their specific direction in the area is determined by the River and by the historic courses of the Boston Worcester railroad and the Muddy River (insert 2). The River also restricts the number of north-south arteries, here represented by Massachusetts Avenue.

Although the expansion of metropolitan Boston has totally altered the relationship between the Back Bay and its regional context, it has not affected its basic organization. In fact, the district's presence was a determinant for the evolving urban structure rather than a response to it. In insert 1, we discuss the major topographical clues which affected the original Back Bay development. Figures 3-1 and 3-2 illustrate major elements of the current urban structure in the vicinity of Back Bay.

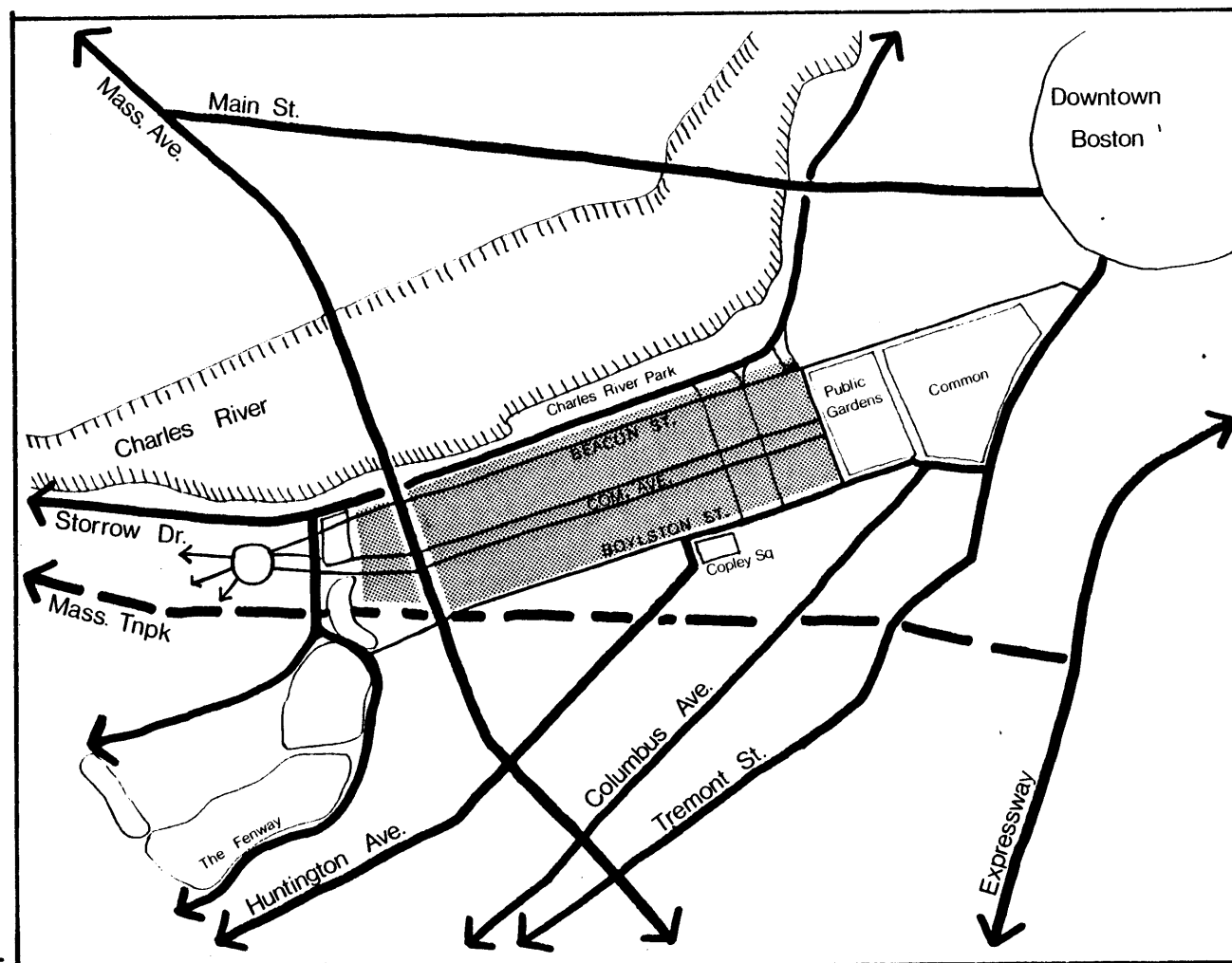
3. See *Insert 2*

3.1 Back Bay: Regional Context



3.2

Back Bay: Urban Structure
Regional routes in the vicinity of the area.

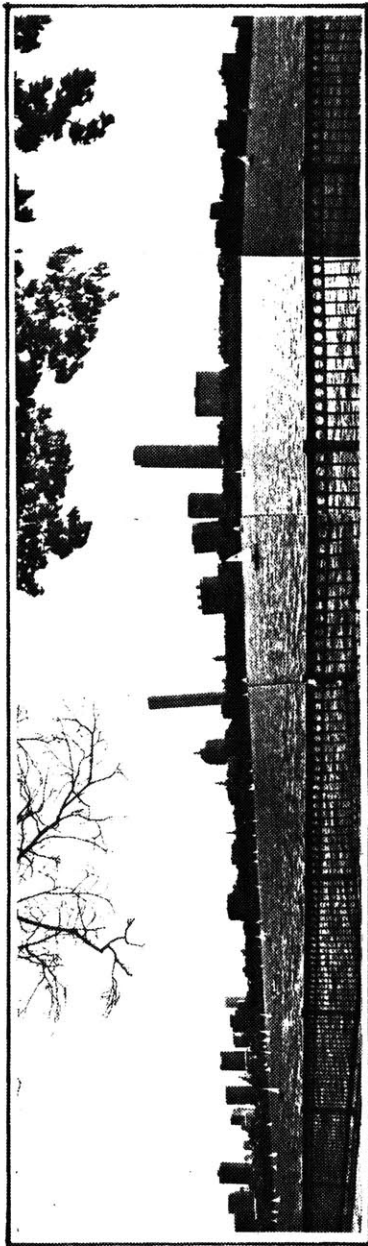


District Boundaries

The boundaries of the Back Bay have been always clear, although they have transformed in character. To the north, the Charles River provides visual relief and effective termination of the area (figure 3.3). The construction of Storrow Drive in 1938 created, however, a visual and functional barrier between the District and the River. Restricting access to the river bank, it has strengthened the identity of the Charles River park as a city-wide civic amenity.

To the east, the interface of the District and the City is more organic, both functionally and visually. Together with the Boston Common, the Public Garden acts simultaneously as a central space organizer for a number of districts, as a regional recreational resource, and as a visual separation between the Back Bay and its other surrounding neighborhoods. The north side of Beacon Street and the south side of Boylston Street provide continuity of the city fabric across Arlington Street, the Back Bay's easternmost street.

To the south, the boundary of the District is more complex and ambiguous. Copley Square acts as a central organizer for the buildings around it; therefore, it extends the perceptual space of Boylston - the Back Bay's southernmost



street - beyond the District's boundary. East of Copley Square, the interface with the Park Square area is unnoticed due to the continuity of the street system. West of the Square, the sharp disruption of the urban fabric around the Prudential Center marks the district's boundary. Past Massachusetts Avenue, the sunken course of the Massachusetts Turnpike tears the District off from Boylston Street. Despite the inconsistency of the southern edge, the perception of the District's southern boundary is clear: the "ridge" of high rises south of Boylston Street stands in sharp contrast with the district's typical morphology.

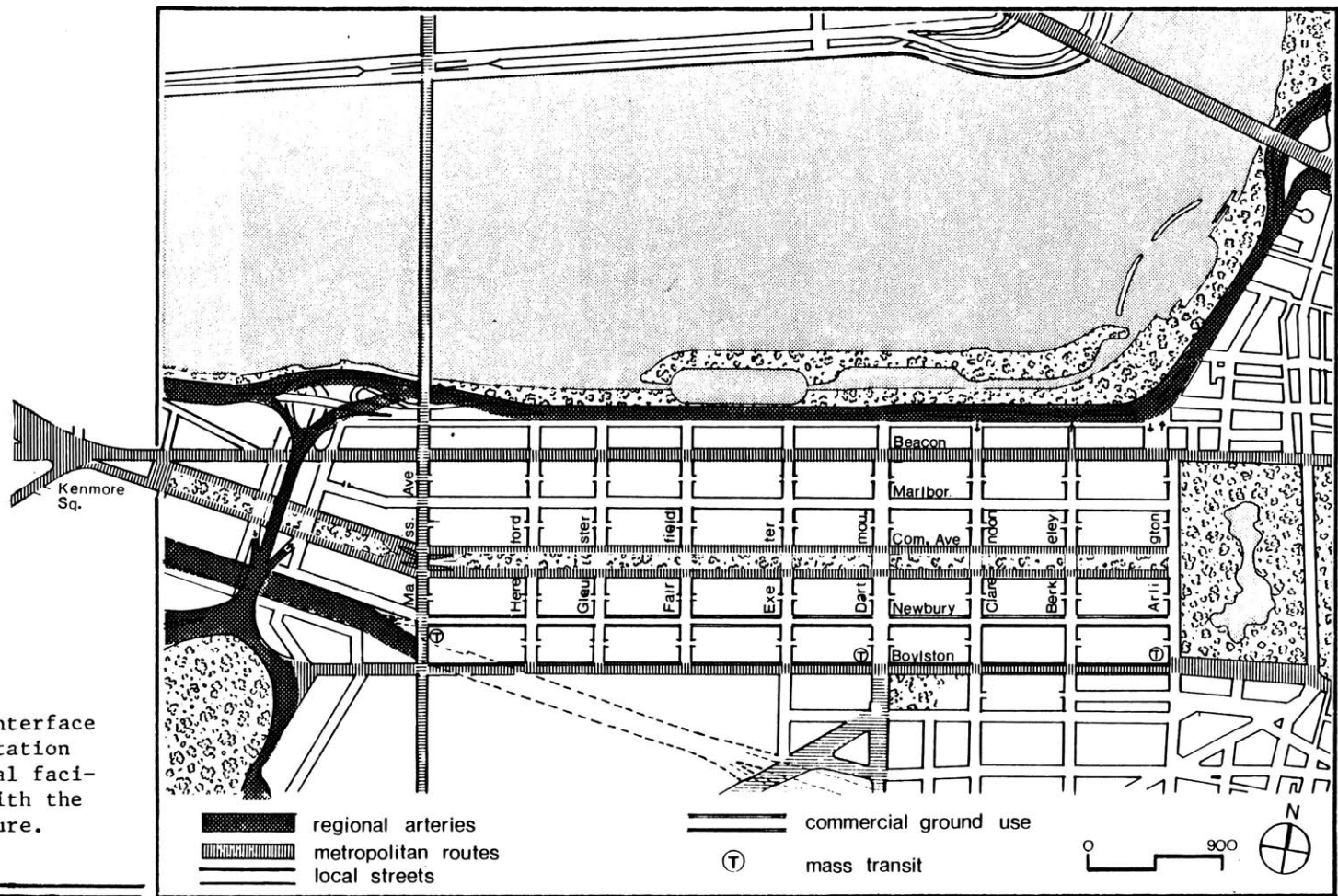
To the west, the boundary of the Back Bay is unfocused. Visual separation is obtained by the Park Drive overpass above the Muddy River, interrupting the otherwise continuous character of Commonwealth Avenue. The street pattern changes at Massachusetts Avenue, where Commonwealth Avenue bends and Newbury Street becomes a back alley. West of the overpass, Commonwealth Avenue and Beacon Street converge at Kenmore Square, and the morphology of both changes.

Regional Transportation Networks

The interface of the Back Bay with regional transportation networks occurs in a number of modes (figure 3.4). Limited access to and from Massachusetts Turnpike and Storrow

3.4

Back Bay: Urban Interface
 Regional transportation
 system and regional faci-
 lities coincide with the
 district's structure.



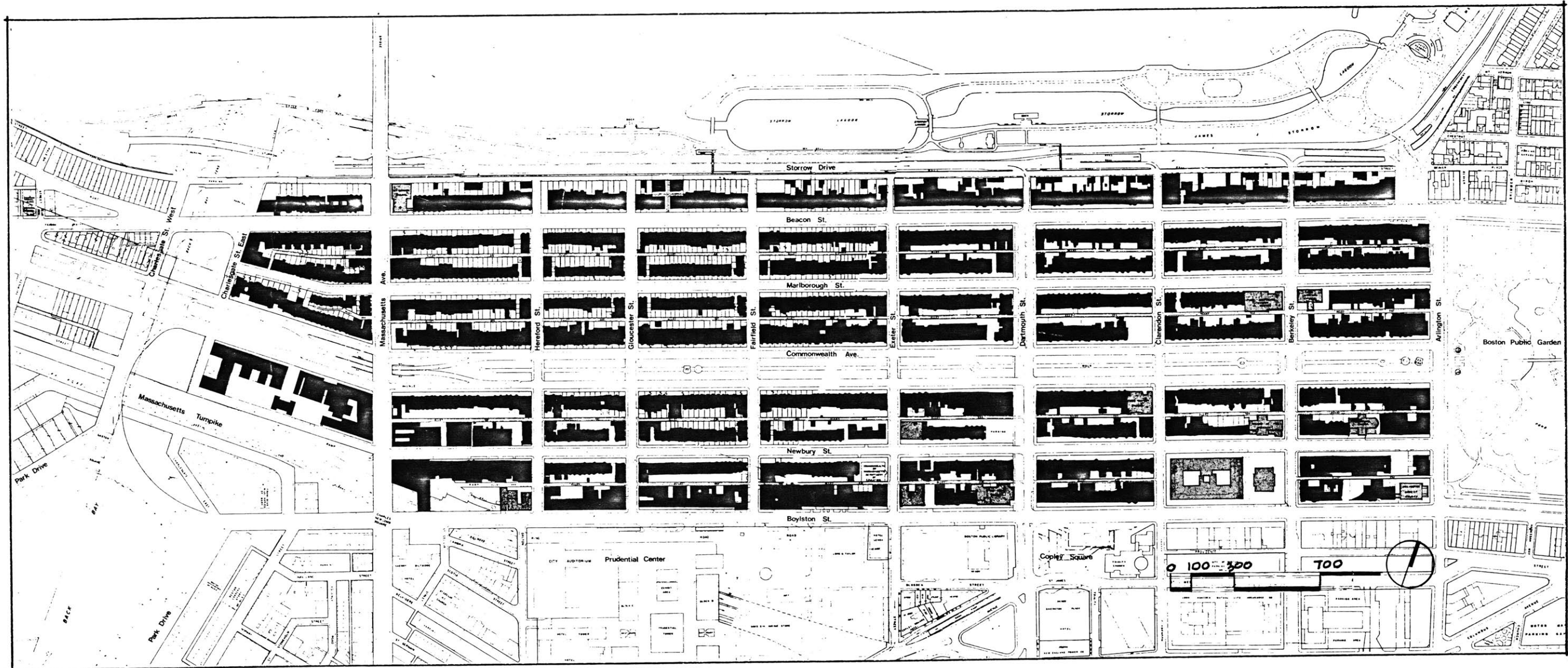
Drive are marked. Regional traffic in the north-south direction is facilitated primarily through Massachusetts Avenue. East-west traffic utilizes all 5 through-streets, although Commonwealth Avenue, Beacon Street and Boylston Street receive most of it. Public transportation routes are interfaced through the 3 Back Bay subway stations and a number of bus-stops along Boylston Street and Massachusetts Avenue.

Regional Facilities

Recreational open spaces are important features of interface between the Back Bay and the city. In addition to the Charles River Park, the Common-Public Garden complex and Copley Square mentioned above, Commonwealth Avenue's green promenade acts as a major recreation and visual corridor to the west of the Public Garden.

Public facilities which serve the region include the Boston Public Library complex, Boylston and Newbury Street shopping area, and a few of the district churches. The concentration of these facilities is reflected in the presence of surface parking lots in the southern section of the area.

Figure 3.6 describes the general distribution of built up and open spaces in the Back Bay regulated by the other 3 levels of the urban framework. In explaining my observations, I found it clearer to start from the lowest level,



3.6 Back Bay: figure-ground plan. Light shades represent non-typical morphologies.

the Lot, and then to proceed with the description of the Tissue and District levels.

The following description of the Back Bay is limited in scope. For reasons of clarity, it is concerned mostly with positions and dimensions of physical elements, and does not provide an experiential description of the area, which is assumed to be known. The reader who is not familiar with the Back Bay is encouraged to read Insert 1 before proceeding with the analysis. Written in 1958, this excerpt⁴ provides a more impressionistic description of the area which in essence still applies today.

4. Donald Appleyard, "Toward an Imageable Structure for Residential Areas", MCP Thesis, MIT, July 1958.

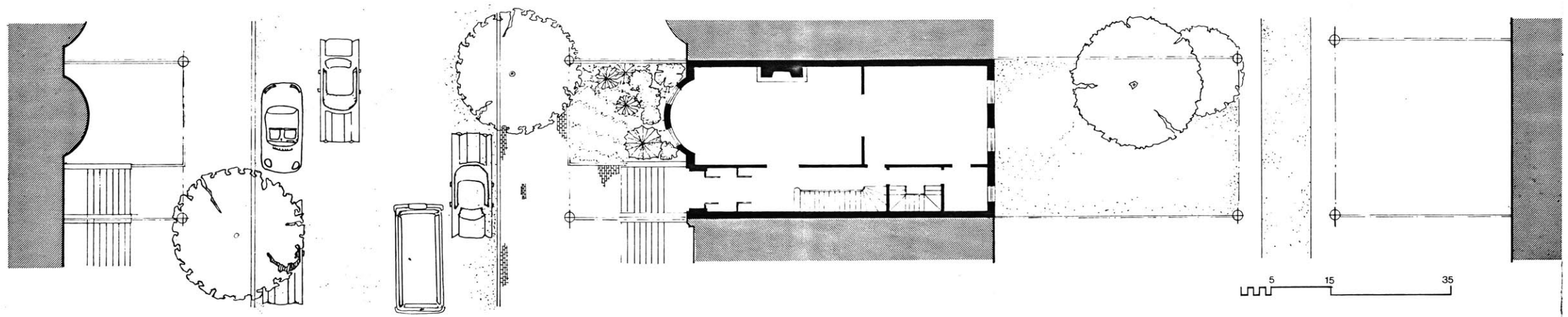
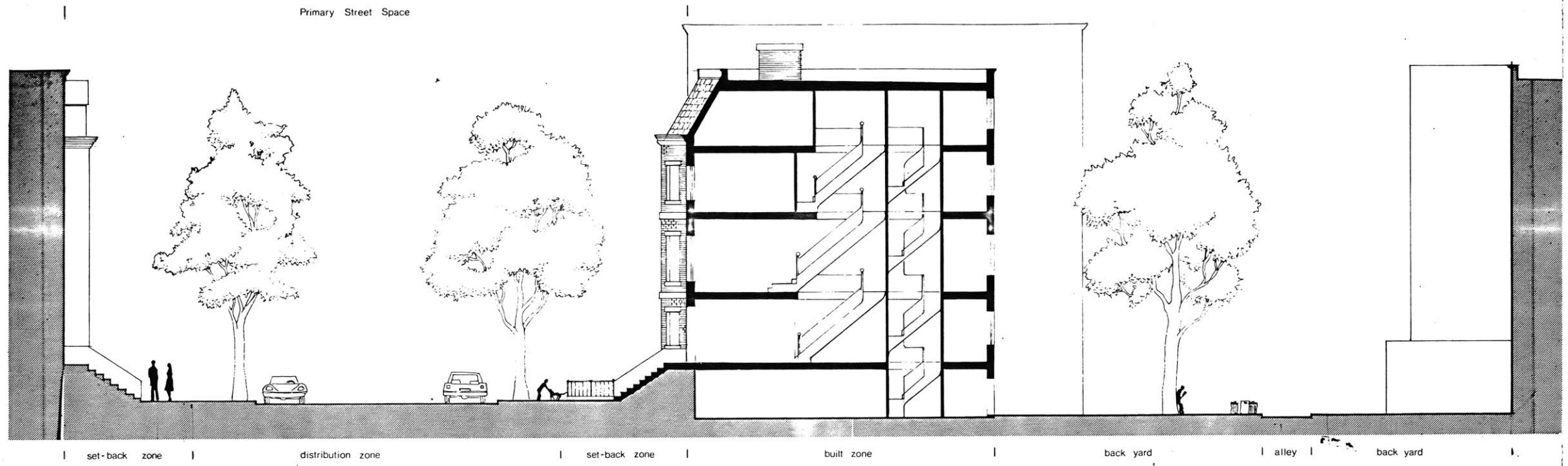
The Lot Level

Figure 3.7 illustrates the distribution, position and dimensions of built and open spaces in the lot level, as well as the spatial relationship between a typical row house and the Tissue, the next level up in the urban framework. The rules which govern the typical morphology at this level are manifested by the following physical characteristics.

Internal Organization

The rectangular lot measures 110 to 125 feet in length and 18 to 30 feet in width with long sides perpendicular to the street. In plan, the lot is divided to 3 major sectors along its longitudinal axis (figure 3.9a). A mandatory set-back zone measuring 20 to 22 feet from the public sidewalk controls the position of the primary plane of the built zone. The built zone extends from the set-back zone into the lot, accomodating either 3 or 4 sectors in between the front and the rear walls;⁵ the backyard, which functions primarily as a service access and parking area, extends between the varying position of the back wall and the service alley. In section, the set-back is elevated 3 feet above the back alley. The basement level lies 5 feet below the street elevation. Front and back entries allow access via

5. See Figure 3.9a



3.7 Urban Framework: The Lot Level

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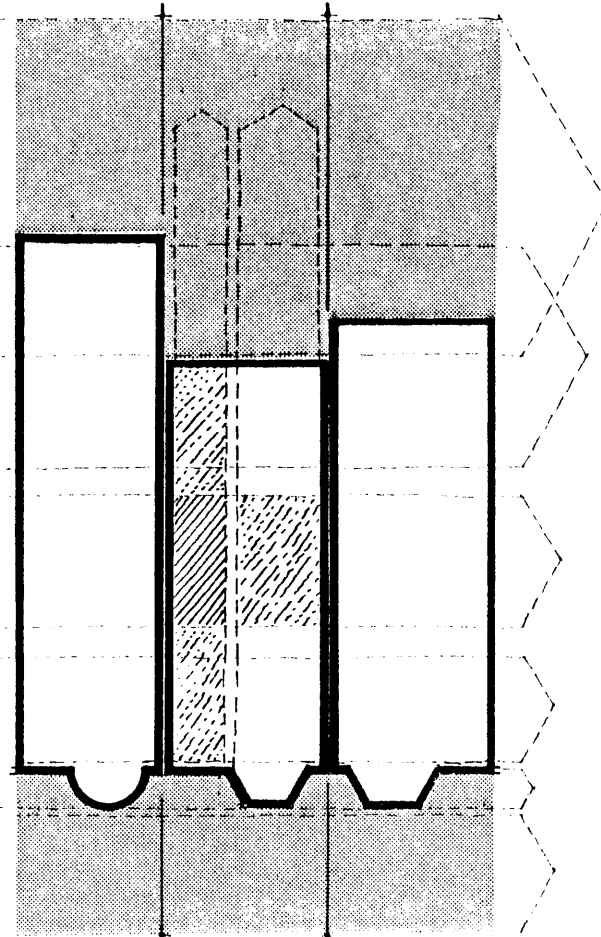
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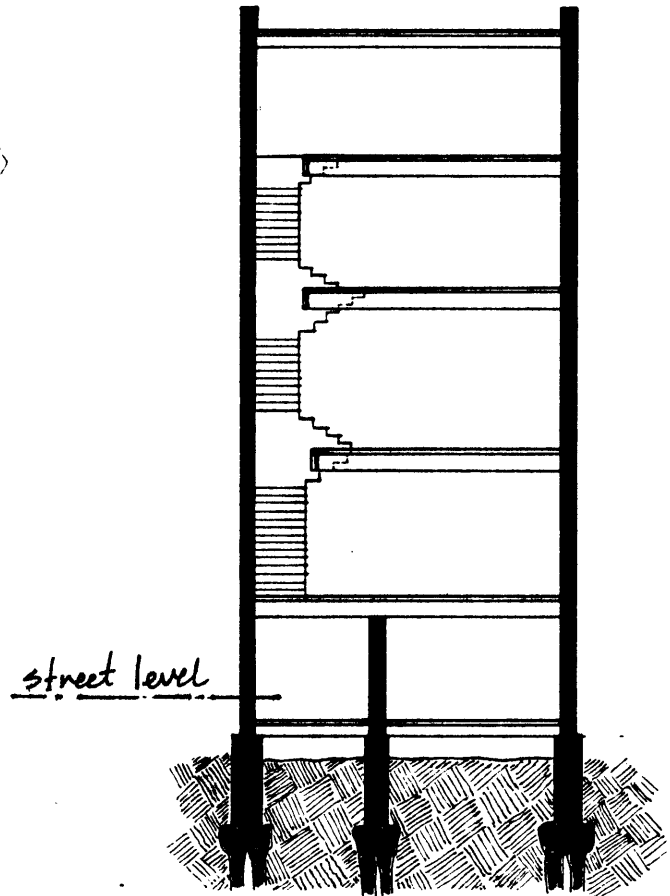
optional



unbuilt



3.8 Typical distribution of functions in a Back Bay house.



3.9 Transverse section through a typical Back Bay house.

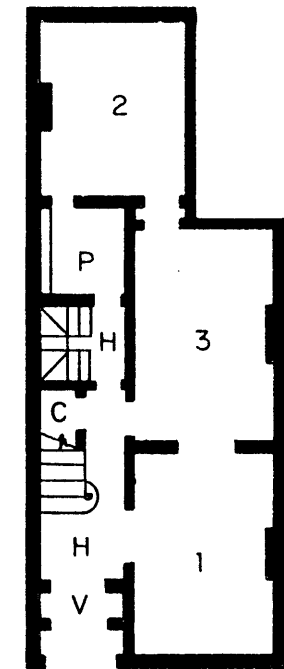
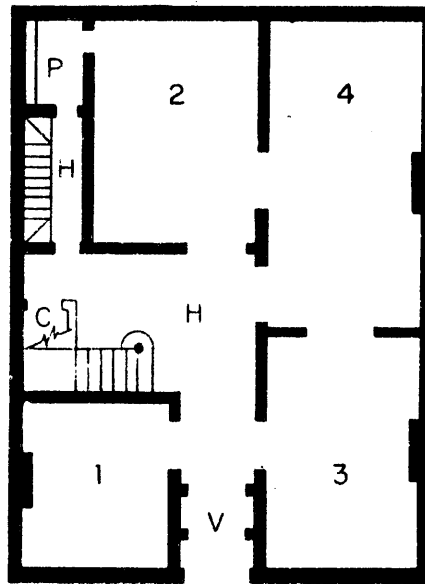
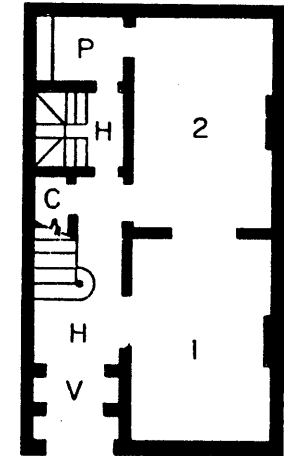
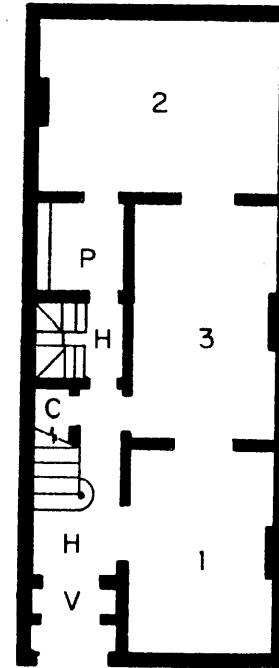
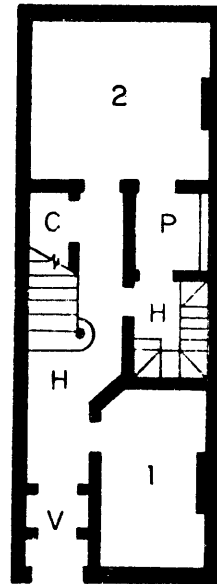
exterior stairs to a double-stair vertical core, located around the middle of the "built" zone. Only the service stairs connect to the basement.

Transversely (figure 3.9) the built zone occupies the entire width of the lot. The structural system consists typically of transverse wood joists supported by two longitudinal fire walls positioned along the lot lines; one intermediate line of support, typically wood stud wall at 2/3 of the span, divides the "built" zone into two longitudinal parts. On the first floor, this line defines a narrow service sector and a wider living sector. This division pertains uniformly to the middle part throughout the house, facilitating access via the vertical cores to upper floors, but does not control the distribution of spaces along the exterior walls on those floors. Typically, ceiling heights vary among floors, depending on the location of the living room in the original house.

Variations in this basic organizational scheme of the lot often result from different positioning of the staircases; from removal of front stoops to allow direct access to basement floors; from different attitudes toward natural lighting from the back wall; and from later-day territorial subdivisions of the original house.

3.10

Common Variations of the Back Bay rowhouse plans (after Bunting). Note the impact of lot-width on internal arrangement. "Rear L" or a 3-room string along the depth of the lot became more common after the introduction of electrical lighting.



- 1. Reception Room
- 2. Dining Room
- 3. Drawing Room
- 4. Library
- H. Hall
- P. Pantry
- C. Closet
- V. Vestibule



3.11 Typical street facade of the Back Bay house. Note alignment of fenestrations in both the horizontal and vertical directions.

6. *A quick survey showed that 80% of the Back Bay houses and apartment buildings include one or more bay windows.*

Allowable Envelope

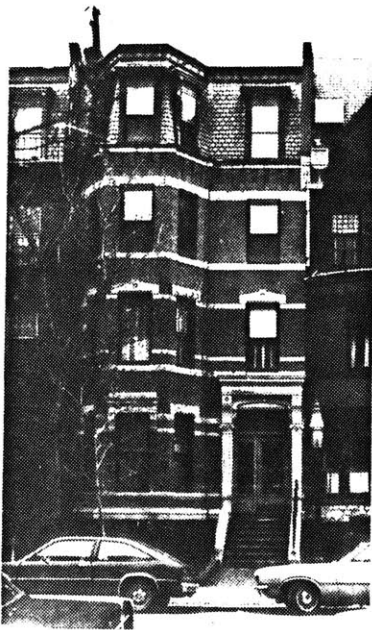
Similar to variable depth of the "built" zone, its height is not regulated dimensionally, except for the height range allowed by zoning, that is 3 to 5 floors above basement. Most Back Bay houses, however, contain no more than 4 such floors, for both technical and comfort reasons (see insert 2). These result in height between 48 to 75 feet. The number of variations within this range is countless (see below). The width and length of the envelope varies as discussed above (see also insert 2).

Street Facade Configuration

The basic facade configuration of the Back Bay house is composed as a traditional tripartite system with regular distribution of openings (figure 3.11). To this, a bay window is frequently added as an appendage.⁶ Similar appendages, such as dormers and balconies also affect the facade configuration. Further articulation results from the applications of ornaments, accents, iron work and color. The following discussion pertains to those elements of the facade which follow common patterns.

Tripartite system: The organization of the typical facade is obtained by subdividing its primary plane into 3 parts. From the ground up they are:

- . a rusticated "base", extending up to the first floor line.

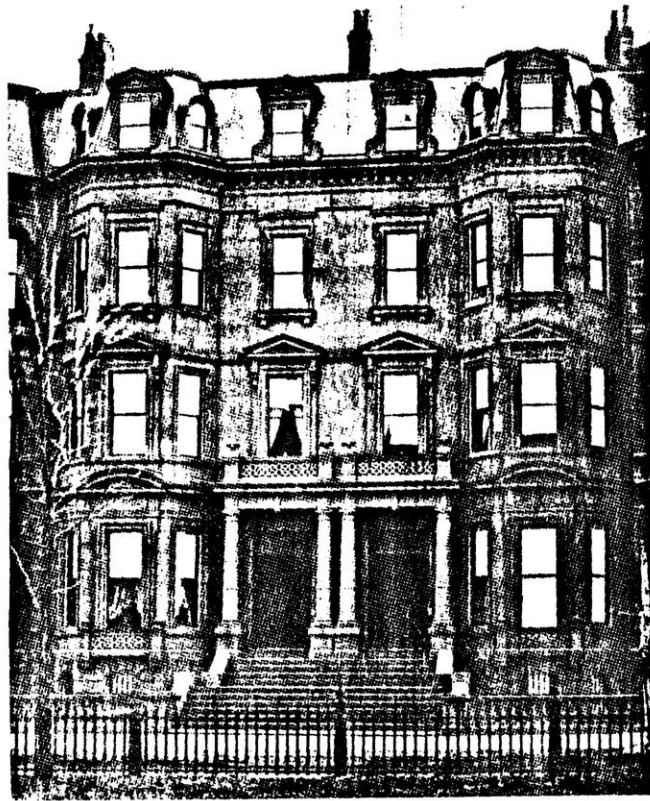


3.12 18' wide lot: facade

- . a "body" extending from the base up to the cornice line.
- . a "cap", extending from the cornice line at least a few feet up; in many cases it is formed by a lived-in Mansard roof.

Distribution of openings: Typically, the facade openings are distributed according to a simple matrix, composed out of 3 vertical bands and horizontal bands in the number of floors. By virtue of its function, the door opening is larger. For a given lot, the height of window openings is proportional to the floor heights, but their width is constant throughout. The number of windows in the lived-in roofs is usually smaller than those in the primary plane.

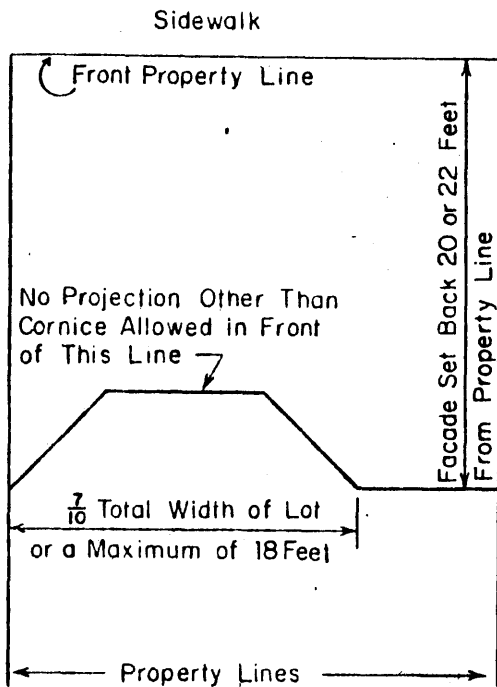
Deviations from this basic scheme are numerous. For example, in narrow (18') lots, there are cases where only 2 vertical bands of the matrix exist (figure 3.12). Alternatively, in wider lots, there are cases where the openings are distributed symmetrically about a central vertical axis, in which the door would be located (figure 3.13). Finally, in many cases, two of the vertical bands in the matrix are either partially or completely replaced by the configuration of the projecting bay window, although the horizontal alignment among openings in the same house is always maintained (see below). Most windows in the Back Bay are of the double-hang type.



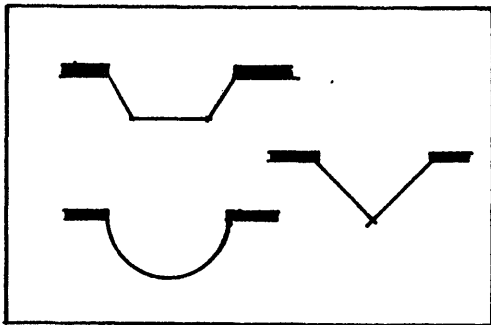
3.13a Facade design duplicated to arrive at a symetric composition of two separate houses.



3.13b When the lot was wide enough to permit a central hall plan, the facade design was symetrical about the center.



3.14 A summary of setback requirements for Back Bay structures. (after Bunting)



3.15 generic geometries of bay windows

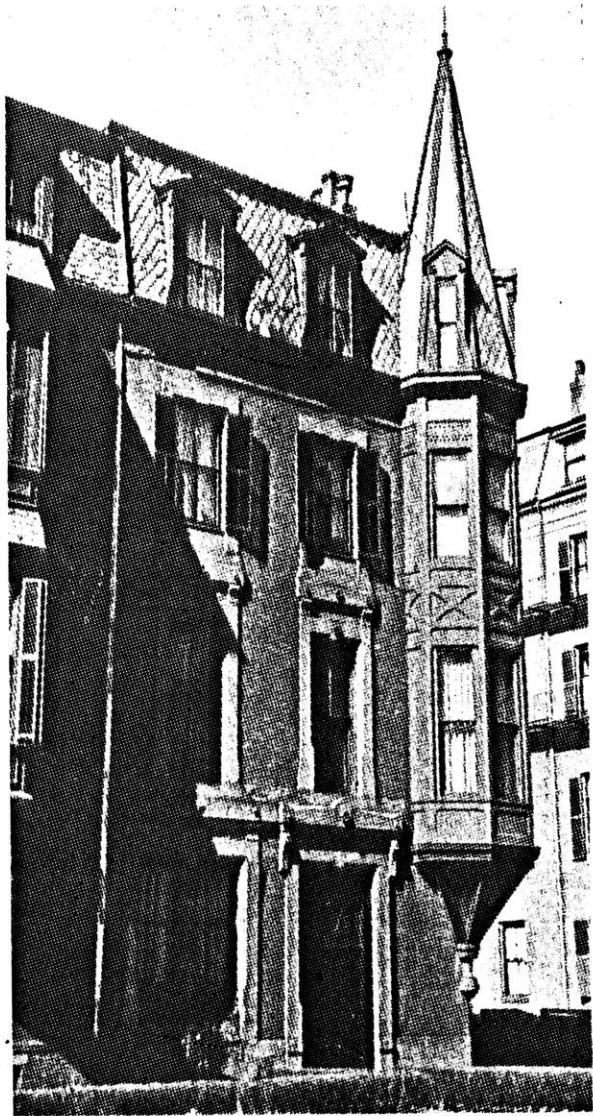
Bay window: The configuration of the bay window is governed by the original deed restrictions, as well as by functional reasons.

The main objective for projecting out of the primary surface of the facade is twofold: first, allowing more varied and even light penetration into the house; second, multiplying the angles of view into the street. The response to both, the bay window must consist of a concave shape with openings in it.

In the Back Bay, the type and extent of the projection into the set-back zone was restricted carefully by the deed restrictions. Those required that it will be an enclosed *appendage* to the primary surface, and restricted its dimensions to 5' in depth and to 7/10 of the lot width (figure 3.14).

The variations on this basic "framework" (concave shape within dimensional limits) are countless. Figure 3.15 illustrates some of the potential geometries which conform to it. Figure 3.16, as well as many other photographs included in this study, may provide better ideas about the range of shapes, materials, and sizes of bay window projections in the area.

Despite this range, however, several features of the bay window configuration seem to recur in the Back Bay. They may be attributed to both formal conventions and



a. Facade of 304 Berkeley Street, 1869. This design illustrates the tendency to redesign Classical forms. The stone trim, despite its eccentric detail, encases openings and accents the cornice and foundation lines in the conventional Academic manner. The corner oriel window is constructed of wood.



b. Facade of 7, 9, 11 Hereford Street and 435 Beacon Street, 1879, by R. S. Bither. Building permits for these houses indicate that they were planned as two stories with a mansard roof. Fourth stories were added for purchasers to two of the houses by the speculative builder before the row was finished.



3.16 Bay windows in the Back Bay. Note the repetitive characteristics of the generic form: the width of the bay, the horizontal and vertical alignment of window openings, and the overall character of an appendage to the primary surface. (captions after Bunting)



d. Facade of 226 Commonwealth Avenue, 1881. Built by a speculator named Asa Caton, this house is one of the few outlandish "Victorian" designs in the entire Back Bay.



e. Facade of 176-178 Commonwealth Avenue, 1883, by Charles Atwood. The continuous line of bay windows and entrance porches would seem to violate property restrictions that limit projections beyond the building line to seven tenths of the lot width, but Massachusetts courts deemed these examples conforming.



7. *In many cases, this is a result of modifications. As pressure for land increased, many Back Bay owners added one or two floors above the original roof. The early houses were limited to four floors both by the deed restrictions and by the capacity of the mechanical systems (e.g. water pressure, steam pressure) and the difficulties of vertical communication in a narrow -and - tall house. The introduction of the elevator and the development of mechanical engineering in the 1880's created new possibilities for vertical expansion of buildings. For detailed discussion of the impact of mechanical systems developments on the Back Bay morphology, see Bunting (1967) p. 271-285.*

structural reasons. In any case, their consistency deserves their inclusion as part of the façade "framework". First, all bay windows occupy the width of two vertical bands in the matrix of facade openings (see above), unless there are only 2 such bands. Second, bay windows never extend above the cornice line,⁷ unless they are capped by a gable. Third, bay windows almost never extend horizontally in front of the party wall. The combined effect of these features enhances the perception of the bay window as a sub-element of the primary plane (see below).

Small appendages: In addition to the bay window, two other types of volumetric projections can be found in the Back Bay. One is the small dormer, which almost invariably shapes the windows within a mansard roof. The other is the small balcony, which was usually added with fire stairs to older buildings for compliance with fire regulations.

Elements of articulation: These are used frequently, but not uniformly. Of the most prevalent, one may mention the ornamentation of door and window frames by painting or carving; the accentuation of continuous floor lines; the painting of entire facades; ironwork and woodwork around doorways and balconies.

Materials: In compliance with the original deed restrictions, as well as with common construction prac-



tices all of Back Bay's houses built before 1920 are made of masonry and structural wood. Most of the facades are made out of either brick or brownstone, although other stones and even metal can be found. Bay windows are mostly made out of masonry materials; however, the primary facade material continued to be masonry.

Front Yard and Doorway

The set back zone is divided into two parts: doorway and front yard. The doorway is composed of a low flight of 6 to 10 steps, a stoop and a main entrance to the building. The front yard is surrounded either by a 6" curb, on which a low ironwork fence is often added. In the latter case, a front gate separates between the doorway and the sidewalk. Typically, the stoop is not covered, and the main entrance is articulated by surface treatment only (heavy moldings and/or ornamentation around the door opening). Front yards are usually planted with bushes and small trees (figure 3.22).

Variation on this basic scheme occurs through changes in the elevation of the first floor above the street level, removal of stoops, differences in front yard landscaping, differences in articulation of front door.

3.17 Front doors. Variety through ornamentation.



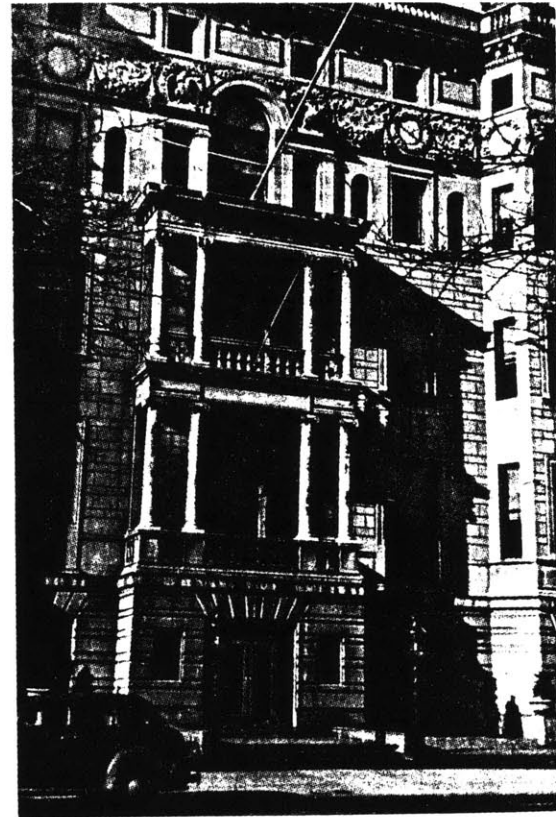
3.18 Variations on a theme.



204 Facade of 128-130 Commonwealth Avenue. Constructed in 1882, the facades of these two dwellings were rebuilt about 1905 in the currently fashionable Beaux Arts Baroque manner.

3.19 Variations on a theme.

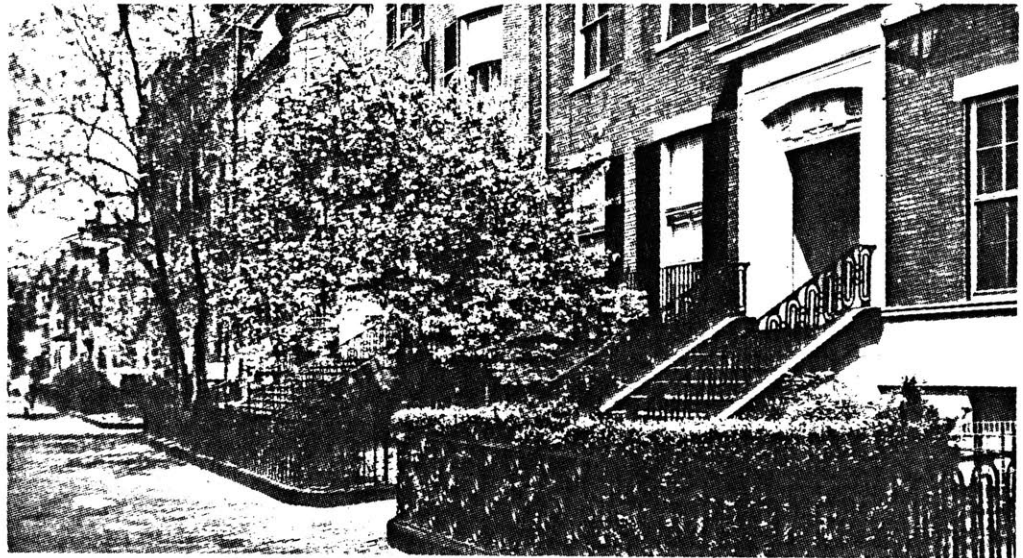
3.20 Variations on a theme.



191 Algonquin Club, 219 Commonwealth Avenue, 1887, by McKim, Mead and White. The first story, which originally projected as far forward as the entrance bay and extended the entire length of the building, was revised in 1889 to conform to the setback regulations established by the Commonwealth.



a



3.22 Typical front yards .

c



b

sources and types of Visual Information

The primary components of the visual information generated at the lot level with respect to the street can be summarized as follows. Redundant visual stimuli result from recurrent relationships between the built zone and the street, and from the recurrent configuration of the facade and the distribution of its elements.

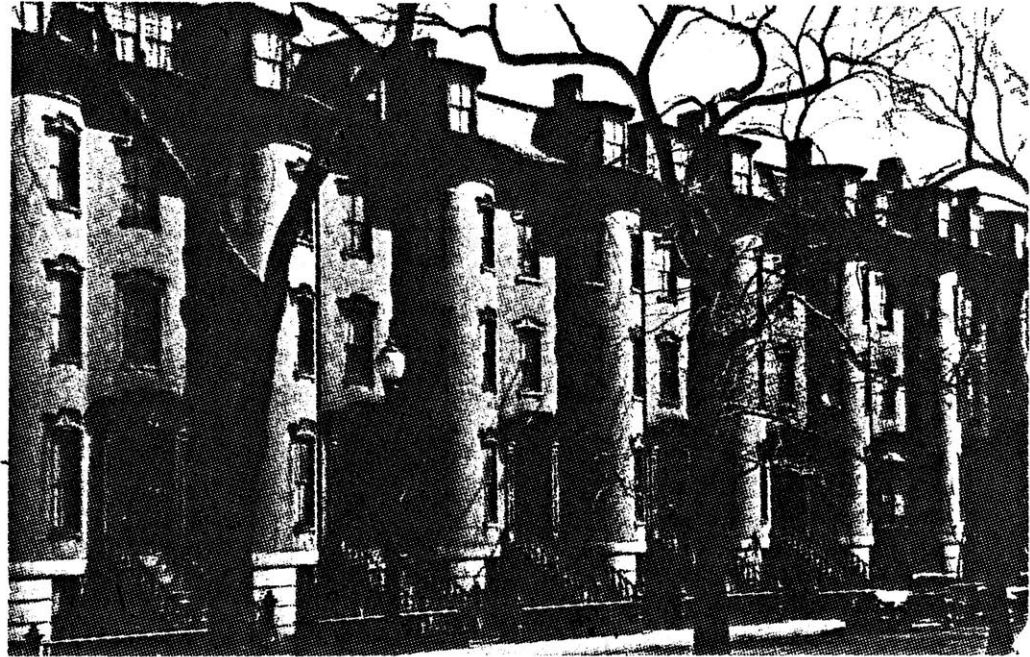
By recurrent relationship to the street we refer here to the fixed position of the front wall; to the relatively constant buildings height; and to the repetitious nature of ground form in the set-back zone. By recurrent distribution of facade elements we refer here to the alignment of openings (both horizontally and vertically); to the repetitious use of bay windows as sub-elements of the tripartite system.

Simple multiplication of the redundant components of visual information generated by the framework at the lot level would result in a continuous built-up wall along the street. This wall would be visually connected to the street by the stoops, which would be distributed in average frequency of one every 25 feet. Its perceived continuity would be maintained by the horizontal bending of window openings, and by the multiplication of projected elements of similar dimensions. In fact, it would be very similar to the visual quality which prevails in the

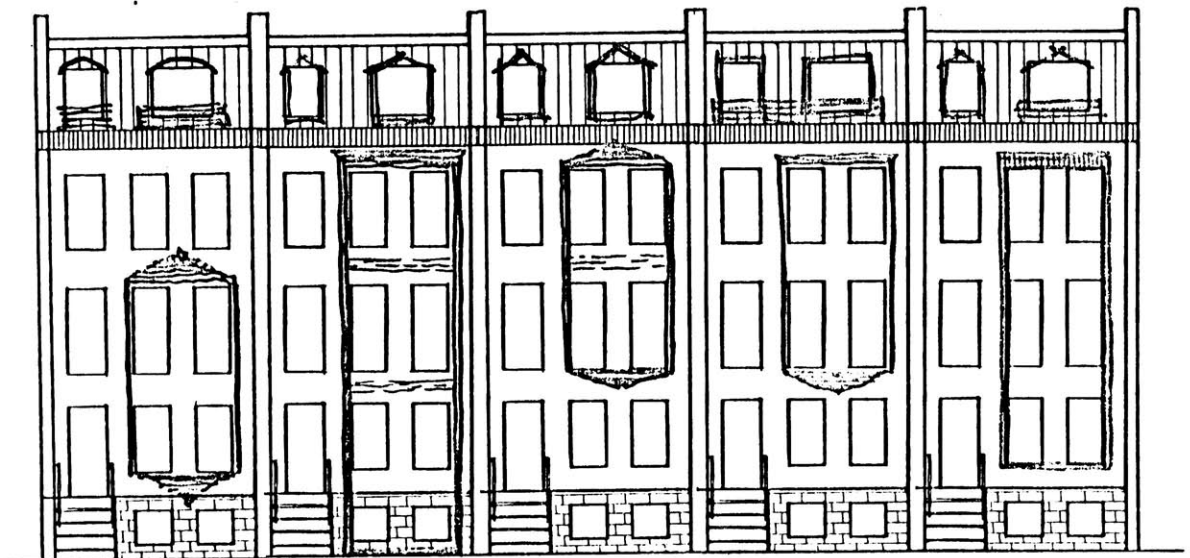


Pembroke Street, typical row houses on a cross street in the New South End; built about 1870.

3.23 Rowhouses in the South End. Note repetitive swell-fronts and lack of differentiation between primary surface and secondary elements.



3.24 illustration: simple multiplication of the Lot Framework. The richer appearance of the Back Bay street is achieved through different interpretations of the same framework.



South End (figure 3.23).

The reasons for the Back Bay's richer appearance can be found both in the greater variety of individual interpretations of the framework at the lot level and in the introduction of additional building types, in compliance with the Tissue framework.

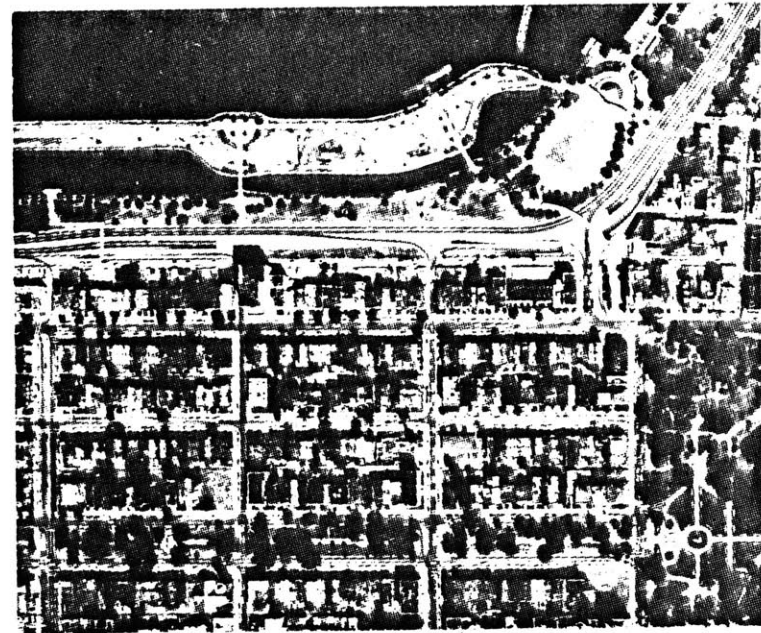
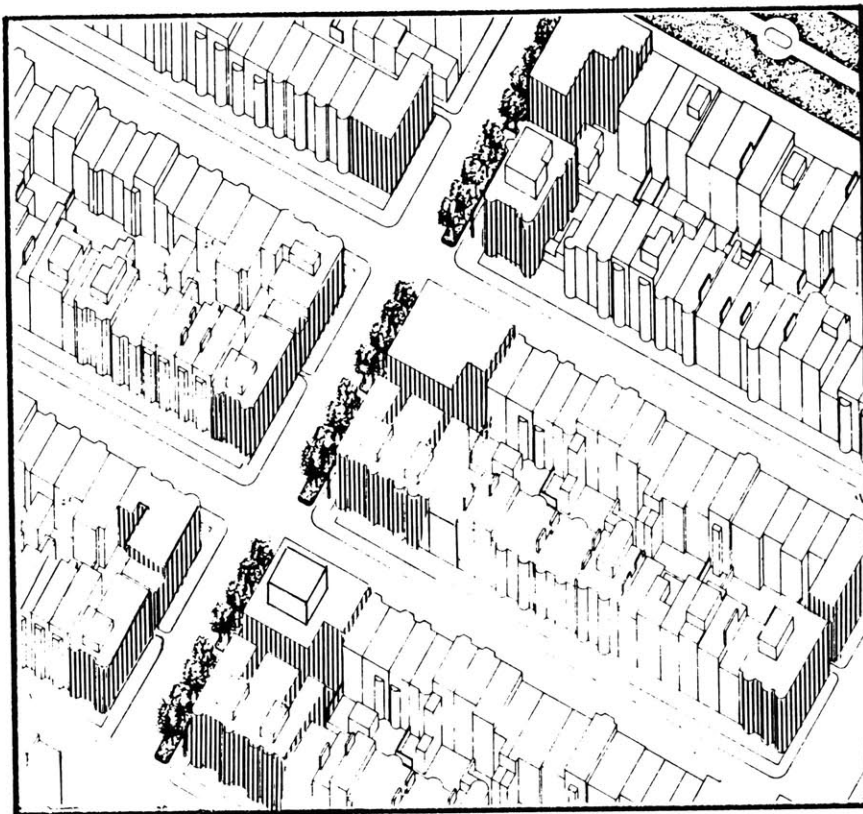
At the lot level, non-redundant visual stimuli is generated by idiosyncratic styling of the facade's sub-elements (e.g., bay window, window and door frames, roof) and by its particular surface treatments (e.g., texture, color, accentuation of floor lines and cornice. At the Tissue level, non-redundant stimuli are achieved by the introduction of larger-scale elements into the aggregate form of the block, such as multiple-lot residential developments, churches and other public institutions. These will be discussed in the next section.

The Tissue Level

Figure 3.25c illustrates a typical aggregation of lots and their "built" zones. This prevailing pattern of aggregation is a manifestation of the principles which govern the relations between the private and the public domains in the Back Bay. Through establishing the position and dimension of built-up and open spaces, these principles underlie the basic spatial structure that characterizes the area. They are referred to as the Tissue framework.

Seen from the illustration, and as observed in the field, between 20 and 30 lots form a row along a public street. Typically, 2 rows are positioned back to back, separated by a narrow alley. The aggregate form of 2 such rows and the building on them forms a block. Because it measures only 2 buildings in width, the typical Back Bay block is decisively elongated in the direction of its back alley. All buildings in the row, except occasionally those on the corner lot, front on one street, with the set back zone separating their front doors from the public sidewalk.

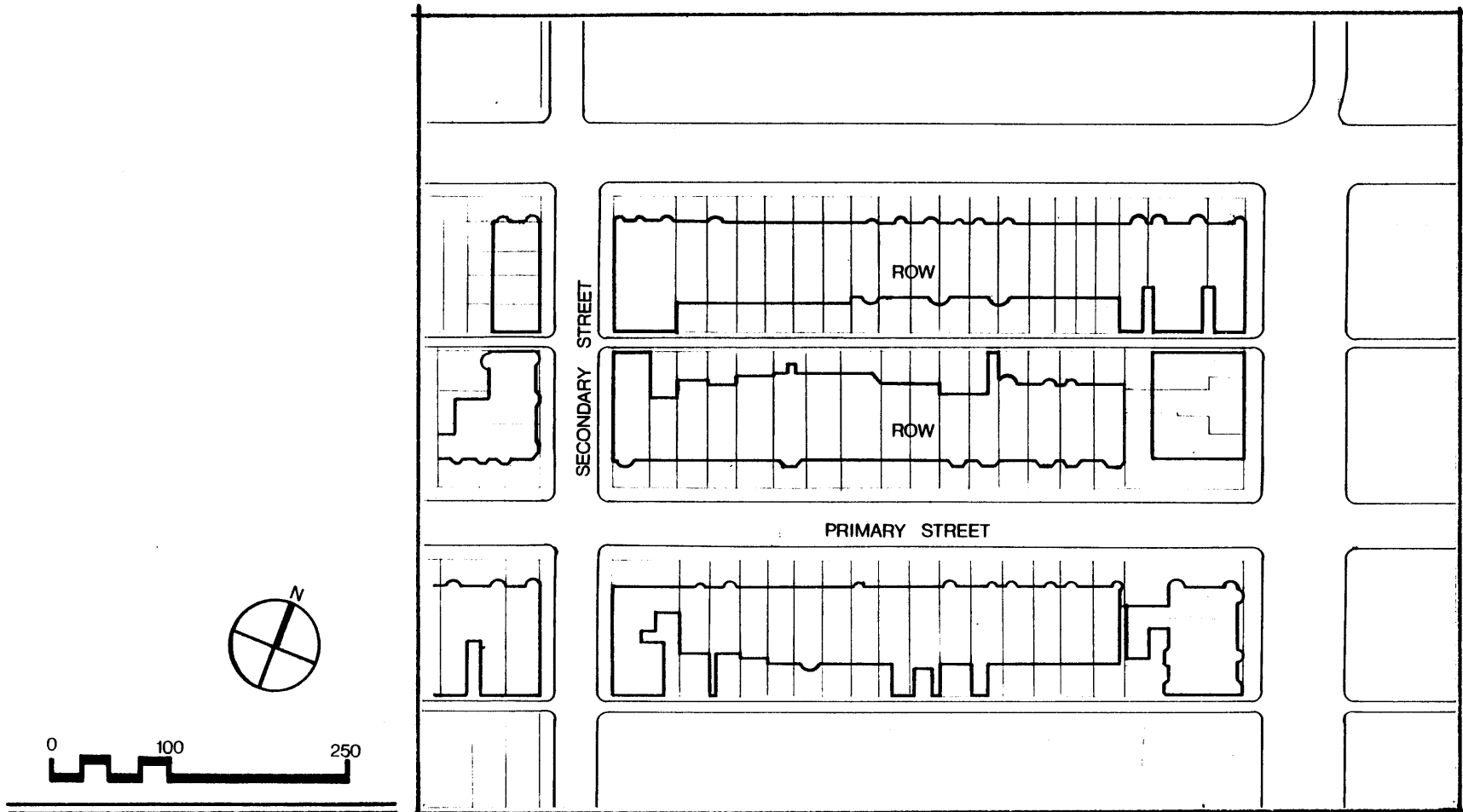
3.25b Isometric view of the Back Bay blocks. Alignment of building fronts regulated by an imposed setback zone. Note the consistent positioning of larger structures at the corner of the blocks.



3.25a Air view of the North-eastern quarter of the Back Bay. Regular pattern of aggregation, dominated by a rigid, orthogonal street layout.

3.25c

Urban Framework: Tissue level. The Row and the Primary street can be viewed as a first level aggregation of the Lot Framework (fig. 3.7).

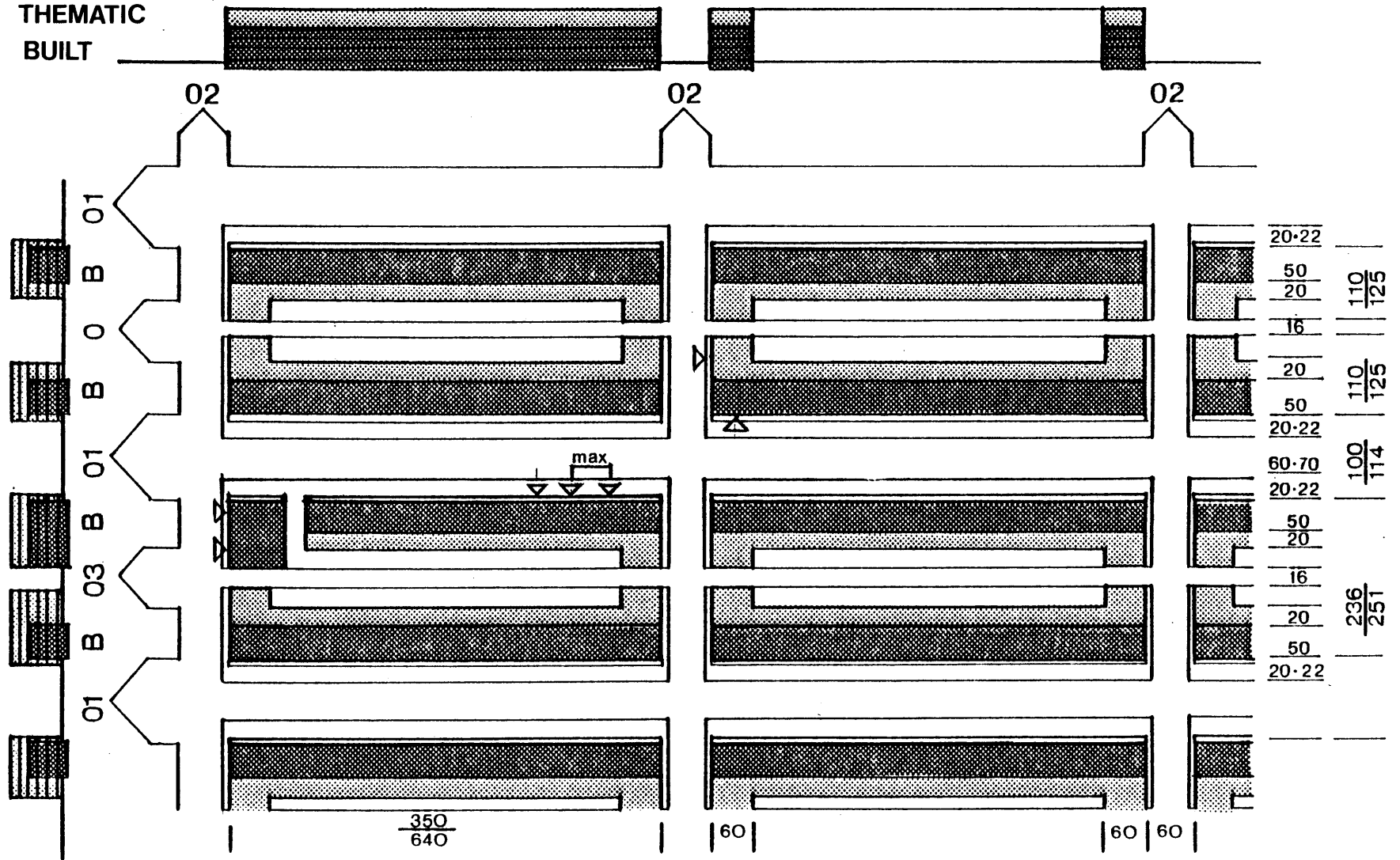


The space created in between the fronts of two adjacent rows of buildings will be referred to as the primary street space. The space created in between the short sides of two adjacent blocks will be referred to as the secondary street space. The combination of a vehicular path and its flanking sidewalks will be referred to as a public distribution zone. The aggregation of primary street spaces along a public distribution zone is defined as a primary street. Similarly, the aggregation of secondary street spaces along a public distribution zone is defined as a secondary street.

Figure 3.25 shows the actual distribution of open and built-up spaces in the Back Bay. Figure 3.26 proposes a "Tissue Model" for the area, namely an abstract representation of the basic positional and dimensional rules, which seem to have governed its morphological evolution. Figure 3.26a and 3.26b describe the prevailing relations between built-up and open spaces (thematic elements). Figure 3.26c and figure 3.26d describe the general type of deviations from these relations (non-thematic elements).

By defining positions, dimensions and use of public open-space elements, the Tissue level creates a framework for the aggregation of individual lots and the buildings on them. Thus, the lot level becomes an element of the Tissue level, which in itself conforms to the District level, the next level up in the urban framework.

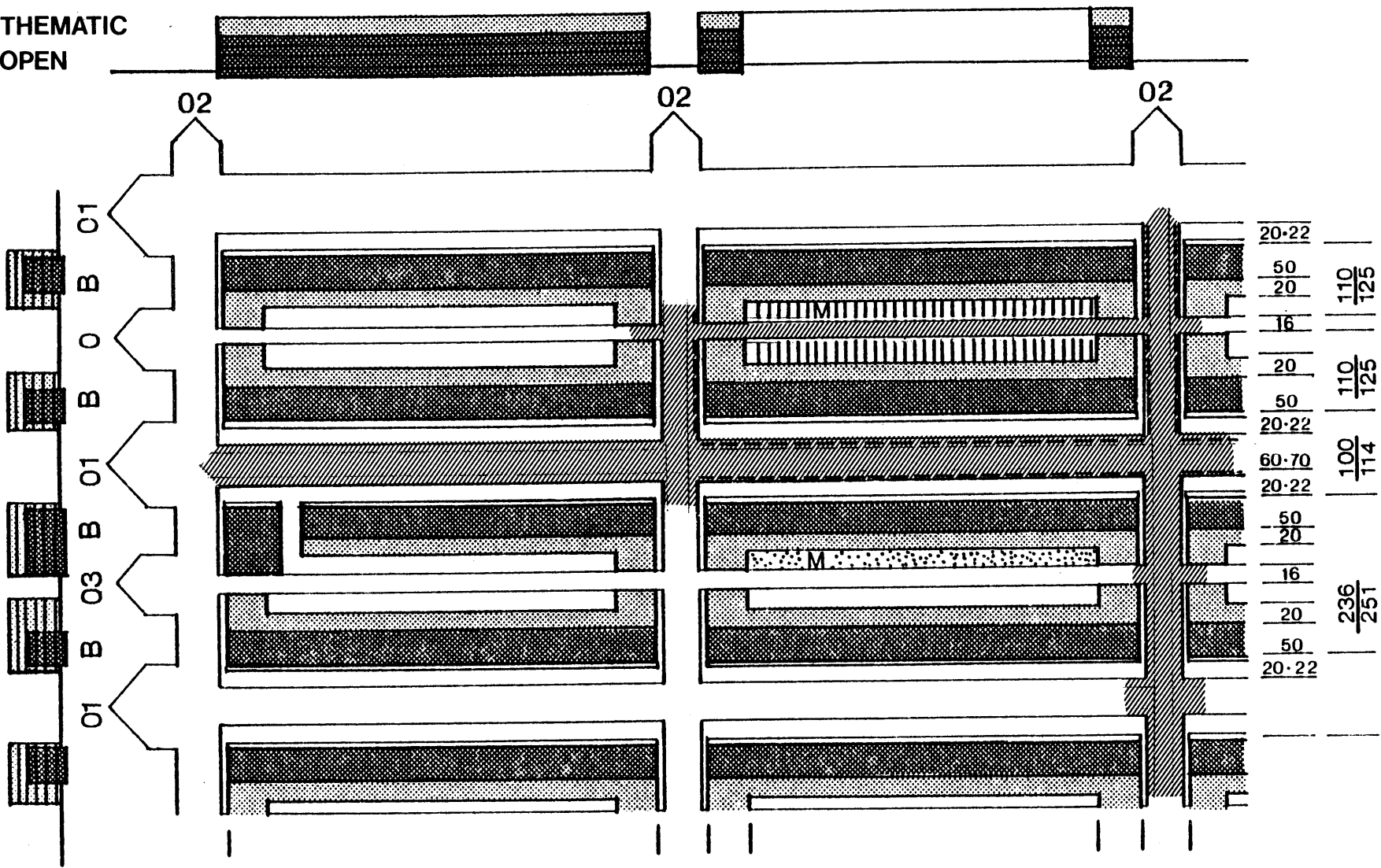
**THEMATIC
BUILT**



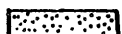


- Minimum Built**
- Maximum Built**
- Main entrances must face street
maximum distance 50 feet**

3.26a Back Bay: Tissue Model

THEMATIC
OPEN



-  Vehicular Circulation
-  Surface Parking
-  Covered Parking

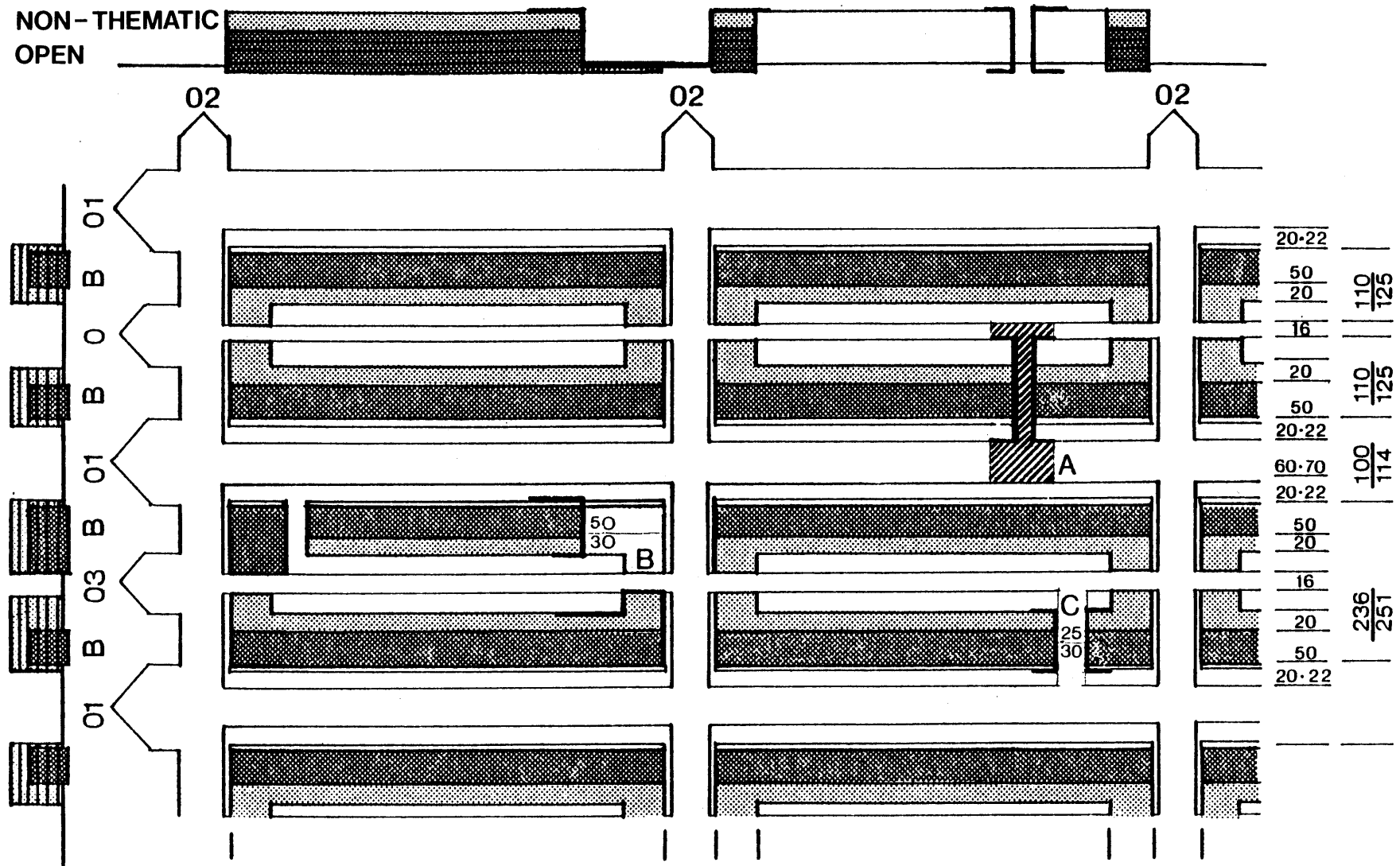
- O1 - Primary Street
- O2 - Secondary Street
- O3 - Backyards and Alley

3.26b

Back Bay: Tissue Model

20-22	
50	
20	110
16	125
20	
50	110
20-22	125
60-70	100
20-22	114
50	
20	
16	
20	236
50	251
20-22	

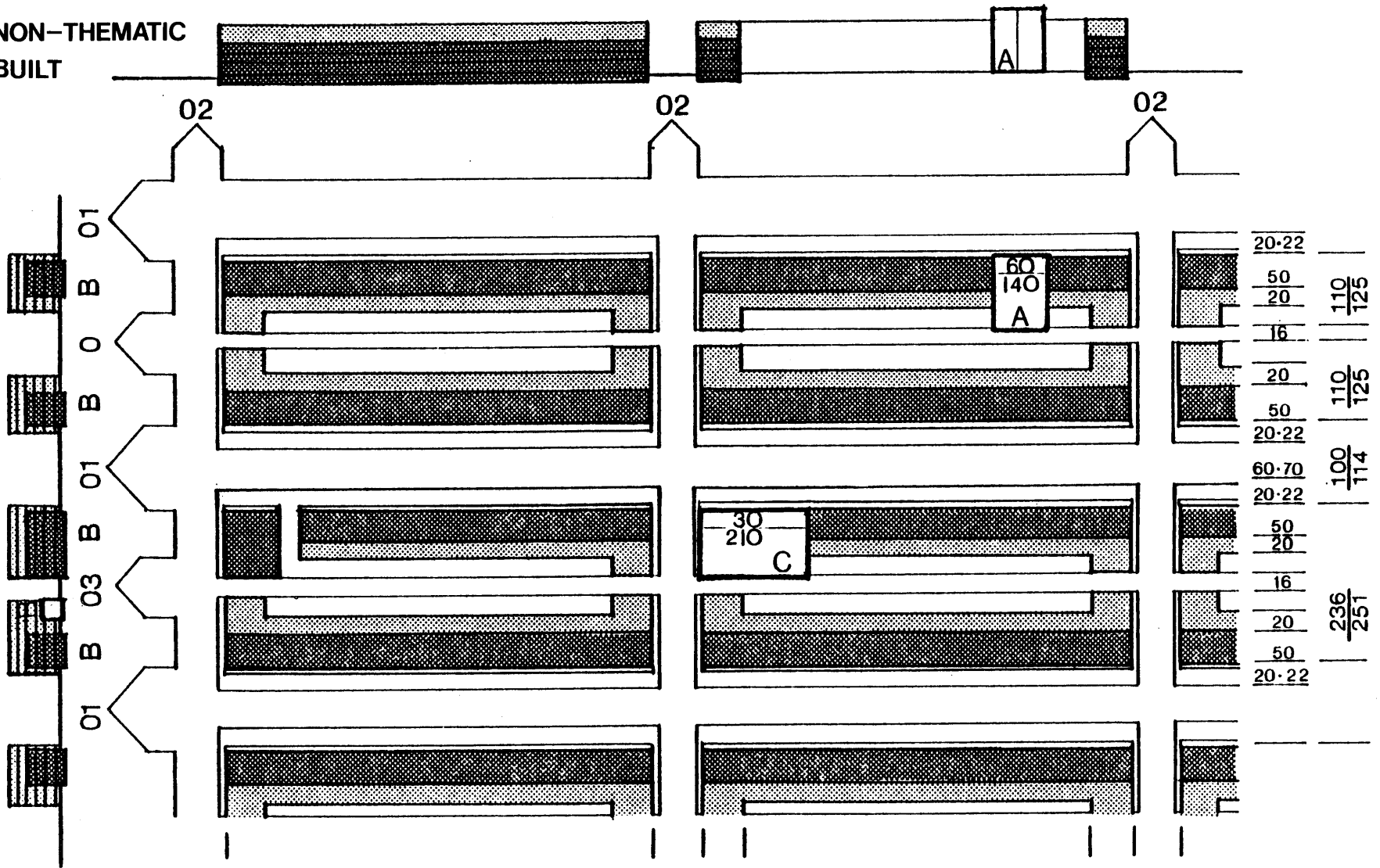
NON-THEMATIC
OPEN



- A - occurs 2 times, as parking access
- B - occurs 4 times, 3 as parking lots, 1 as playground
- C - occurs often, as access for indirect light

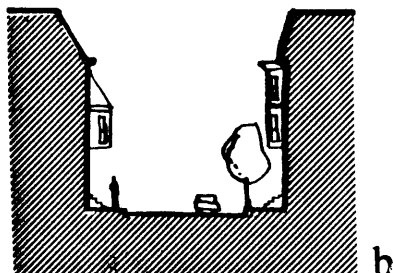
3.26d Back Bay: Tissue Model

NON-THEMATIC
BUILT



3.26c Back Bay: Tissue Model

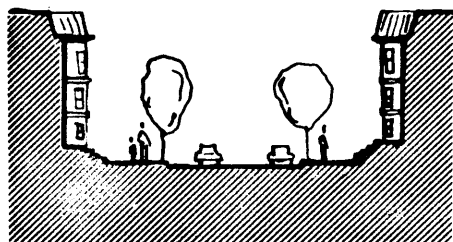
The most significant spatial manifestations of the urban framework at this level are the street space and the blocks: it is through the simultaneous perception of both that the spatial pattern of the Back Bay is registered. The morphological and use characteristics of these entities are discussed below, in reference to the Tissue Model.



b

streets

There are two typical street forms in the Back Bay. Primary street (01) run in the east-west direction, each acting as a collective space for the majority of front entrances in adjacent blocks. Secondary streets (02) run orthogonally to primary streets, each providing access through alleys to backyards (03) in their adjacent blocks. The dimensional range and the functions of the two street types are shown in figure 4.26b. Their spatial structure is discussed below.



a

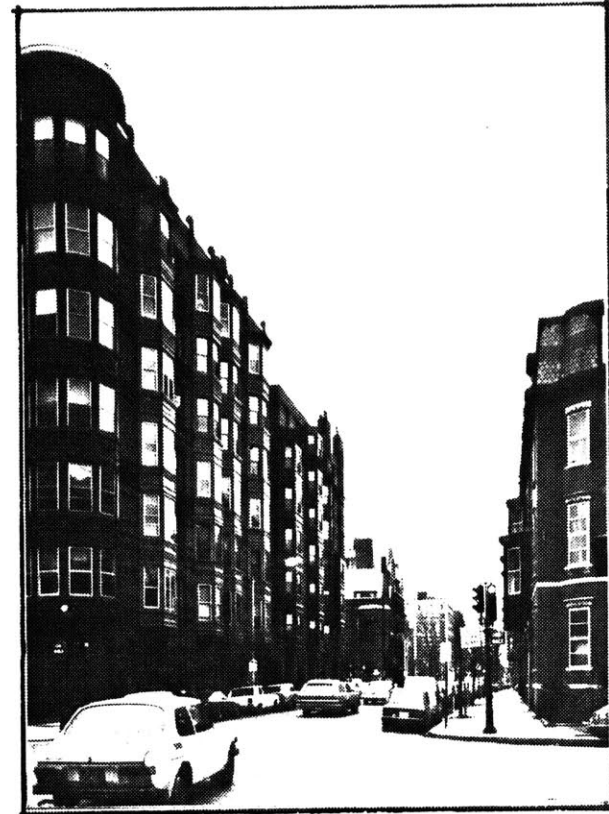
3.27

Diagrammatic comparison between primary and secondary street spaces. Effect of set-back zone and building height on the proportion of the street space.

Primary Street

The spatial enclosure of the primary street is defined by the combined width of the public distribution zone and its two flanking set-back zones, and by the height of the street wall (figure 3.7, 3.27). The distribution zone

3.27c primary street space (Beacon Street looking east from Dartmouth Street, 1885).



3.27d Secondary street space. (Clarendon Street looking south from Marlborough Street.)

contains 2 or 3 automobile driving lanes, 2 parking lanes and two 12' sidewalks; the set-back zone was discussed in the previous section. The height of the street wall varies according to the height of individual interventions (see page 103). However, the accentuated cornice lines at the bottom of the highest floor, as well as those at the top of bay windows, provide strong visual reference, suggesting virtual "closure" of the street space.⁸ The unity of the primary street space is further enhanced by the rhythm of stoops and front yards, both of which soften the junction between the vertical planes of the block and the continuous ground plane.

Secondary Street

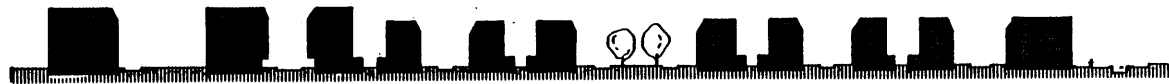
The spatial enclosure of the secondary street is significantly different from that of the primary street. Because set-back zones exist only along primary streets, the width of the secondary street-space is much smaller. Coinciding with the distribution zone, it typically contains 2 driving lanes, two parking lanes and two flanking sidewalks. By virtue of the block structure and proportions, the secondary street walls are discontinuous, and their lengths between street intersections are much shorter than those of the primary street. Furthermore, as will be discussed later, corner buildings are often taller than mid-block ones; and the mandatory coincidence of their "built" zones with

8. *Such sense of closure is explained by the Gestalt laws of form perception, specifically the Law of Proximity and the Law of Continuity, (Prak, 1977, p. 18 and p. 54).*

the edge of the sidewalk restricts articulation of their joint with the street. The resulting cross section (figure 3.27b) is of much narrower proportion, and the overall closure much less effective as compared with the primary street.

The spatial difference between the primary and secondary streets reinforces the directional bias of the street system: the wider streets run east-west, facilitating public distribution to and within the area and provide access to the majority of the private destinations.⁹ The narrower streets facilitate secondary movements between the major (east-west) streets, and provide access to only a few private destinations.

9. Appleyard (1958) proposes 2 generic types of movement in a residential neighborhood. The Primary Movement structure consists of the paths that connect the residence with movement systems outside the neighborhood, and can be analyzed in terms of Entry Sequence, Distribution (the major path system of the neighborhood) and Distributions (the circulation area immediately adjoining the residence). The Secondary Movement structure is associated with movement within the boundaries of the neighborhood, e.g. between the place of residence and local shops, schools, etc.



blocks

In the previous section we referred to the "street wall" as a definer of the street space. Alternatively, we could define this wall as a "Block Facade", which in itself is composed of the facades of individual buildings. Equally valid, however, would be to define the block as the area bounded by the intersections of 2 consecutive primary streets with 2 consecutive side streets. It is the reciprocity of the street and the block as definers of each other that underlie their simultaneous affect on the perception of the Back Bay's spatial pattern.

As a continuous aggregation of two rows of lots, the block consists of "built" and "open" zones which are similar to those mentioned in regard to the Lot Level. Referring again to figure 3.26a,b, the "built" zones (B) consist of "minimum built" and "maximum built" sectors, which reflect prevailing variations in the depth of thematic buildings. The set-back zone in front of the "built" zone is merely a sequence of the set-back zones described at the Lot Level; it is shown here as part of the 01 zone, reflecting its share in the spatial definition of the primary street. Zone 03 is comprised of 2 sequences of private backyards and the

public alley. The backyards (zone M in figure 3.26b) were never intended and are almost never used for recreational purposes. Rather, they now serve predominantly as surface or covered parking. In some occasions, other secondary functions may occupy this zone, but the built elements on it do not exceed 2 stories, and do not affect the streets visually.

While the Tissue framework is geometrically simple, it creates two conditions which merit further discussion. First is the special condition at the corners of a typical block. The second is the spatial overlap between the street space, the block and the lot, all of which share the set-back zone and the building facade.

Corner Lots

The corner lot, by virtue of its location at the end of a row, has two sides of its perimeter exposed to the street, compared with only one such side in the case of the mid-block lot. This exposure provides ample opportunity for natural lighting and increases the flexibility of internal organization. It also increases the visibility of the corner building from the street, and by virtue of its position, has great influence on the perception of the spatial pattern in its vicinity.

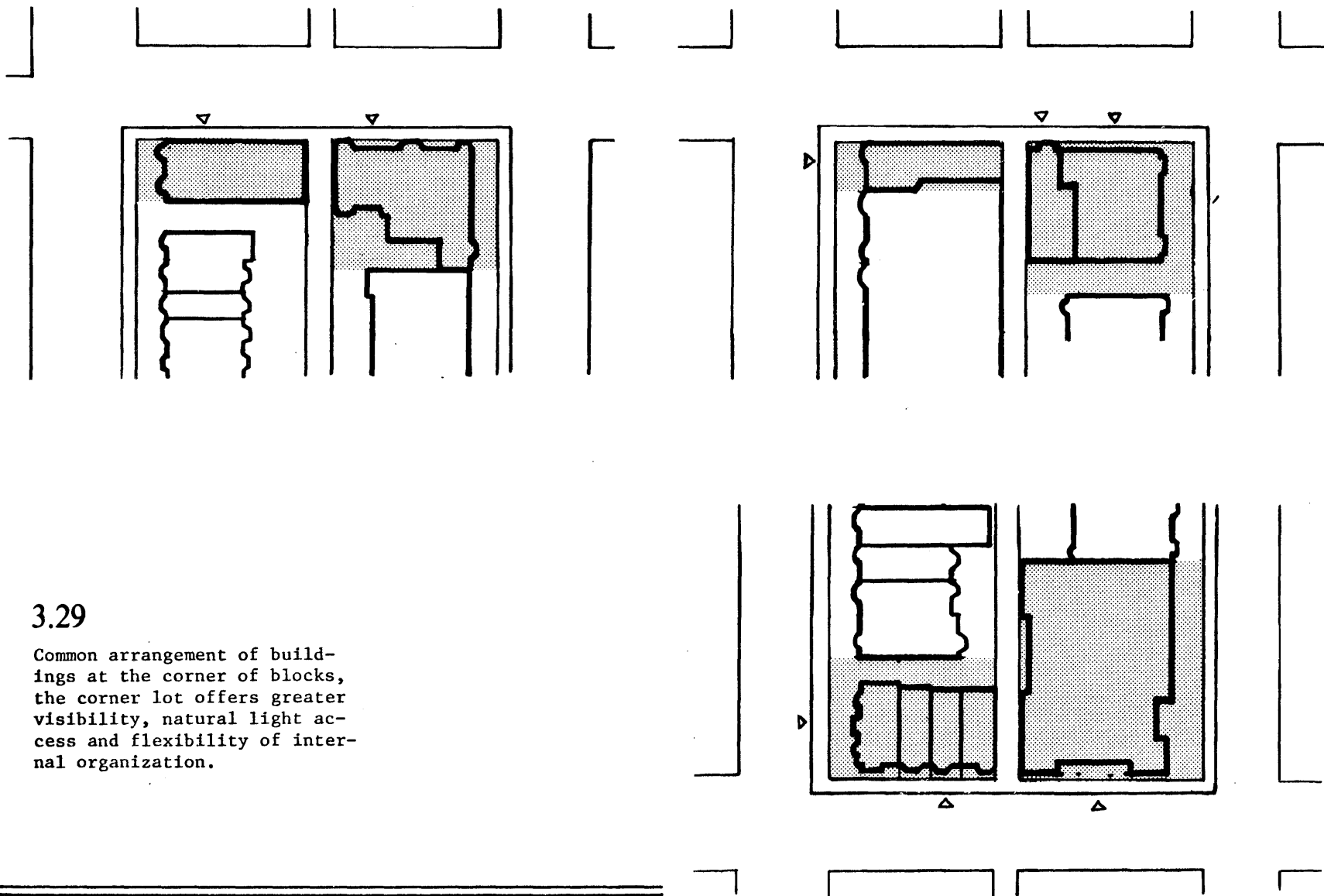
of organization, corner lots attracted quite a few religious organizations as they moved into the Back Bay between the 1860's and the 1880's (see insert 2). Later, their morphological properties became useful for developers, who constructed large apartment buildings at many corners of the Back Bay blocks, especially after the introduction of the elevator in the 1890's. Other public building types, such as hotels and clubs also found their locations on corner lots.

Thus, although some non-typical buildings occur in mid-blocks (notably Emmanuel Church on Newbury Street) the great majority of "non thematic" morphologies occur at the corners of blocks (figure 3.28). Rarely, however, does this situation occur in all four corners of a block. In most cases, one or two corners are occupied by large structures while the rest are occupied by more affluent homes or specially-arranged row houses. The most recurrent solutions for the corner lots are illustrated in figure 3.29.



3.28 Church at Newbury and Berkeley Streets. Larger structures occupy the corner lots.

A recent precedence regarding the position and dimension of public open space was established along the commercial streets of the Back Bay (Newbury and Boylston Streets), where 3 corner buildings were demolished to provide surface parking (figure 3.7). One lot, at the northwestern corner of Commonwealth Avenue and Clarendon Street was



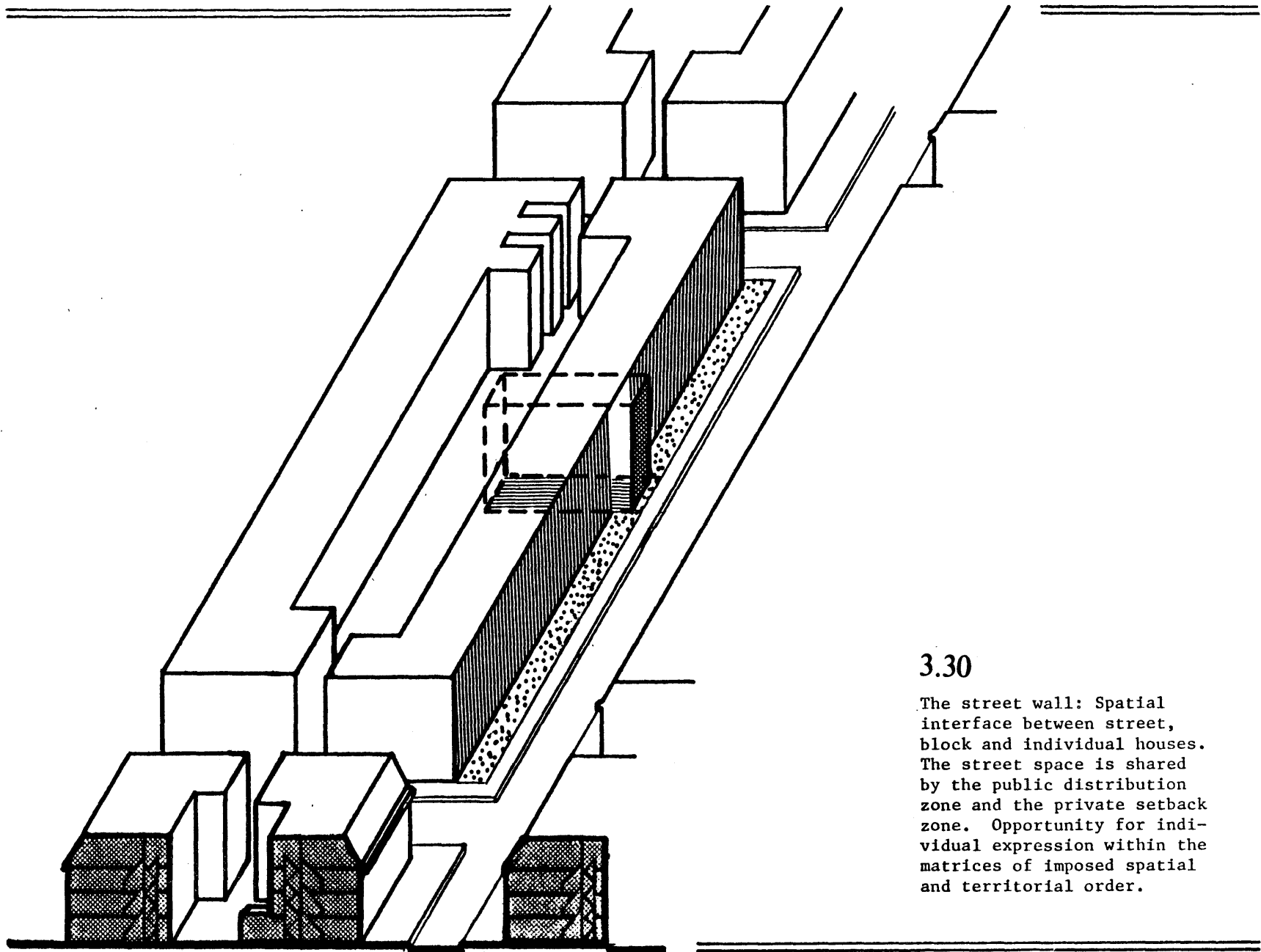
3.29

Common arrangement of buildings at the corner of blocks, the corner lot offers greater visibility, natural light access and flexibility of internal organization.

turned into a playground. While this latter type of intervention may be justified functionally, it weakens (to the point of transforming) the original spatial structure which characterizes the Back Bay. It exposes the backs of buildings in the adjacent rows, and if repeated too many times, will result in ambivalence with regard to the overall character of the area.

Spatial Overlap

The ambiguous, or multifunctional visual role of the houses' front facade is illustrated in figure 3.30. On one hand, as the most public face of the building, it is the most natural location for visual differentiation, as a means of expressing territorial control and uniqueness. On the other hand, this surface is also a small vertical slice in the continuous surface of the block. Thus, if perceiving the spatial pattern of the neighborhood is a desirable objective, then adjacent building facades must be visually integrated with each other, as a means of enhancing the perception of continuity. The author believes that the appeal of the Back Bay as a built environment is largely due to a successful resolution of this conflict.



3.30

The street wall: Spatial interface between street, block and individual houses. The street space is shared by the public distribution zone and the private setback zone. Opportunity for individual expression within the matrices of imposed spatial and territorial order.

sources and types of Visual Information

Figure 3.30 summarizes the basic spatial relationship between the Lot and Tissue levels in the Back Bay. The spatial definition of the street obtained by the continuous "built" zone, which in itself consists of the aggregated "built" zones of individual lots. The aggregated set-back zones in front of the houses are contained in the street space; thus private and public territories share the same spatial definition.

Obviously, the rigidity of the Tissue framework regarding position and aggregation of the lots imposes a great deal of visual redundancy, both among the blocks and within the street space.

Specifically, it eliminates the possibility of creating non-directional open-space. At the level of the Tissue, this results in a repetitive pattern with no variations in spatial intensity. At the level of the Lot, it limits the visual interface between the buildings and the street to the narrow front of the row houses.

It is in the context of this restricted range of possibilities that the following discussion should be understood.

The primary components of the visual information generated at the Tissue level can be summarized as follows. Redundant visual stimuli result primarily from the recur-

rent positional relationship between the two street types and the blocks, and between the blocks and the individual lots of which they consist. The perception of the street and the block as a unified system is further enhanced by the recurrent elements on the individual buildings' facade.

Non-redundant visual stimuli are generated at this level by width and height differences among various types of interventions and by incidental differences in the interpretation of the Lot framework among the typical buildings. The primary sources of both types of visual information are discussed below.

When moving through the primary street, our angle of vision is restricted by the width of the street and the height of the blocks along it. Walking, our view is channeled along the massive wall, isolated from the rest of the area around it. Driving, our view is further restricted by the roof of the car, channeled toward an indefinite vista.

The feeling of containment changes at street intersections, where the foreshortened view of the street is permitted to expand obliquely into the crossing street and to catch a glimpse of occasional landmarks. The recurrent sequence of visual containment and subsequent relief at similar intervals establishes itself as a redundant experience: quite quickly we tend to perceive it



3.31 the new John Hancock Building seen from the intersection of Marlborough and Dartmouth Streets: Boston's highrises introduced a new level in the visual hierarchy of the metropolitan area.

as "read". Even with very little familiarity with the area's boundaries, one is able to extrapolate an image of its street network and to plan one's moves.

Of course, ease of orientation in the Back Bay is achieved not merely by the redundant nature of its Tissue, but rather by the balance between this overall redundancy and the existence of visual and spatial "breaks" in and around it (see District level). The redundancy of the spatial structure is balanced also by variations among the Tissue elements.

Earlier, we pointed out that the perception of visual richness depends on the observer's ability to establish a certain balance between redundant and non-redundant visual stimuli. Redundancy was said to support the construction of a sound visual hypothesis; this, in turn, would increase the observer's ability to construct a perceptual framework for the interpretation of non-redundant stimuli as variations, thereby enhancing the simultaneous perception of both types of information as visual richness.

In the Back Bay, typical lots average out to about 25' in width; however, substantial dimensional variety is introduced to the aggregate form of the block facades both by slight width and height differences among the houses and by occasional larger-scale interventions on

both mid-block and corner lots (see below). In addition, there is little coordination in detailing among the various intervention, reflecting the multiple intervention process, which characterizes the Back Bay development.

Perception of Continuity (redundant information)

Despite these differences, the street facade of the block is perceived as a unified plane, a continuous background for large- and small-scale incidental variations.

Beyond the positional alignment of its individual lots, the perceived continuity of the wall surface is enhanced by two characteristics of the aggregated form of the Back Bay block: Rhythmic recurrence of bay windows of similar width at similar intervals, and near alignment of window openings and floor lines across the block.

Bay Windows: Figure 3.32 illustrates the visual effect of recurrent bay windows on a typical street wall in the Back Bay. This effect can be easily explained by the Gestalt terminology: During a non-specific scan of the environment, the dimensional similarity and physical proximity of the bay windows results in our tendency to perceive them as a coherent group ("law of equality" and "law of proximity"). Their sequential organization and partial alignment enhances subgrouping among the bay windows, and



3.32 Visual organization of bay windows in a block along Commonwealth Avenue. Similarity in position and width of individual elements enhances the perception of order; dissimilarity in height and detail enhances the perception of variety. Seen against the background of the higher level of visual organization (the unified form of the street wall), the presence of both order and variety provokes a sense of visual richness.

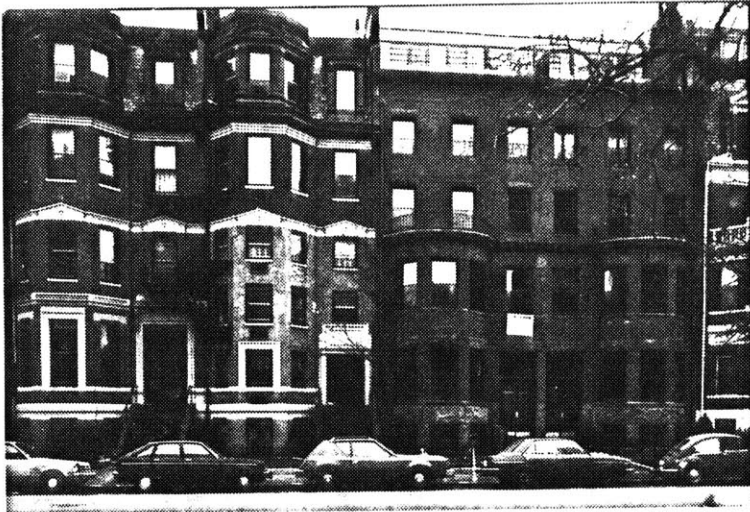
supports overall continuity along the street (law of continuity): because of the foreshortened perspective, our view is carried over to the next blocks, until the gap between two blocks reveal itself as we come closer to a street intersection.

The effect of bay windows in maintaining continuity is enhanced both by the fact that they are of intermediate scale (between the building and the smaller facade elements) and because their alignment makes up the foremost layer of the facade zone.

The role of the bay window is paramount in breaking the large surfaces of apartment buildings into narrower vertical slices, thereby mediating the scale differences between the row houses and larger interventions.

Horizontal Alignment: Seen from figure 3.32, another characteristic of the Back Bay block is strong visual continuity in the horizontal direction. This phenomenon, which was not coordinated by any authority, can be attributed to a number of factors.

First, it is a result of the conservative nature of both architectural design and construction method that prevailed in Boston in the Back Bay's formative years. It resulted in the conformity of almost all mid-block houses and buildings to the Lot framework described above, both in terms of internal organization and facade configuration,



a

3.33

Horizontal continuity across individual interventions enhanced by accentuated cornice lines.



b

as well as in terms of the structural system.

Second, as discussed in insert 2, the filling operation resulted in a uniform ground elevation throughout the area. Given the conservative vertical organization of the house, (which was largely forced by the method of land-subdivision and deed restriction) most houses utilized similar floor heights over an indispensable basement floor. Since all basements were laid on or slightly above the filling level, the similar vertical subdivision of the "built" space of the lot resulted in very slight differences among floor heights of adjacent buildings. Thus, the degree of horizontal alignment among adjacent facades, most of which conform to the basic configuration prescribed by the Lot framework, is high - usually to within 10% of the floor heights (figure 3.33b). Note that where the alignment is not consistent, the amount of differences on the wall is so great that we tend to perceive it as one jumble, unable to interpret them as distinct variation, except in a very careful look.

Third, the horizontal continuity is enhanced by the tendency on part of many builders to accent the horizontal elements of the tripartite facade. Beyond many stylistic differences, the accentuation of floor lines, cornice lines, and window lintels (above the aligned openings) contributes significantly to the perception of continuity.

Perception of Variety (non-redundant information)

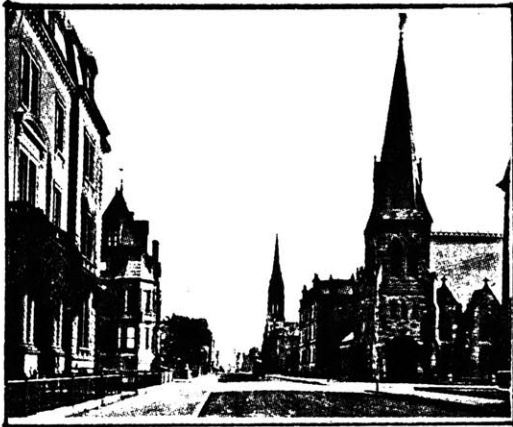
The alignment of buildings of similar materials within the blocks, and the alignment of the blocks themselves along the straight streets, provide the basic spatial order of the Back Bay. The continuity of the street wall, enhanced by the similarity in width and frequency of its bay windows and by the horizontal alignment of its surface elements provides the visual theme, namely the redundant component of visual stimuli. The non-redundant component, which provides the variations on this theme, is discussed below.

Given the strict alignment of buildings and blocks, variations in the Tissue do not usually derive from different positioning of a building with regard to the street. On the contrary, even the most outstanding buildings tend to conform to the positional alignment required by the Tissue framework.

As explained in the beginning of this section, the spatial relationship between the building, the block and the street is limited by the strict rules regarding aggregation of buildings and blocks. At the scale of the block, the redundancy of the spatial pattern is balanced by larger-

scale interventions, which are interjected into the block fabric, and from the special treatment of the corner lots. The special morphological characteristics of the corner have been discussed above. There is no one solution to corners in the Back Bay (figure 3.29); however, some types of interventions are characteristic to the corner lot.

Churches: Religious organizations were donated land in the Back Bay by the Commonwealth, so as to encourage their movement into the area. In addition to their prominence, corners of blocks were also the most useful to such axial buildings as churches, given the limited depth of the lot between the front street and the alley.



3.34 Churches along Berkeley Street (the one in the foreground was replaced after being demolished by fire). Vertical accents in a redundant spatial pattern.

Back Bay churches usually conform to the Tissue model in terms of the position of their "built" zones. However, their configuration and envelope dimensions make them the most noticeable type of built form in the area. Together with their spire, these landmarks provide orientation and introduce diversity into the block structure.

Apartment Buildings: The introduction of the elevator in the 1850's allowed the construction of taller and bulkier buildings. Utilizing the corner for added natural lighting, developers responded to the housing demand by erecting apartment houses. Over the years, many original

houses were demolished, and lot assembled, to allow larger new apartment buildings to occupy corners of blocks.

The internal arrangement of these buildings vary. Depending on their width along the primary street, their entrances face either the primary or the secondary streets.

The visual effect of the corner apartment buildings is not very noticeable at first glance. However, together with the churches they have an important role in supporting the spatial pattern implied by the street layout: First, by filling the full length of the lot, they provide 3 dimensional closure to the block, and minimize the affect of back yards on the street. Second, by marking the corner, they add identity to places around them.

It is worth noting that many apartment houses, despite their bulk, maintain continuity with adjacent buildings. some of them can serve as examples for a successful differentiation: while they enhance their particular location in the block, they also enhance the overall urban framework (see Chapter 4).

Corner houses: While some corner houses merely continue the typical pattern of the mid-block houses, many others deviate from it. In general, corner houses are entered from the side street, and their backs are lit through a gap between them and the second building on the primary street.



3.35 Apartment building along Beacon Street. Economic utilization of a morphological opportunity. Visual "closure" at the corners of blocks.



a) multiple-lot residential
development on Marlborough
Street.

3.36

"Coarse-grain" types
of intervention



b) Hotel Vendom



c) Central Congregational
Church at Newbury and
Berkeley Streets.

Interestingly enough, even though functionally they may relate to the side street, most corner houses would support the integrity of the primary street space by maintaining the bay window rhythm and the horizontal continuity.

Multiple Lot Development

Together with churches and apartment buildings, this is the third type of intervention which introduces "coarser grain" into the Back Bay tissue.

During the creation of the Back Bay, speculation developers bought and built upon several lots at one time, either repeating the same row house on each lot, or creating a compositional whole of the group. In either case, the reading of the cluster is clear, strengthened by the horizontal continuity of the common roof and the dark cornice line. The visual affect of this type of intervention is much subtler compared with that of the previous two. The configuration of each unit in the cluster is similar to that prescribed by the Lot framework.

In addition to the three types of large interventions just described, other coarser-grain buildings appear within the block, notably Hotel Vandom (figure 3.36). The slight differences in the width of row houses add variety to the composition of the street wall; the larger interventions add to it diversity. That is, they introduce differ-

ventions which resulted in a variety of incidental compositions within the block facade.

It also resulted in an irregular distribution of the stoops and the front yards along the set-back zone, softening the channel-effect of the street space.

10. *As a typical 19th century urban-expansion, the Back Bay followed a characteristic pattern of phased development. This phased-development process reflected the social and economic changes which resulted from the Industrial Revolution. The primary criteria for urban development became the regularization of the distribution system, of the land surface and of land values by the public authorities, so as to control growth and reduce uncertainty for private investment. Reflecting the changes in the income structure and the distribution of investment-power among the rising middle class, urban development became a vehicle of the Capitalistic economy. The first phase involved the Regularization of land use and land values by the public authorities; it resulted in the master plan of 1957 and in regular subdivisions (lots). The second phase involved the Urbanization of the land by the public authorities; in the case of*

The Tissue framework specifies the position and maximum envelope dimensions of built and open space; though in combination with the Lot framework it implies the building type, it does not specify the exact visual content of the interventions. Thus, a great deal of variations among buildings has occurred at the stage of implementing the urban framework.¹⁰

Architectural Styles

In general, construction of buildings in the Back Bay followed the filling operation quite closely. Whole blocks were sold and built within a short period of time. As a result, each block carries with it a slightly different architectural style; while the general row house typology

ent building types of a substantially different scale, associated with their different functions. It is this diversity (superimposed on smaller scale variations within the street wall) that distinguishes between the visual qualities of the South End and the Back Bay blocks.

There are a number of recurrent modes in which smaller scale variations appear within the block. They are described below.

Nonsequential Pattern of Aggregation

As shown under the Lot framework, the row house is divided structurally and functionally into two uneven longitudinal sectors. This subdivision, which is reflected in the a-symmetric facade, allows flexibility in the location of the front door relative to the lot lines.

Reflecting the multiple-intervention development process (see insert 2), no sequential pattern of alternating the wide and the narrow bay has developed in the Back Bay. Compounded by the fact that not all houses have bay windows, the street wall does not read as a repetitive multiplication of the same unit-type, but rather as a collage of related elements.

In fact, the flexibility of the longitudinal subdivision allowed a range of visual groupings among individual inter-

the Back Bay, it included the filling of the Bay, in addition to construction of roads, installation of infrastructure and service lines and improvement of the public outdoor areas. The third phase involved the implementation of the plan through a process of multiple-intervention by individuals, subject to the deed restrictions imposed by the public authorities. For the purposes of this paper, a fourth phase must be considered. Termed the phase of inhabitation, it refers to modifications made to buildings by their occupants after the original construction had been completed. It is through these changes that a great deal of differentiation among houses has occurred. For a detailed discussion of the generic characteristics of the urban expansions of the 19th century, see Sola Morales (19 ..).

11. *For a detailed description of the various architecture styles which found their manifestations in the Back Bay, see Bunting (1967). The author enumerates 14 stylistic influences.*

continued to prevail, its detailing expresses the time in which individual building and whole blocks were designed and constructed.¹¹

Materials

The original deed restrictions required that the primary facade elements would be made of masonry materials. This requirement not only provided latitude within this category, but also allowed a range of materials for secondary elements of the facade. As a result, while the street wall is uniformly massive, it contains a wide range of textures, colors and accents among the masonry materials; in addition, one may find a wide range of material used for door frames, balconies, ironwork and bay windows.

The variety of materials and styles characteristic of the implementation stage has been compounded by later interventions by occupants. The most typical manifestations of this process can be summarized as follows.

Changes Made to Buildings

These include additions of floors to existing buildings; painting of deteriorating wall surfaces; addition and removal of facade elements, such as fire stairs and balconies; and removal of stoops.

Changes Made to Open Space

Although not functioning intensively as a recreation space, Back Bay front yards are carefully planted and maintained by the residents. Within their dimensional consistency, they vary in the type of planting, of surface and of enclosure. As such, they break the uniformity of the channel-like street space at the pedestrian level.

The District Level

The primary element of the urban framework at this level is the district's public distribution system. It contains the public vehicular and pedestrian networks, as well as utility lines which feed into the private domains. In the subsequent discussion we will be concerned only with the surface elements of distribution.

Distribution System

12. A LINK is defined here as a 2 dimensional, linear element of a circulation system. A JOINT is defined as a meeting of two or more links. A NET-WORK is defined as a physical system composed of lines and joints. This terminology is borrowed from Imre Halasz.

13. A third type of link, namely the back alley, although technically continuous with the other two, is functionally a sub-element of the individual blocks, and is therefore described under the Tissue Level.

The Back Bay is an artificially created stretch of land (insert 1) where all streets are raised to a uniform elevation (insert 2). Its distribution system is an orthogonal network³ of links, which facilitate both vehicular and pedestrian movements in parallel (figure 3.38).

This network is composed of two types of links: major links run in the east-west direction, coinciding with the primary street spaces prescribed by the Tissue framework; minor links run in the north-south direction, coinciding with the secondary street spaces prescribed by that framework.⁴

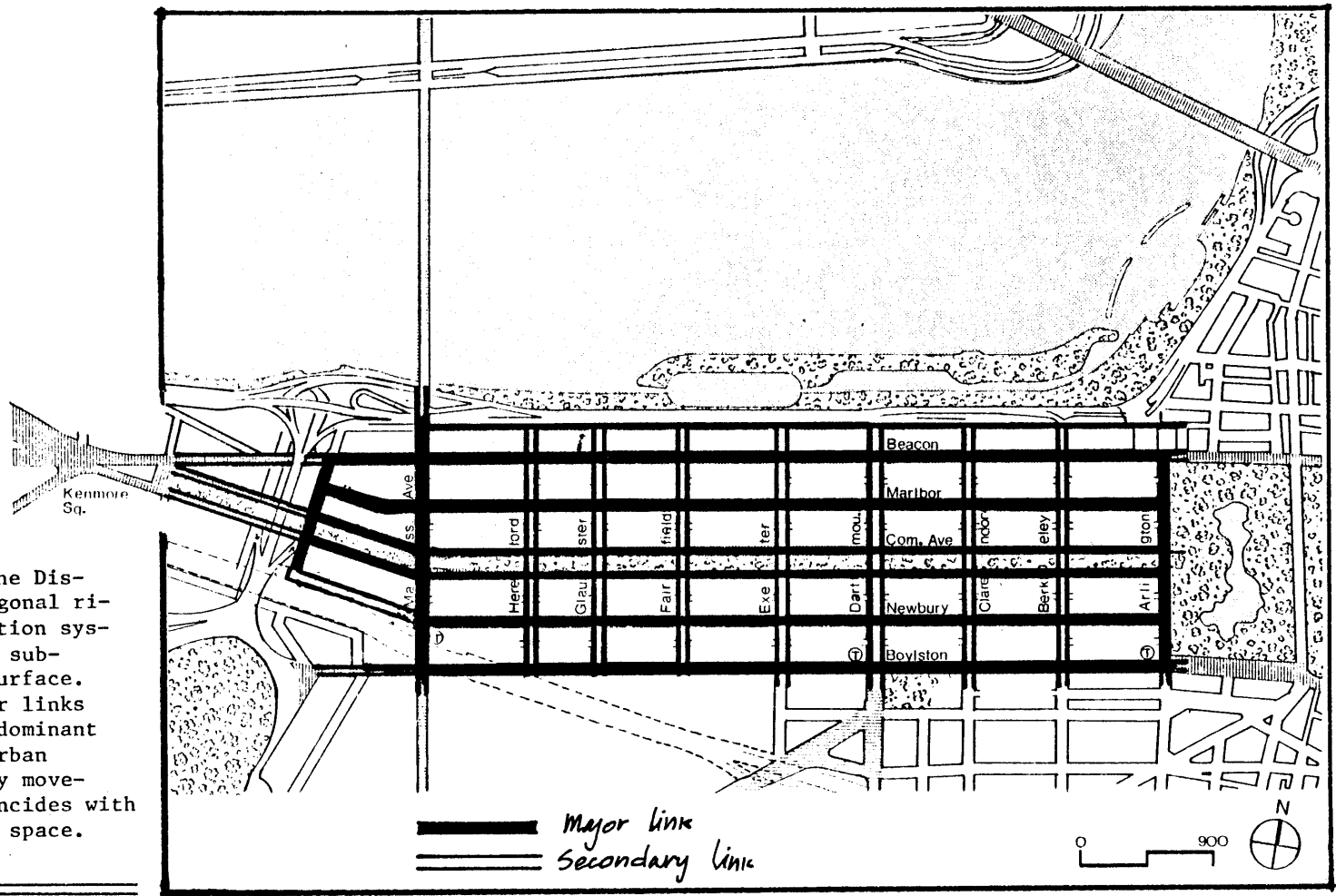


3.38a

Back Bay: Aerial view
prior to construction
of the John Hancock
Tower.

3.38b

Urban Framework: the District level. Orthogonal rigidity of distribution system allowed simple subdivision of land surface. Directions of major links coincide with the dominant direction of the urban structure. Primary movement structure coincides with the primary street space.



Major Links

In the Back Bay, major links are laid parallel to the Charles River in the east-west direction throughout the entire length of the area. Each of them is a linear aggregation of public distribution zones, around which primary street spaces are aligned.

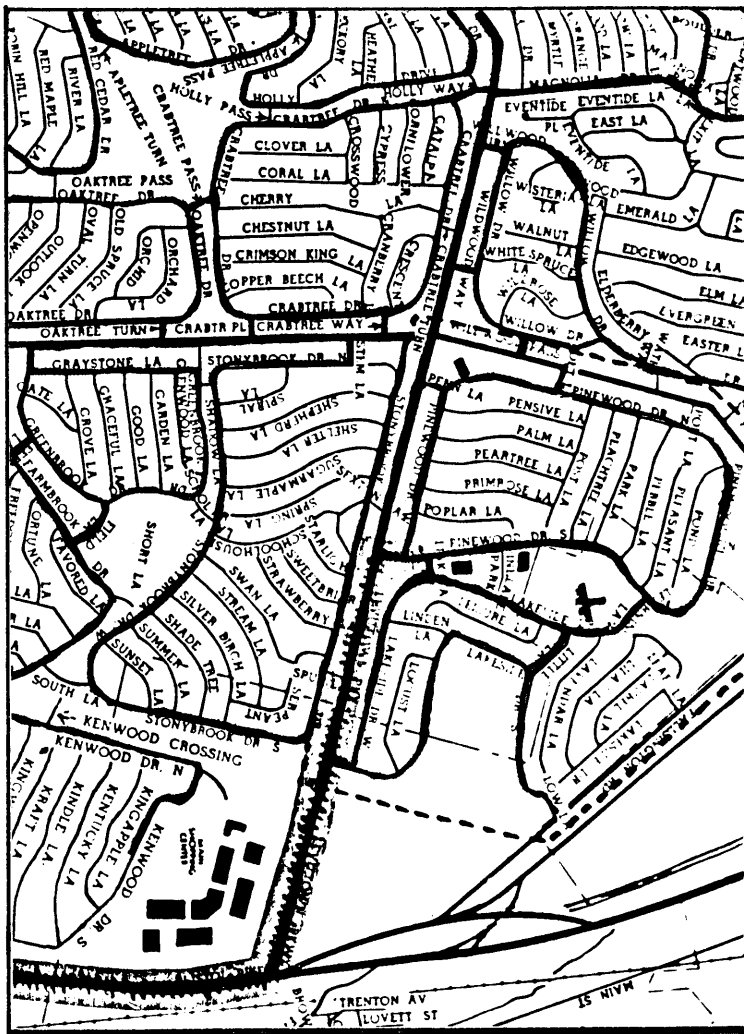
There are 6 major links within the boundaries of the study area, all of which facilitate one-way vehicular movement. From north to south they contain the distribution zones along the following streets: Beacon, Marlborough, Commonwealth Avenue (north), Commonwealth Avenue (south), Newbury and Boylston.

The positional coincidence of the major distribution links and the primary street spaces is an important characteristic of the Back Bay's urban framework.⁶

This coincidence presents a conflict in the urban framework. While it enhances the clarity of that framework and therefore the ease of orientation, it creates a condition where both the most public (distribution) and the most private (destination) components of the primary movement system share the same space.

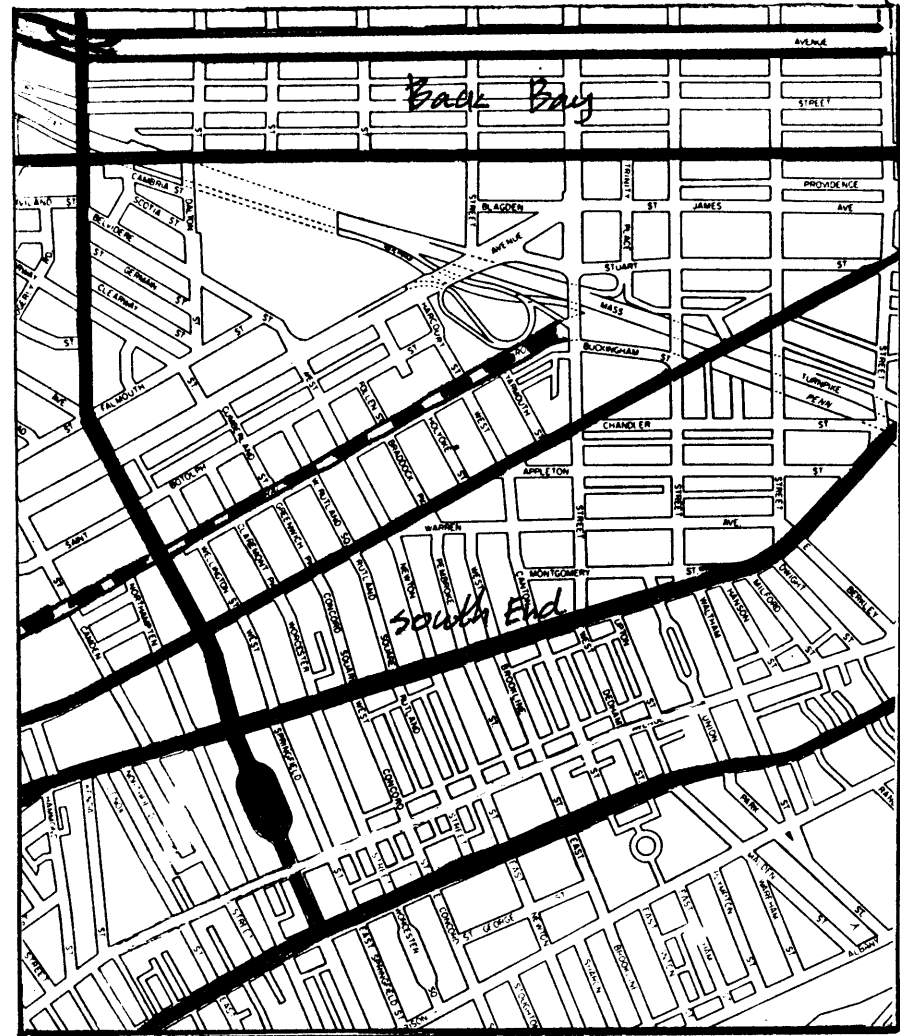
As explained under the Tissue level and described in insert 3, this conflict is further intensified by the coincidence of the urban structure with several of its major distribution links in the area.

14. *In comparison, the major distribution links in the South End are perpendicular to the primary (residential) street spaces. In Levittown, the major distribution links do not coincide at all with its equivalent of the primary street space, namely those spaces which are shared by most of the front entrances to the houses. See Apple-
yard (1958).*



3.39a

Levittown: plan. Regional routes by-pass the residential area. Primary movement structure is peripheral to primary street space.



3.39b

South End: plan. Regional routes perpendicular to primary (residential) street space.

Minor Links

The Back Bay's minor links are all perpendicular to the major links, running through the entire width of the area in the north-south direction. Each of them is a linear aggregation of public distribution zones, around which secondary street spaces are aligned. There are 9 minor links within the boundaries of the study area, all of which, except one,¹⁵ facilitate one-way vehicular movement. From east to west they consist of the distribution zones along the following streets: Arlington, Berkeley, Clarendon, Dartmouth, Exeter, Fairfield, Hereford, Gloucester, Massachusetts Avenue, and Charlesgate (east).

In addition to their shortness with regard to the major links, the inferiority of the minor street is enhanced by their positional coincidence with the secondary street spaces, and by their perceptual discontinuity with the urban structure, especially in the western half of the district.

Connection to the urban structure is facilitated in this direction by Arlington, Berkeley and Clarendon Streets, all of which are one way feeders into or from Storrow Drive; the only actual coincidence with the urban structure occurs at Massachusetts Avenue. At the Tissue level, the functional conflict created by these relationships between minor links and the urban structure is minimal, due to the small number of buildings fronting on secondary streets.

15. *Massachusetts Avenue, was developed as a regional North-South route after construction of Harvard Bridge in 1890.*

sources and types of Visual Information

In contrast with other levels of the urban framework, the District level is the only one in which differentiation was built into the framework at the planning/design stage.

The redundant visual component at the District level derives from the simple matrix of the street network, as well as from the redundant spatial structure of the Tissue, which prevails throughout the area. A person going through the Back Bay who is not interested in a specific location within it, is most likely to fail to notice much of the visual variety discussed before. For example, he/she perceives no difference between single-lot and multi-lot development, and in a non-specific scan of the environment would hardly pay attention to the bulkier configuration of apartment houses.

At this level, slight dimensional differences among the blocks are not readily perceived; what becomes more noticeable are dimensional differences among the open spaces (streets) in the district and the temporal patterns which give them specific character and meaning throughout the area. Other elements of variety at this level are those tall buildings that can be perceived from many locations in the area.

The spatial and temporal characteristics of the Back Bay streets were described in an impressionistic manner in insert 1. The following observations are concerned with major structural differences.

1) *Open space*: The major differentiation among streets occurs at Commonwealth Avenue, which measures 200' in width (figure 3.40). The role of this street as a major orientator is further enhanced by its central position in the area and its landscaping. Because the Back Bay is only 5 streets wide, the visual effect of Commonwealth Avenue is paramount throughout the area. Its uniqueness in Boston, and for that matter the United States, makes it an imageable feature in the context of the city, as well as the Back Bay. In our terms, its importance within the District reflects the overlap between two levels in the urban framework: the Urban Structure and the District. The Tissue framework is distorted to accommodate a higher-level element of the urban framework.

16. *Newbury Street may serve as an example for the accumulative impact of temporal patterns on the spatial patterns of the environment. Started as an incidental sign of habitation, the by-now authorized building-up of the original un-built set back zone has transformed the spatial nature of the street. (see also the Urbino 1976 report.)*

Slighter differentiation occurs among the other 4 streets. Narrow Marlborough and Newbury measure 60 feet between front yards, a characteristic that was reflected in their lower prestige among Bostonians. Due to the transformation of Newbury into a commercial street, there are remarkable temporal differences between it and the other streets.¹⁶

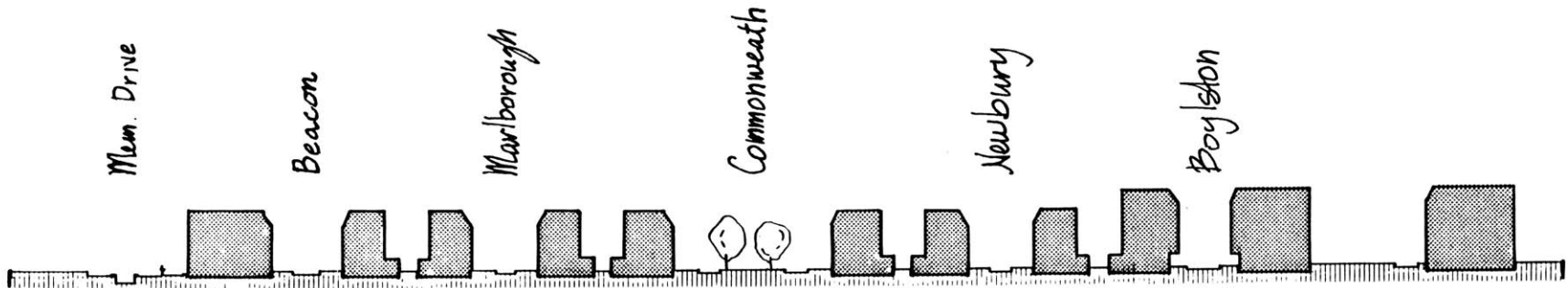
3.41

Commonwealth Avenue: The Tissue-Framework is distorted to accommodate a higher-level element of the urban framework.



3.40

Typical north-south section across the Back Bay. Marked spatial differentiation at Commonwealth Avenue: the district is organized symmetrically about its linear center.



Marlborough is the most quiet street in the Back Bay: it does not directly coincide with the urban structure, and it is mostly of residential use. In contrast with Newbury, it is planted along sidewalks.

Beacon and Boylston measure 75 feet between front yards. They also differ in character from the other streets. By now Boylston is an entirely commercial street, which relate to the Back Bay morphologically only in terms of the latter's distribution system. Beacon is a mostly residential street, coinciding with the urban structure. Unlike Boylston, Beacon is regularly planted, yet its pattern of planting is different from that of Marlborough's.

Among cross streets, Dartmouth and Massachusetts Avenue measure 100' feet in width, compared with the regular 60' dimension characteristic of all other secondary streets. There is, of course, a marked difference in the character of the two streets, due to their different function in the urban framework.

Beyond the dimensional differences, the Back Bay streets are easy to recognize by their relation to the area's boundaries. While this is not a consequence of its internal organization, it is certainly an asset from the point of view of variety and orientation.

2) *High elements*: Originally, the church towers provided the only vertical accent in the Back Bay area. With the building of Old Hancock Building, and later with that of Prudential Center and the New Hancock Tower, their presence is increasingly dominated. While the church towers continue to provide variety and orientation within the Back Bay, their role in providing a unifying image to the area is almost none. (This change may serve as an illustration for the impact of metropolitan development on the image of individual neighborhoods.)



chapter 4

Illustrations

The preceding chapter presented our analysis of the urban framework, and specified sources of redundant and non-redundant visual information at each of its levels. In this chapter, we present a number of mini-case studies, the purpose of which is twofold.

First, to provide a perspective on the kind of observations that have led to the preceding analysis. Second, to illustrate the usefulness of this analysis in evaluating the visual impact of both planned and existing interventions.

There is an important difference in the mode of presentation between this chapter and the preceding one. There, we generally reserved judgment on the *function* of the various sources of visual information, attempting a more or less objective description of the physical conditions which produce different kinds of visual stimulation. Here we group the sources and types of visual information into two functional categories, namely those which enhance *integration* and those which enhance *differentiation*.

As explained in the introduction, integration is the act of establishing common visual charac-

teristics among different interventions. Differentiation is the act of establishing different visual characteristics among different interventions. Hence, integration is enhanced by increasing visual redundancy, while differentiation is enhanced by decreasing such redundancy (increasing variety). Another important difference between the two chapters is the more comprehensive evaluation of the visual impact of each intervention. In the preceding chapter, we were concerned mostly with the visual role of various *types* of interventions with regard to the level at which they are elements. In this chapter, we are concerned with *specific* interventions and their visual impact on all levels.

Reflecting our interest in the differentiation of the Tissue, all of the following examples consist of buildings, which are elements of the Tissue framework.

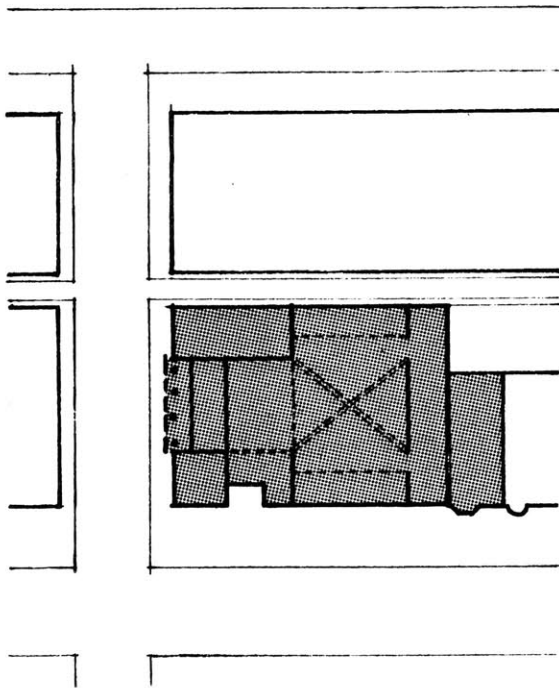
The examples given below are not inclusive. They are not intended to present a balanced assortment of Back Bay morphologies, but rather to provide a better sense of the type of information we have been concerned with.



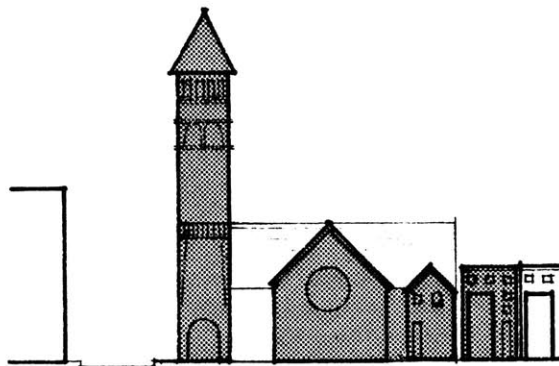
First Unitarian Church of Boston

4.1

Designed by H.H. Richardson and built in 1871, the first Unitarian church utilizes boldly the main advantages of the corner lot: Visibility, flexibility of internal organization and natural lighting.



4.2 Schematic plan, long axis parallel to primary street.



4.3 Schematic north elevation.

Integration with the Tissue is obtained through strict alignment of the facade planes with the primary (Commonwealth Ave.) and secondary (Clarendon) streets. Except for the campanilia, the building mass does not exceed the envelope dimensions allowed by the framework; and the masonry walls reflect the prevailing material in the area.

The entrance is located on the secondary street.

The tower occupies the block's corner. Its presence on the street is effectively enhanced by its isolation from the main roof of the church. Despite the diminishing affect of the John Hancock building, the tower commands the observer's view along all 4 streets arriving at the street intersection, and has a particularly long range visual effect on Commonwealth Avenue (moving east) and Clarendon Street (moving south).

4.4 Commonwealth Avenue looking east, 1880. Bell tower as an orientator in a highriseless urban scape.



Differentiation is achieved by the specific configuration of the building, which in itself conforms to the general typology of churches, and is therefore immediately understood as one. At the Tissue level, the sheer size and configuration of the church sets it apart from other buildings, although the reading of the block as a whole is not impaired. The breaking of the primary and secondary facades into smaller pieces helps mediating the scale differences between the typical buildings and the church, as well as emphasizing the presence of the tower.

At the District level, the body of the church is un-noticeable, while its tower assumes the role of an orientator land mark: it is both distinct and visible, and can be seen from many angles.

4.5 Clarendon Street looking south. Dominating effect of the high rise. (compare with 4.4)





53-57 Marlborough Street

The block containing these four row houses was developed in the 1870's. These four houses may serve as an example for a multiple lot development which resulted in a symetric configuration about the center of the group.

The group contains 2 bow-fronts and two flat row houses, all of which conform to the major components of the urban framework.

Horizontal continuity with adjacent buildings is maintained through the typical distribution of openings, the base lines, the cornice lines and the roofs.

Originally, the symmetry about the center was emphasized by the two central bow fronts, by their accentuated cornice line and by the common framing of their two doors. Differentiation between the group and the adjacent buildings is facilitated through change in roof heights and slight misalignment of base lines.

Differentiation between the four houses of the group came about in the process of habitation.

The stoop of the left hand (westernmost) house



4.6 75-81 Marlborough Street.

Complex visual whole achieved through simple rules of aggregation and variability of secondary facade elements.

was lowered, and a fifth floor was added above the original common mansard roof. The new door was framed uniquely, further enhancing the identity of this house. At the center, extending the cornice line created a shallow balcony in front of the top floor of the center-right unit. Applying white paint to both balcony and window frames clearly distinguished this house from the rest of the group. It also created ambiguity, as this a-symmetric accent conflicts with the centrality of the common door frame.

Despite the low artistic value of this development, the complexity of its visual messages with regard to ownership is a rather surprising incident. It also demonstrates how, with rather limited means, visual variety can be achieved at one level without impairing the integrity of higher levels in the urban framework.



81-87 Marlborough Street

This group of four 18' wide lots was built upon as a multi-lot development, probably in the 1870's. It is an example of speculative building, characteristic of Newbury and Marlborough Streets. More likely than not, the adjacent building (to the left) was built at about the same time by the same developer.

Built in accordance with one of the three most prevailing types of row houses in the Back Bay, the facade of each of the houses enhances horizontal continuity by alignment of window openings with adjacent buildings. Horizontal continuity is also established by the cornice line, which aligns with its neighbor's as well.

The identical metal bay windows serve as an example of the abuse of redundancy. Although they do establish continuity, in combination of the identical facades they become boring. The presence of the essentially identical facades on the adjacent building intensifies this redundancy even more.

The articulation of the dormer is an important feature of this mundane development. (The building to the left was originally built to the same four-story height. The addition of the fifth floor is an example of a



4.8 225-235 Marlborough Street.
Excessive redundancy results
in monotony.

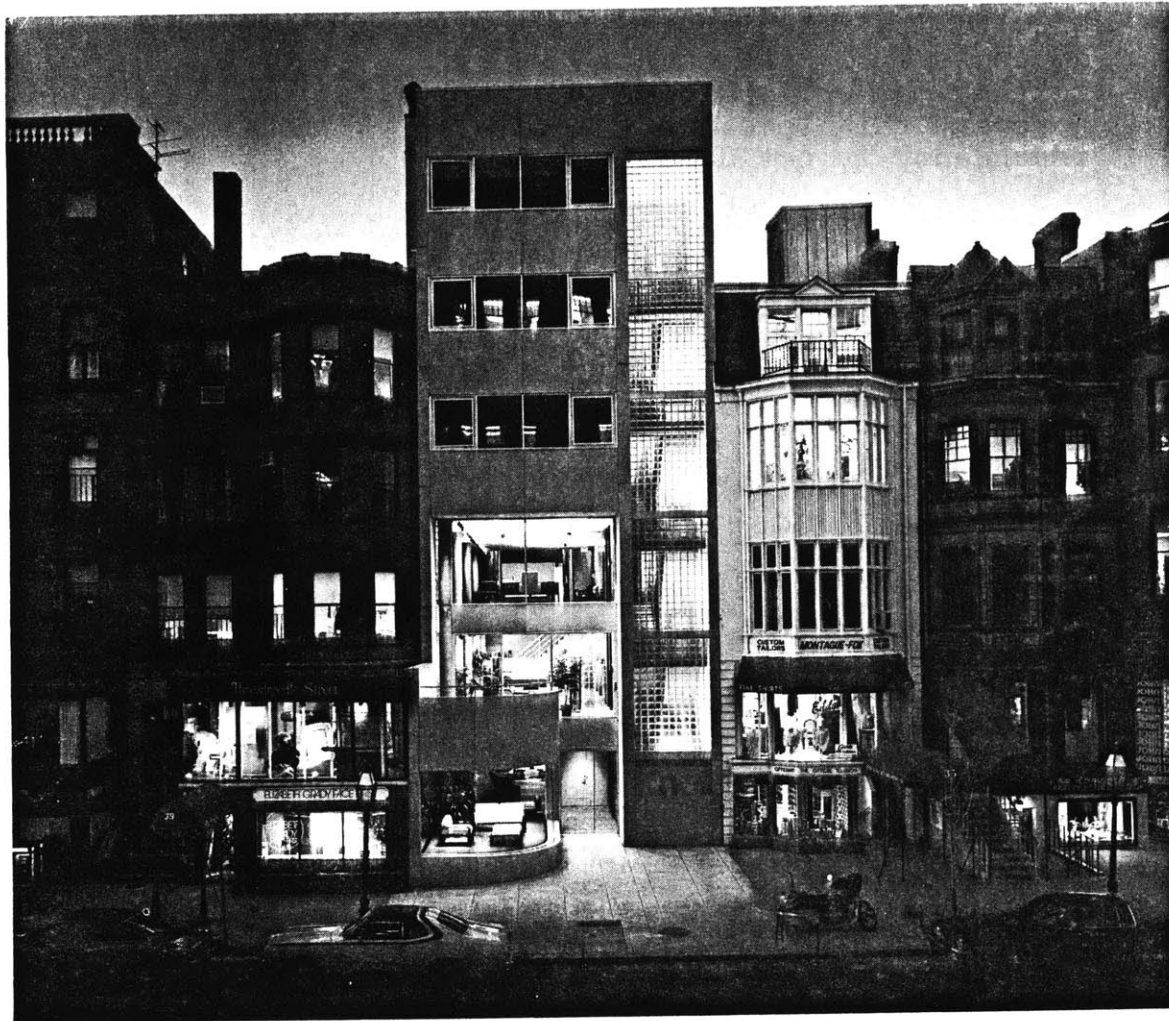
prevailing practice, which here increased visual variety.) Another prevailing mode of inhabitation represented here is painting. Over the years, an owner would paint the entire facade of his house, or only a number of its sub-elements. In cases of multi-lot development, these helped differentiation between identical facades.

The building at hand may serve as a good example of bad taste. It is a simplistic duplication of the 18' row house, in which excessive redundancy without elements of variety resulted in a lack of richness with regard to its immediate adjacencies. In the context of the whole block, however, this level of redundancy is not damag-

ing, since it establishes a counterpoint to other, simple lot interventions of sufficient degree of differentiation. This intervention also illustrates the role of inhabitation in enhancing variety.

4.9 Monotony reduced through interventions of individual owners on the originally repetitive facade design.

32 Newbury street (Knoll Furniture)



The Knoll Furniture building was built in 1980 on Newbury Street, the residential-turned-commercial street of the Back Bay.

In contrast with most other buildings in the area, this building was built to serve a strictly non-residential function. It contains 6 floors; the first 3 house Knoll's Boston showroom and office; the rest are intended for lease as office space.

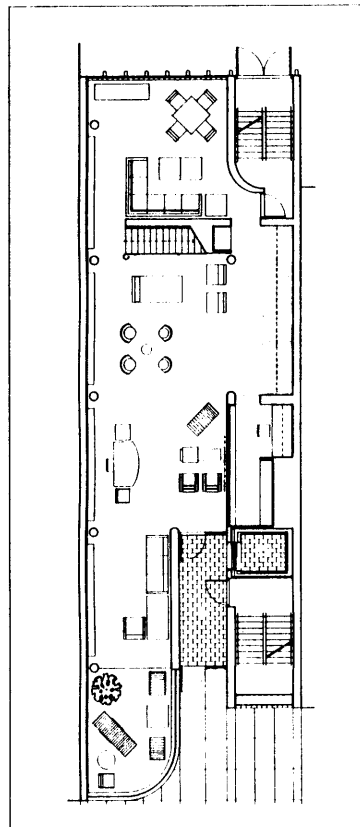
While the subdivision into two longitudinal sectors is maintained, the internal organization is different from that of the Back Bay row house (see plans).

The architect seems to have made a special effort to express the fact that the building is not a typical row house, while making some gestures to recall formal aspects of the row house. The affects of this intervention on the street are summarized below.

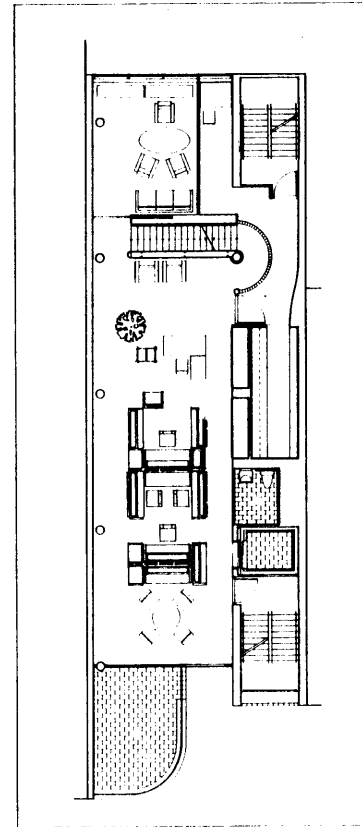
The building conforms in positions and envelope dimensions to the Tissue framework. It is subdivided into two uneven longitudinal sectors, which are expressed on its facade as two distinct vertical zones.

The building's untraditional structural system (combined concrete frame and shear walls) is exposed to the street, its facade configuration deviates sharply from that of the typical row house,

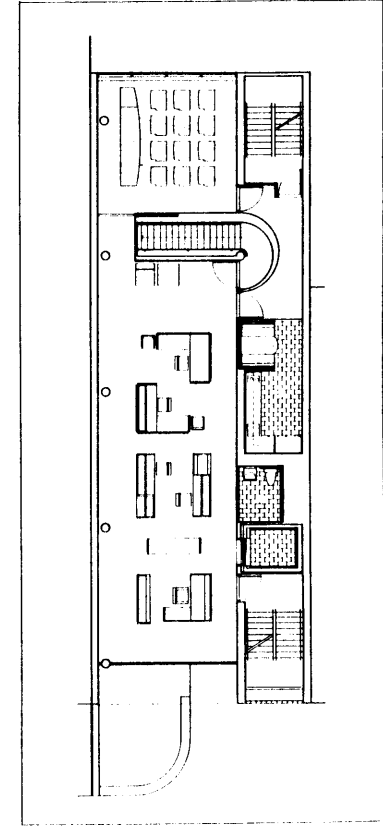
4.10 Kno 11 Building: floor plans. Traces of the original typology can be seen in the longitudinal subdivision of the space into one secondary and one primary.



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN N ↑ 10/3m

as well as from the modified version of its neighbors. Instead of a tripartite system with uniform distribution of openings in a simple matrix, the primary plane is divided into 3 non-sequential parts, reflecting the different functions of the spaces behind it. The ratio of solid to void (glass) is far higher than in the traditional row house. The facade's unorthodox subdivision is further emphasized by the recessed plane of the first 3 floors. In combination with the outward extension of the first floor, this recess interrupts the uniformity and solidity of the street wall, the primary characteristic of the traditional Back Bay block.

The traditional horizontal alignment of window openings is denied, both within the building's envelope and with respect to its adjacencies. In contrast with the typical house, floor to floor heights are uniform.

In the absence of a traditional tripartite subdivision, the primary plane extends uniformly upward, failing to accent a cornice line. The contrast between the exposed concrete and the traditional brick is further enhanced by the lack of ornamental detail in the primary surface.

The Knoll building represents a significant deviation from the "rules" of the Lot framework.

Nevertheless, its positional alignment and envelope dimensions conform to the Tissue framework (modified to allow the extension of enclosed space into the set-back zone which is characteristic of Newbury Street), thus minimizing its visual impact on the spatial framework.

Visually, the building is mostly redundant at the Tissue level (conforms positionally and dimensionally but does not enhance continuity) and non-redundant at the

Lot level. It has no visual affect at the District level.



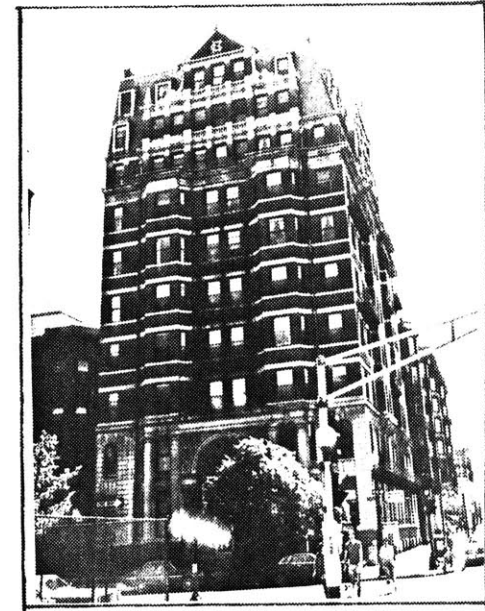
Apartment Buildings

The height and bulk of large apartment buildings make them hard to integrate with the Back Bay Tissue. In general, older such buildings are more successful on this count. Some of the techniques used for achieving integration are discussed below.

Tripartite system: when implemented in large scale buildings, the "base," the "body" and the "cap" usually assume large vertical dimension so as to maintain proportion to the larger width and height of the building (figures 4.11, 4.12, 4.13). In addition to monumentality, this treatment of the facade enhances integration with smaller buildings by establishing horizontal continuity between the accentuated base of the large building and the cornice lines of the adjacent houses. Further integration can be achieved by horizontal alignment of floor heights and openings.



4.11 8 Gloucester Street:
Modified tripartite facade:
enhances horizontal continuity
along the street.



4.12 482 Beacon Street:
Modified tripartite facade.

4.13 522 Beacon Street: Bay windows
and expressed "base line" help
integration with the street
walls.



"Breaking" the surface:

another prevailing mode of integration is the introduction of projected vertical "shafts" (bay windows) along the walls of large apartment buildings (fig. 17, fig. 19).

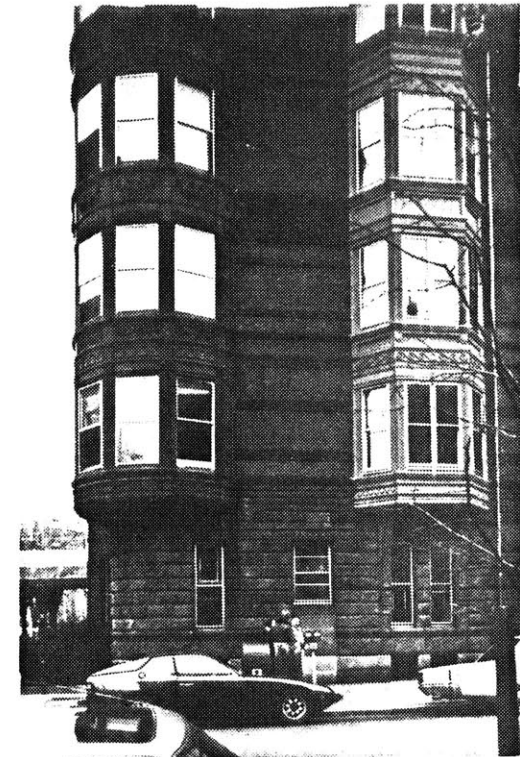
In addition to their functional importances these projections effectively break the monotony of the large building's wall. These projections, which usually follow the configuration of the three-window bay window, establish a mediating scale between the large mass and the houses; the effect of this device, especially when combined with a tripartite facade configuration, is an important factor in the successful integration of older apartment houses.

In cases where minimalist gestures replace true response to the need for integration, the result is less convincing.

In the building in fig. 4.16 the frame construction is exposed and the tradition-



4.14 295 Beacon Street. Massive wall on a secondary street.



4.15 Detail of 4.14. Attempt at "breaking" the surface by projecting secondary elements is defied by the redundancy of those elements.

ally solid "base" is substituted by a void. In addition, the front wall is undulated as an allusion to the bay-window, but it fails to establish a valid rhythm. The combined result is detachment from the prevailing morphology. A similar failure is seen in fig. the intention to break the homogeneous facade by dividing its surface into 3 parts results in a superficial gesture; the contrast between the depths of the 3 vertical zones is insufficient to establish internal discontinuity, and our eyes tend to perceive it as one continuous surface. (Gestalt Law of Pragnze).

As described under Tissue level, the Back Bay apartment buildings play an important visual role. Their consistent occurrence on corner lots helps introduce diversity to the Back Bay fabric, and enhances orientation at the Tissue level.

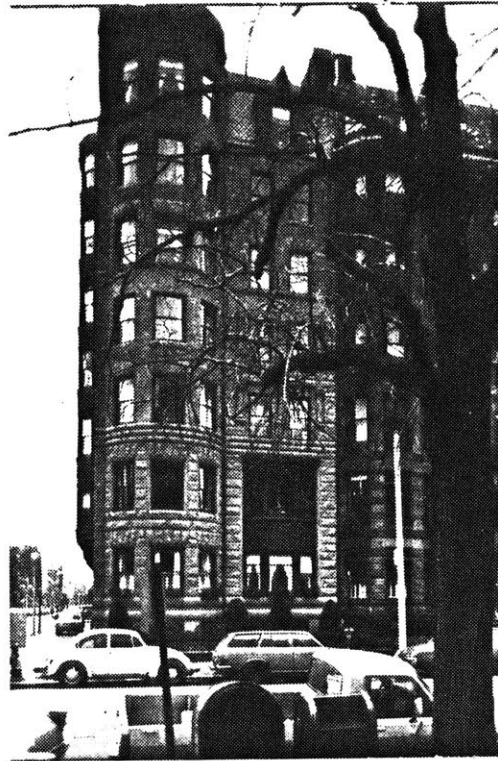
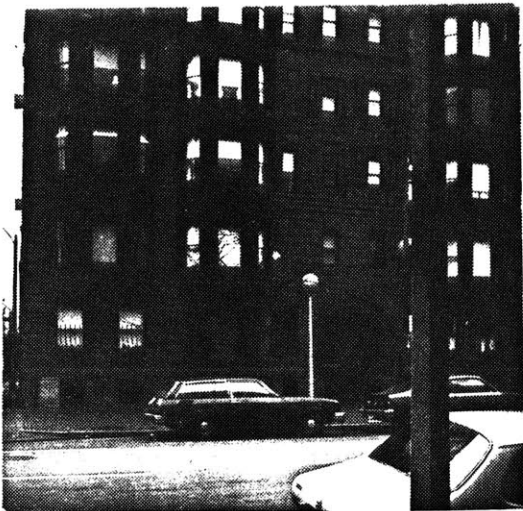


4.16 330 Marlborough Street:
Foreign rhythm and lack of secondary facade element; excessive redundancy within the overall form; sharp deviation from the normative envelope dimensions; limited opportunity for emergence of variety through inhabitation.



4.17 Detail of 4.16. Recessed primary plane at ground level results in discontinuity with adjacent houses.

However, while fulfilling this role depends on the non-redundant nature of these buildings with respect to the tissue, their role as an integral part of the block would be impaired in the absence of visual continuity with the prevailing morphology. It is here that the visual devices just described play a paramount role of integration.



4.18 330 Dartmouth Street. Successful integration of a massive building by a careful treatment of the street wall.



4.19 180 Beacon Street. Excessive redundancy within a rigid overall form. Note the deviation from the Tissue Framework by building a wall at the property line.

chapter 5

Conclusions

In the process of establishing a line of thought with specific objectives for this study, it was necessary to set priorities thereby eliminating other considerations. In concluding, however, the position taken in this thesis may be clarified by mentioning several ideas that grew out of the process, some of which were not developed in the thesis. The following comments should be taken with caution. Although they reflect general notions, they stem from observations of one urban area.

Our analysis of the urban framework revealed the basic physical properties (positions and dimensions) and visual characteristics (configurations) of built-up and open spaces in the Back Bay. It presented the consistent relationships between the lot, the block, the streets, and the district as a three dimensional system: the Back Bay's *spatial order*. It also presented the recurrent configuration shared by the elements which make up the spatial order as a visual system: the Back Bay's *visual order*. The investigation distinguished between physical relationships among the elements of the spatial order and the visual information produced by the particular interventions that

occupied the framework. For example, bay windows were first defined as general framework elements in terms of dimension and position, and only afterwards as a source of varying visual information.

This procedure was derived from the guiding hypothesis regarding human perception: the perceptual mechanism forces us to construct the overall form before we are able to distinguish amongst the sub-elements which make up that form. Therefore, we assumed that recurrent physical relationships between similar elements would be perceived as a higher level in a unifying visual order, regardless of subtle dissimilarities among those elements. Following this procedure, the investigation has led us to a number of preliminary conclusions about the following issues:

Spatial & Visual Orders

The separation between spatial and visual orders may have been unnecessary; spatial relationships are part of the visual information we perceive in the environment. That these relationships override two dimensional dissimilarities among elements merely makes them a *higher level* of the *same* visual order, not a different order.

Underlying Physical Relationships & Formal Manifestation

Our observations support the assumption that underly-

ing dimensional and positional similarities override the perception of formal dissimilarities amongst elements; this is demonstrated by the role of bay windows and window openings in provoking the perceived continuity of the street wall despite the variety of forms either of them may take.

The general dimensional and positional similarity provides the sense of order; the different formal manifestations provide the sense of variety; together they contribute to the sense of visual richness. Similar perception of both order and variety is provoked by dissimilarities among individual buildings which are played against their dimensional and positional consistency within the block. For this reason, we perceive the Back Bay as a visually unified environment despite the range of architectural styles which are manifested in its morphology.

Drawbacks of the Back Bay Framework

The simplicity and clarity of the urban framework provided for visual richness and legibility. It has resulted, however, in functional conflicts and lack of spatial variety. The evolution of metropolitan Boston has led to double functioning of the primary street which now serves both as a channel for regional traffic and as a residential street. This condition results in a disadvantageous juxtaposition between private and public domains, which not only introduces environmental hazards -- noise, pollu-

tion, danger -- but also inhibits private use of the front yards. In the absence of usable backyards, this situation precludes the use of outdoor space for private recreation. While this development was probably unavoidable in this case, it is not a desirable condition and should be avoided as a general rule.

In addition to lack of usable private grounds, the area lacks variety of public open spaces. Specifically, it does not have even one concentric square. This condition is a direct consequence of the tissue framework which was forced by the pressure for buildable land and by the initial decision to expend all outdoor space in the linear streets. As mentioned before, the rigidity of the spatial pattern is compensated for by the relieving effect of Commonwealth Avenue and by the proximity of adjacent open spaces around the Back Bay (Copley Square, the Gardens, and Charles River Park).

Visual Richness

The initial perception of the Back Bay as a visually "rich" environment may now be better explained and qualified. The area's visual quality derives from the simultaneous existence of low-level visual variations among elements which conform to a higher-level visual order.

This relationship is primarily evident at the Tissue level: the unifying order is provoked by the highly re-

dundant street/block system and by the consistent relationship between individual buildings and this system. Variety is provided by differences in dimensions and articulation of individual elements, (variations of the Lot framework), all of which conform to a typical configuration (the row-house typology). Diversity is provided by the presence of different configurations (apartment houses, churches, hotels) which share some features with the prevailing morphology (masonry materials, structural dimensions, bay windows, positional alignment).

At the District level, the redundant street/block pattern is the main reason for the perception of the area's spatial order. Despite a sense of rigidity and "uneventfulness", monotony is defied both by the lower-level variety discussed above and by contrast between the prevailing order and a few distinct elements: Commonwealth Avenue, the church towers, and, to a lesser extent, Dartmouth Street. At the Lot level, visual richness is provoked by the number of sub-elements (bay windows, openings, lintels) which are played against the recurrent visual order established by the tripartite facade configuration.

These observations suggest an operational definition of visual richness in the built environment:

A sense of visual richness derives from the experience of variety within an imageable spatial order of a given environment. This sense depends

on multiple variations and diversity of elements within one or several common typologies which obey the same order. It is likely to be provoked by environments which are organized in a perceivable formal hierarchy where variety increases down the levels of the unifying order.

Spatial Legibility

Our concept of spatial legibility refers to the contribution of space perception to the sense of "legibility" as defined by Lynch (1960). Thus, we did not discuss other environmental clues which facilitate legibility, e.g. use patterns, signage, and social aspects of the environment.

However, our initial hypothesis, that spatial legibility is related to the perception of both spatial order and variety in the environment, bears refinement.

Like visual richness, the sense of spatial legibility in the Back Bay is provoked through several levels of its physical organization. The perception of order is provoked by the redundant block/street pattern and the repetitive aggregation of individual lots. At the tissue level, the main contribution to legibility derives from the directional bias of the blocks, enhanced by the spatial differences between the primary and secondary streets. Further enhancement of spatial legibility is gained by the

identity of high apartment buildings or churches on corner lots.

At the District level, spatial legibility derives from the contrast between Commonwealth Avenue and the other primary streets; from the vertical accent of church towers; and - to a lesser extent - from the difference between Dartmouth Street and the other secondary streets.

At the Lot level, spatial legibility is limited, due to the redundant pattern of aggregation, which is the main contributor for the perception of the unifying spatial order. Here, the identity of individual buildings derives from variation on the typical facade configuration through small-scale interventions. We recall that variations and diversity are the main contributors to visual richness.

It is apparent, then, that while both spatial legibility and visual richness depend on the perception of the same spatial order, the type of variety which facilitate the perception of each is different.

Visual richness is provoked by multitudes of partial dissimilarities among *common* elements at each level of the unifying order; spatial legibility is provoked by clear differentiation of the movement system and by highly visible elements, which *contrast* with all levels of the unifying order.

This distinction between visual richness and spatial

legibility can be explained by the nature of human perception. The sense of spatial legibility satisfies the need for orientation; it derives from the ability to construct a valid anticipation with regard to specific locations and directions within a given environment. Good visibility and high contrast allow frequent eye contact with the same element in the perceptual field; thus, through recurrent perception of the same image, the perceptual mechanism would tend to interpret it as a redundant message, thereby supporting the observer's perceptual hypothesis.

In this sense, spatial legibility enhances the formulation of an overall image of the environment, which allows an observer to focus his/her attention on lower-level variety in the perceptual field.

The role of spatial legibility in facilitating orientation in the Back Bay is enhanced by the positioning of its highly-distinguishable elements with regard to its internal structure and the interfacing elements of the urban structure.

Commonwealth Avenue occupies the axial center of the area, which makes it highly visible from almost any street intersection within the tissue. Together with the other primary streets, its direction reflects the primary movement system in the area, as well as that of the Charles River. Most of the church towers occupy block corners;

they command views both along the intersecting streets and above the stretches of row houses; thus, they not only gain identity within the redundant spatial pattern, but also mark locations of functional significance: the street intersections.

The above observations suggest a refined operational definition of spatial legibility in the built environment.

A sense of spatial legibility derives from the experience of contrast within a unified spatial structure, and involves the awareness of specific locations and directions within that structure. It is likely to be provoked by spatial differentiation of primary and secondary movement systems, and by recurrent eye contact with few contrasting elements (orientators) within an otherwise unified spatial order.

IMPLICATIONS

Bearing in mind the limitations mentioned above, our conclusions may lend themselves to a number of applications. In general, these conclusions provide tentative criteria for the incorporation of visual objectives into the design of a new urban framework or evaluation of an existing one. Our concept of this process is very much based on the SAR method, which facilitates the formulation of decisions with regard to function and morphology of urban areas.

Evaluating the visual impact of new interventions

Designers and policy makers should assess the visual nature of the existing context in order to judge the visual impact of a new intervention. The method used in this study could be applied to other areas as well. It consists of the following general steps:

- A. Evaluate the existing urban framework in terms of
 - . hierarchy (if any) of physical aggregation (levels)
 - . position, dimensions, and configurations of recurrent elements at each level.

- B. Evaluate existing sources of visual information at each level, so as to answer the following questions:
 - . What elements support the perception of a recurrent spatial pattern (if any)?
 - . What visual features in the vicinity of the site support integration? differentiation?
 - . What is the prevailing visual hierarchy?

- C. Evaluate the desirable visual impact of the new intervention (variation? diversification? contrast?) in relation to its location and function.

Design of urban framework

The following suggestions are based on the assumption that visual richness and spatial legibility, as defined above, are desirable attributes of a built environment. In view of the present nature of urban development and construction technology, it is also assumed that explicit

rules must be developed in order to assume satisfactory responsiveness of the environment to basic behavioral needs. As explained before, the underlying assumption of this study is that the latter includes the need for orientation, variety and personal control of the immediate living environment. In light of these needs, the following requirements should be incorporated as visual guidelines to the urban framework.

A. Hierarchical and simple spatial structure

Based on repetitive relations between generic elements, the spatial structure of an area should be composed of at least 3 levels: the basic physical unit of aggregation, an intermediate unit of aggregation and the district as a whole. To assure an opportunity for inhabitation and evolution of variety, the basic unit of aggregation should ideally match the unit of occupancy, and would have an exterior wall(s) facing the public realm.

B. Match between spatial order and movement structure

To increase legibility, the appearance of an environment should reflect its main elements of organization. Most importantly, its primary and secondary movement systems should be spatially-defined and differentiated. The spatial organization of an environment should be viewed as the highest level of its visual order; to construct a spatial order, it must consist of a repetitive pattern of

aggregated built-up and open spaces.

C. Spatial legibility, visual richness and order of invention

The urban framework should allow for the evolution of spatial legibility and visual richness. The primary elements which contrast with the spatial order at the district level should be determined at the design phase; the shape and position of special public outdoor space, as well as the position of special morphologies should be specified in absolute terms, in relation to the internal movement structure and the surrounding neighborhoods.

The emphasis on absolute positioning of some special morphologies is in part a reaction to the SAR method. The method is very conducive to the evolution of visual richness, but less conducive to the creation of spatial legibility. This drawback was clearly evident in the project "Grunsfeld Variations" (MIT, Fall 1980).

My contention is that a major reason for the failure to establish a sense of the whole out of the aggregation of the parts in that project derives from the systematic treatment of the "district" level. It is seen as an aggregation of blocks, with virtually no differentiation and no sub-grouping of the repetitive spatial pattern. This is, in part, a result of treating non-thematic morphologies at the Block level, rather than at the District level.

Spatial legibility has to do with differentiation of the spatial pattern. The implication for systematic design is that decisions about special morphologies should be made with regard to the level *above* in which streets and blocks are elements.

To enhance orientation, the placement of non-thematic morphologies should be decided upon with regard to *both* internal organization of the districts as a whole *and* with regard to the surrounding urban structure. From this perspective, such morphologies are not merely elements of the Tissue Model, but also serve the role of orientators. Thus, the position of the most distinguished morphologies should be determined in absolute geographical terms, as well as in terms of the Tissue Model.

Typical morphologies should be specified in terms of a range of positions, envelope dimensions, dimensional subdivision of public facades, and possibly materials. This range should be determined such that each intervention must include sufficient commonalities with the overall visual order, and conform to a consistent pattern of aggregation. The framework should allow for an intermediate zone between the primary plane of the public facade and the public distribution zone. That plane should be modifiable, and accommodating for projecting sub-elements.

The framework should also specify the criteria for positions and maximum envelope dimensions of future non-typi-

cal morphologies.

3. Design of legible urban structures

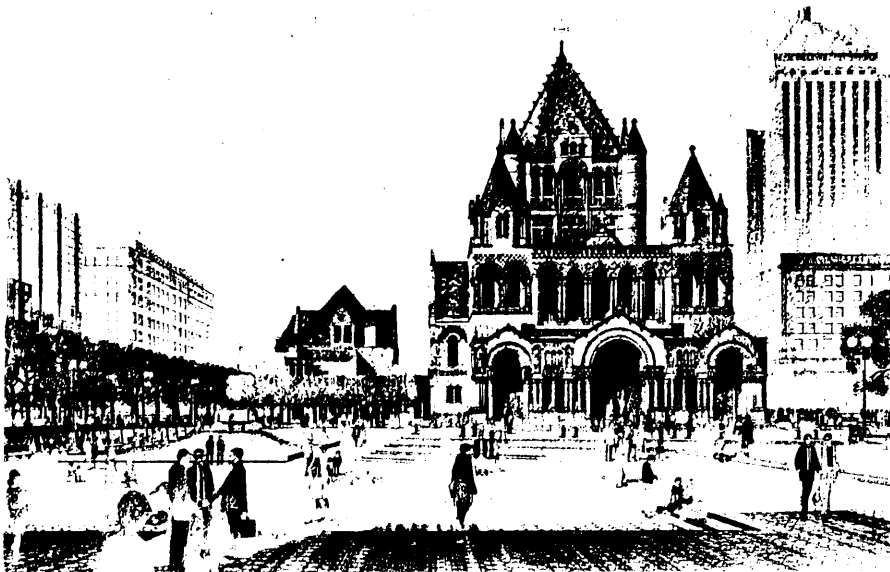
The concept of spatial legibility may be applied to the highest level of the spatial hierarchy, that of Urban Structures. By extrapolation from the district level, legibility at the next level up in the urban framework would be achieved by creating defined neighborhood boundaries and utilizing the concept of contrast to mark special routes and locations within and between them.

At this scale, utilization of topographical characteristics and large open spaces, as well as careful positioning of high-rises, seem to offer an opportunity for improved spatial legibility.

End

Insert 1

Back Bay Impressions



The following description of the Back Bay streets is included here as a reference for the reader who is unfamiliar with the area. It is an excerpt from an MCP thesis by Donald Appleyard (M.I.T., 1958, p. 69-88).

(b) Distribution and Destination¹

The functions of distribution and destination are not segregated in Back Bay as they are in Levittown and Radburn, since the four main streets, Beacon, Marlborough, Commonwealth and Newbury, also contain the houses. This duality of purpose leads to some confusion on the one hand, with certain practical disadvantages of noise, danger, and traffic congestion; but on the other hand there are gains in vitality, through the close juxtaposition of passing traffic and domestic activity. The total image created by these streets is a composite of its double character, which happens rather to increase than to lessen its overall impact on the perceiver. There is an immediacy about the direct transition from the outside to confrontation with the houses, which begin at the entrance to the neighborhood.

The distinction of all these streets depends primarily on their clear and strong spatial definition. The walls are continuous, built up typically with from three to six storey houses mostly in red brick, sometimes in stone, but always in a solid material rather than wood or other light materials. The solidity and continuity of these walls defines the street-space as a rectangular

¹See fig. 15-19.

channel, the containing surfaces of which are further strengthened by the flights of steps from the houses down to the street, which splay the junction between wall and floor to mold the space in a powerfully sculptural manner. This cross-sectional form remains constant throughout most of the length of the main streets, although the width of the streets varies slightly, and very much on Commonwealth.

The proportions of all except Commonwealth are slightly wider than a square, which allows an amount and quality of light on each street which, despite the walled enclosure, is not oppressive in normal weather.

The orientation is always east-west, and the alignment straight, so that parallel vistas may be appreciated in sequence from any cross-street. The streets are not directed at any particular vista, however, and their full length cannot always be appreciated so that they are memorable more in themselves than as spaces leading up to some more important object, as they might be in rond point layout.

The strength of the space is supported by the strongly carried-out detail of the containing surfaces. The sensuously curved bow windows, the heavy stone balustrades, the stone curbs surrounding and defining the front yards, and the iron railings are all designed with vigor and robustness that is distinctive and unifying.

The sidewalks, no longer in the original red brick, are nevertheless ennobled by the large and widespreading trees which are planted along them. Although the tree formation and type of tree changes with each street, the presence in every case of these amorphous elements succeeds in softening and modifying the channel-like spaces. Their color impact in the summer months, greenish yellow seen against brick red, is part of Bostonian character rather than a phenomenon of the Back Bay.

The channel spaces are further modulated in cross-section by the presence of parked cars on both sides of every street. These act like grooves in the space, defining and separating the pavement way from the sidewalks on either side, in such a way that the motorist's vision of the front yards and the lower part of the houses is cut off and his own separate channel is more closely tightened; whereas the pedestrian, whilst securing practical protection from passing cars, also finds his perception directed more to the space of the sidewalk and front yards, steps and houses, than to the pavement. In this way two worlds exist within the total space, and these are the distribution and destination worlds. Their segregation within the channel is dissolved at street intersections where sidewalks stop, at hydrants where cars cannot be parked, and by the trees which arch over both,

joining one to the other. Were the partial spaces not so reduced and constricted by this division they might well form a satisfying relationship. The amount of traffic on any street also has an important visual effect on the space and in the Back Bay this movement clearly reduces the apparent width of the streets, whilst forming a longitudinal barrier between each side of the street.¹

Perceived in sequence these streets retain many similar characteristics, although the present one-way system tends to disrupt this. Entry is by turn-off from Arlington or Massachusetts Avenue with the exception of direct entry across Massachusetts Avenue for Commonwealth and Marlborough. It is therefore clearly marked by change of direction.

From the automobile driver's point of view, the length of the streets (5000 feet) is not unreasonable. The straight alignment and long vistas are perhaps more in scale with vehicular than with walking distance, although what vistas there are seek out buildings well beyond the Common - the Custom House Tower and Parker House for instance. Within the length of each street rhythms take place at two different scales, the block and the house.

¹An M.I.T. thesis correlated traffic volumes with the longitudinal social barrier they created in certain streets. Robert S. Bryan, The Street - A Social Barrier? M.I.T. Thesis, 1951.

The block rhythms are all slightly different in length, a not very noticeable fact since the presence of more sporadic landmarks distracts attention from them. Thus they appear more or less regular. The varying importance of the intersections, however, makes a strong impression. Some have stop-lights, some STOP signs; alternate streets are one-way to the left or to the right, so that traffic flows come in from different directions, and their names descend in alphabetical order. These clusters of variants make every intersection different in character, but unfortunately their impact is not made architecturally. The directing signs are standardized elements, forgotten as soon as they have been registered and used. Consequently there is perpetual confusion in attempting to identify one's position in the length of the street.

Orientation is helped much more by the existence of Dartmouth Street which is wider than all other cross-streets and therefore creates a strong reference point whose influence extends over two to three later streets in the sequence. Other reference points are created by churches such as the First Unitarian, and First Lutheran on Marlborough, which emphasizes the turn-off to Storow Drive.

In addition to these points within the length of the streets, in one or two cases landmarks on the vista change

in relation to each other, like the spire of the First Unitarian Church and the Custom House Tower on Marlborough, or John Hancock and New England Mutual on Newbury; or they grow in size like the State House on Beacon. These are interesting chance phenomena which, however, seem to do little to help accurate positioning. For the pedestrian the cross-vistas at intersections, particularly of the M.I.T. skyline across the Charles River Basin, are much more telling.

Differentiation between Destinations

The rhythms set up by the houses, though mostly of an arbitrary character, are nevertheless wholly successful in differentiating one home from the next within the block lengths. The identifying features are not generally the total form of the house which often is suppressed in deference to the unity of the terrace, but certain predominant parts, chiefly the bow windows and the flights of steps up to the front doors. These features are discernible by the searching car driver, whilst from the sidewalk the front yards are the key identifying feature. One important lesson that these houses seem to demonstrate is that the use of rhythms or rows of repeated elements is perfectly adequate for the purposes of identity. It is unnecessary for every house to be different, or even

for alternate houses to be different. Short rhythms form groups of similar elements, each of which begins to gain identity as a small group within which it is easy to position oneself, so that the normal block length of, say, thirty houses instead of being read as one group may be broken down into groups of six to ten houses, as is the case on many Back Bay streets.

The role of the front yards appears to be different and more precise, so that general identification of groups can be made and then particular articulation between dwellings can be made through the front yards. It is interesting to note that these houses, built for the best families and therefore most demanding of individuality, nevertheless submitted to a communal order.

Differentiation between Distribution Paths

Within the framework which relates each main street there is sufficient differentiation to establish clearly the identity of each. To do this it is necessary to regard each street in toto as an image, commencing with the most easily distinguishable.

Commonwealth

This street contains many unique elements, which include, on the horizontal plane, its great width (200 feet), the central park strip, intense two-way traffic. The containing walls are higher and of more monumental character,

including many hotels and clubs in addition to houses.

Within the space the four rows of trees in the central strip articulate it into three parts: the center under the trees where people may sit and stroll and where seats and sculpture are placed, and that on each side between the arching trees and the buildings.

Sequentially, the underpass entry is its most memorable feature, with the gateway to the Common as a pleasant climax. The Custom House Tower can be seen from one side but makes little impression.

Marlborough

Opposite characteristics appear to distinguish Marlborough. Its narrowness (60 feet, equal to Newbury) and the quietness of its one-way traffic, but most of all its huge and sporadically placed trees, which in summer entirely fill the street space, are its recognizable qualities. This combination results in a visual barrier, and affects the quality of light. The darker atmosphere of Marlborough Street is an impressive characteristic. In winter when the trees are sparse, the vista of the Custom House Tower with the spire of the First Unitarian Church in front is most memorable.

Whilst the previous two streets exhibit extremes in character, the remaining pair represent the means and are thus less easily distinguished.

Beacon

Beacon may be recognized only perhaps by its negative characteristics. However, its pavement width is greater than any other single lane in Back Bay, a fact which is remembered by motorists; its traffic flows only from ^{east} west ~~to east~~; and its trees are regularly spaced down the sidewalks. Sequentially, Beacon fails to end visually at Massachusetts Avenue since, unlike the other streets, it does not bend there. It gives an impression of infinite length, with the sky descending to street level.

Unfortunately, its proximity to the Charles River is not an obvious characteristic, since the latter's presence is all but denied. The short cross-vistas are too brief to be appreciated from an automobile.

Newbury

Newbury could, of course, be distinguished just by not containing any of the other streets' characteristics. In fact, its use changes have affected its character a great deal. The domestic quality has nearly disappeared. Some houses have been replaced or pulled down for parking lots; shop fronts have been installed; and the sculptured quality of the space has been further weakened by the elimination of the flights of steps to the houses, and made naked by the disappearance of trees.

(c) Minor Distribution¹

The cross-streets are seven in number: Hereford, Gloucester, Fairfield, Exeter, Dartmouth, Clarendon, and Berkeley, with Arlington as the end street before the Garden. These cross-streets, with the exception of Dartmouth and Berkeley, act as minor connectors between the main distribution streets.

Their widths (60 feet; Dartmouth is 100 feet) are identical to Marlborough and Newbury, but here the relationship ends. Their walls are discontinuous, since most of their houses face onto the main streets right up to the corners, a proof of their inferiority. Interestingly, in Marlborough and Newbury the houses on the cross-street often lead up to the intersection, indicating a certain equality of importance. Generally, however, the impression created is one of a cross-sectional street cutting through to serve the main streets. Even where houses are continuous they have small front yards, lacking the grandeur of those on the main streets. Trees occur only at intersections with the major streets. Their unity is maintained by the straight vistas and limited length. Some of the vistas extend right across the Charles River Basin to hit M.I.T., but these, like most grid-iron vistas, are unconscious and vary in quality.

¹See fig. 20.

At the Massachusetts Avenue end the height of Boylston Street creates a concave basin-like quality in the length of these streets, which is most pleasant. The Boylston Street vista rises up to the sky, and the length of the street is contained as a unity. The grand and hanging concave spaces of San Francisco streets are hinted at and recalled.

The whole street length is gathered on entry, and initially the straight vista suggests that there will be high continuity. This impression is immediately destroyed by the short length of the blocks, the presence of the aforementioned clusters of signs and directions at each intersection, slow traffic and dramatic, wide and varied cross-vistas. Crossing Back Bay is a staccato experience of high quality.

Differentiation between Minor Distribution Paths

From all these streets, Dartmouth stands out clearly, by its greater width, its large corner buildings, two-way traffic, and its fine entry from Copley Square. Unfortunately, the opposite vista, which could have magnificently exploited the Charles River Basin, has been destroyed by the narrowing of the street. The other streets have to rely on smaller differentiations. Although vista is important, the presence of prominent buildings, such as

the Exeter Theater, or First Lutheran Church, are the prime factors of identity.

4. SECONDARY MOVEMENT STRUCTURE¹

Since Back Bay is near the center of Boston, many of the facilities found within its boundaries are the servants not merely of Back Bay, but of the whole metropolitan area. The functions of secondary movement are therefore confused. Two cases of secondary movement by pedestrians might well be mentioned, however.

1. The central green park-strip of Commonwealth Avenue still functions as a place for people to stroll and sit. Further, its connection with the Boston Garden at one end defines its destination. People gather onto it from the other Back Bay streets; and hence it becomes a main pedestrian circulation channel, a concept developed in Philadelphia more fully as the 'Greenway' system.

The present turmoil caused by fast-moving traffic which has virtually destroyed its original function, must contrast strongly with its probable atmosphere fifty years ago, when carriages and strollers related more closely to each other as forms of movement.

¹See fig. 21.

The outlet of Commonwealth into Boston Garden seems to be a case where the 'exit' direction seems to be the more successful. This may be explained by the presence of accessible open space adjacent to a dense neighborhood, but the key feature here seems to be the strip of trees which runs down Commonwealth and expands into the scattered trees of the Garden. It is as if the space were being sucked out of Commonwealth Avenue in such a way that a person standing there would feel this attraction. The interpenetration of areas suggested by this phenomenon and the possibilities of attraction and repulsion, pressure on space, could help greatly in achieving more clearly pathed structures.

2. The service alleys in the centers of the blocks, which parallel the main streets, form a secondary movement structure in embryo. Originally intended only for the more lowly functions of life, they have under modern conditions begun to take on some of the characteristics of a Radburn cul-de-sac. Their narrowness (about 8 feet of pavement) prevents any but the slowest of traffic movements, so that children can safely play without much disturbance. Many children also use them for circulation about the area. They seem to find much more of interest in these streets than in the main ones. The informality of

differentiated back yards, trash barrels and parked cars all contrast greatly with the main street formality. Many owners are converting their back yards, which are three feet lower than the alley, into private parking lots, so that there is much elementary building activity, with ample quantities of sand, bricks and concrete blocks for divertimento. The children's attitude to these streets seems to be markedly different from the almost comical abhorrence registered by a group of adults who were taken through one of these alleys to record their impressions,¹ and it is true that only a few eccentrics, and people going to their cars, are to be seen there.

Potentially, then, these streets might suggest the formation of an informal secondary pedestrian circulation structure in the center-city areas, as contrasted with the formality, definition and dynamics of the primary circulation structure, as are the pedestrian parks of Radburn to its main streets and culs-de-sac: a system which is urban yet open-ended.

Community Facilities

The visual influence of community facilities in a grid-iron plan such as Back Bay merits examination. It

¹Lynch, Kevin, Go Take A Walk Around The Block, M.I.T., unpublished report, 1957, pp. 12-14.

can be well illustrated by a comparison between the location and form of the First Unitarian Church and that of the new First Lutheran Church, on opposite corners of the Marlborough/Berkeley intersection.

First Unitarian Church, Gothic in style, has a spire which can be seen on the skyline, and for some distance down Marlborough Street. However, on approach down Marlborough its influence actually diminishes, for there is little space around it to set it off. On the other hand the First Lutheran Church, which is a low isolated form and cannot be seen more than two blocks away in any direction, exerts a strong influence over its immediate environment, since it has a space, one of the few vacant lots in the Back Bay, next door to it on Commonwealth.

An important factor on Marlborough is the one-way flow of the traffic which makes it difficult to see buildings on the near corners at the ends of blocks, which emphasizes the buildings on the beginning of the blocks.

In this sort of continuously built-up city-structure, space around a building becomes extremely important. Most of the great historic spaces were formed to set off buildings, rather than as squares in themselves, a fact which has not been forgotten on Park Avenue today.

The projection of any object into the street of a grid-iron plan makes a very strong impact since it breaks the extreme continuity.

5. EVALUATION OF STRUCTURE AS AN IMAGE

The Back Bay is the most strongly imageable of the three neighborhoods considered. Orientation within the district is easy and clear, but there is more than this. Its unity and grandeur has been little affected over the course of eighty years. They still demonstrate a belief in urban living and man-made artefacts that is not evident in today's suburban developments. Even Radburn seems tentative in comparison with this assurance. Back Bay was not the result of any particularly new concept, like that of Radburn. Rather it was a masterly interpretation of a strong tradition in domestic architecture and layout. As with the Greeks, the functional problems were so well understood that they were "grasped as an idea."

The following points may be made.

1. The clarity of over-all form is unique for a residential neighborhood. Its own compactness and unity, with the presence of the Charles River as a kind of forecourt, have through facade and skyline made it as visible as any public building with a forecourt. The grouping of tall buildings behind it like John Hancock and the future Prudential complex will, by defining its depth, allow a further imaging of its three-dimensional form. Differentiation on all other facades with the strong dividing line of Massachusetts Avenue completes the isolation.

2. The main entries into Back Bay, those down Commonwealth and Dartmouth, have to some extent suffered from the automobile. The kinked entry along Commonwealth still exhibits the subtle character of such an entry despite the underpass, whilst Copley Square antespace, although not appreciable beyond a cursory impression from an automobile, still heightens the approach into Dartmouth. This latter entry nowadays is more for pedestrians, despite the narrow sidewalks of Dartmouth. Of the later and more uncontrolled entries the long broadside view of the river facade and skyline is easily the most successful. This is truly an automobile entry, contrasted violently by that from Storrow Drive into Beacon Street.

3. The image created by the longitudinal distribution streets is one of the strongest individual features of Back Bay. Their high continuity depends on a channel-like spatial definition, with vigorously sculptured containing surfaces in solid materials, their lines of parked cars, and their straight parallel alignment. Long vistas can be appreciated, or at least sensed, down each one, whilst the presence of large trees softens and differentiates their spaces. The long blocks allow some large scale to the sequence, but not enough to avoid a certain compromise in continuity.

As destinations they gain much from the parked cars, which define and separate destination area from distribution, whilst the forcefully molded facades, front steps and differentiated front yards 'slow down' the space to pedestrian scale, and help horizontal differentiation. Location within the length is secured by certain non-residential buildings which act as landmarks or reference points. Their influence is spread in sequence by the steady rhythms of intersections.

4. Horizontal differentiation between these streets within the unified framework described is especially remarkable. Commonwealth stands out clearly as the main axis, by virtue of its central location, width, park strip, tree lines, grand facades and high-class strollers. Marlborough is distinguished more for its quietness, the large arching trees placed about in the space, and its small scale; Beacon for its end-location, and continuity from Beacon Hill, double line of trees and high facades; and Newbury for its commercial uses, and lack of trees. Each street has a theme about which the characteristics cluster. It was once said that "According to Boston lore, Beacon Street has been occupied by people who have both 'family' and money; Marlborough occupied by people with 'family' but no money; and Commonwealth Avenue has been the choice of

people with money but no 'family.'¹ This can be seen in each street today despite changes in social character.

5. The minor distribution streets are clearly distinguishable from the main distribution streets by their cross-sectional character. They are perpendicularly oriented, with most of their walls formed by the end houses and gardens of the main streets, and no trees. Their intermittent sequences are characterized by short block-lengths, dramatic cross-vistas, and staccato rhythm climaxing in the center, and their unity almost entirely formed by their straight alignment (and lack of trees) which allows the whole length of each to be appreciated from any point along it. Dartmouth is the unique exception by virtue of its impressive entrance from Copley Square, its width (100 feet) and impressive corner buildings, and two-way traffic. The rest of the streets are differentiated only by name and in some cases by the landmarks of non-residential buildings, or vistas across the Charles River, in that order of priority.
6. The two secondary movement structures examined represent, in one case, an original intention built into the

¹Firey, Walter, Land Use in Central Boston, Harvard University Press, Cambridge, Mass., 1947, p. 263.

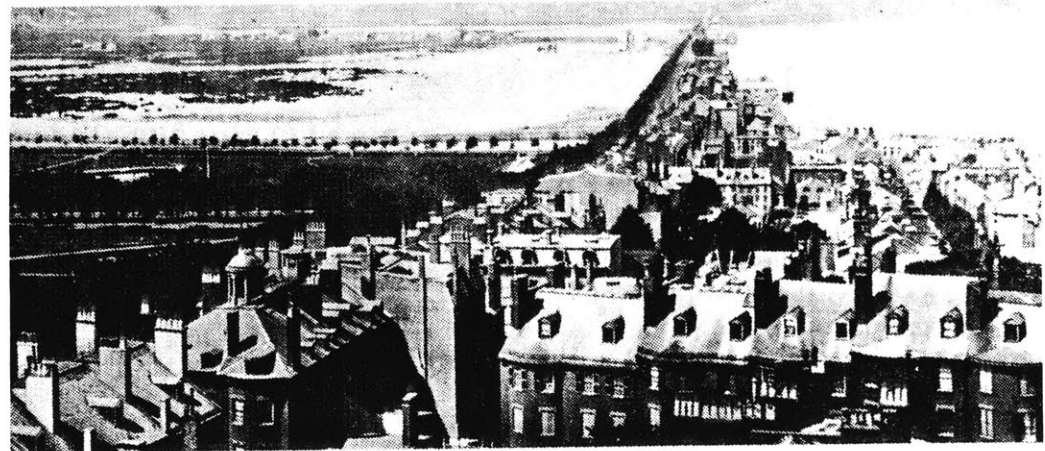
plan, and in the other a spontaneous activity by the occupants. The first, comprising the Commonwealth center strip and exit into the garden, was a perfectly resolved and highly imageable solution now compromised by the automobile. The second, almost a result of the automobile, points up a demand and suggests some characteristics of a new movement structure.

7. The scatteration of community facilities about the neighborhood is due to its unique location and so is outside the context of criticism. The only conscious formulation of facilities can be considered to be Copley Square and the Garden. The location of these 'outside' but adjacent to entries into the neighborhood shows dependence on the outside world, similar to the shopping centers of Levittown and Radburn. Copley Square is a fine example of how these public buildings and spaces can help to make the movement structure imageable.

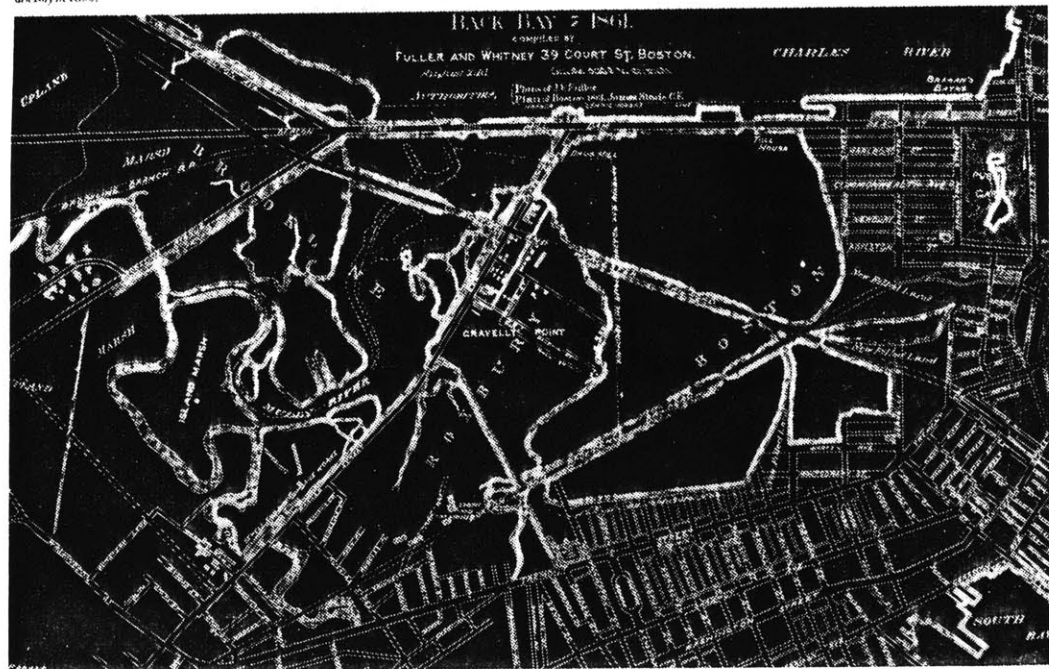
To show the effect of a grid-iron plan on location of community facilities, the location and form of the two churches demonstrates the limited influence of these or any buildings on a grid-iron plan, where the circulation structure predominates, and vistas are matters of luck.

Insert 2

Evolution of the Back Bay Area



Back Bay in 1858.



For a person looking west from Beacon Hill prior to 1857, the Back Bay would offer very few clues about its future form: A shallow body of water, surrounded by an amorphous shoreline, it laid between Boston in the east, Roxbury in the south, and Brookline in the west, functioning as a tidal basin for the Charles River.

The built-up area known today as the Back Bay is, in the very basic sense of the word, a man-made environment. Intervention in the Bay was initiated in 1814, when the Boston and Roxbury Mill Corporation proposed a scheme to harness its tidal flow for commercial power generation. A granite-faced Mill dam (completed in 1821) stretched across the Bay from Charles Street to Sewall's point (now Kenmore Square) along a route corresponding to the present Beacon Street. A shorter cross-dam, projecting northward from Roxbury, intersected the mill dam and divided the Back Bay into full- and receiving-basins. The Mill dam project, however, was soon forced to compete with steam power-generation and never became the financial success envisioned by its promoters. Railroad lines built on trestles across the dammed basins in the 1830's further impeded the flow of water in the bay. The shallow basin, which served as an outlet for part of Boston's sew-

age system, became clogged; and its stagnating waters produced such noxious odors, that by 1949 the Boston Health Department demanded that the area be filled in the interest of public welfare.

The construction of the Boston-Worcester and the Boston-Providence railroads, as well as the overflowed sewer-system, may serve as indicators of the City's growth. Boston of the mid 19th century was a booming city. Its prosperous economy and cultural elitism attracted both Americans and immigrants in large numbers, such that the influx of population between 1840 and 1850 resulted in a population growth of 47% (43,000 to 137,000 citizens).

One immediate result of Boston's prosperity was an intensified competition for land. However, by 1850, the last in a series of small-scale fill operations in various locations around the Boston peninsula was completed. By that time, all the potential areas for residential development were occupied, and all local resources of filling material were exhausted.

The scarcity of developable lands resulted in soaring prices. During the 40's and 50's, home-owners were forced to sell out under real and speculative pressures, and the practice of absentee ownership became prevalent. It was during this period that interest in develop-

ing the Back Bay for housing was renewed, despite the technological difficulties and lengthy negotiations such undertaking was sure to involve.

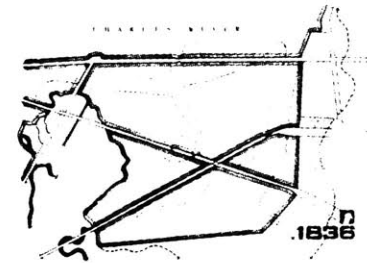
In 1852, a special commission was appointed by the State Legislature to prepare a plan for the development of the Back Bay. Prolonged negotiations had brought about the Tripartite Agreement of 1856 which divided the proposed lands among the Boston and Roxbury Mill Corporation; its subsidiary, the Boston Power Company; and the Commonwealth of Massachusetts. The City of Boston, which played a rather adversary role in the process, was granted some 2.5 acres from the Commonwealth's share as an addition to the proposed Public Garden.

The filling of the Back Bay began in September 1857. In the absence of a near-by source of land-fill, a specially constructed railroad line enabled the contractor to transfer gravel from digging pits in Needham. By 1860, the Back Bay had been filled up to Clarendon Street; by 1870, the fill had reached Exeter Street; by 1880, the entire area known as the Residential Back Bay District was solid ground; and by 1890, the fill extended beyond Kenmore Square into Brookline, and was continuing along Back Bay Road. At its completion, the project had added some 680 acres of buildable land, 450 of which were



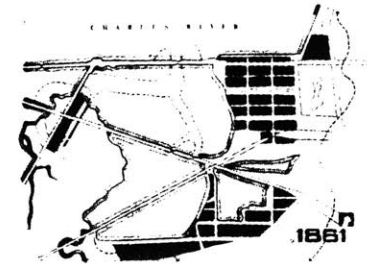
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2 1808 map of Boston superimposed
in white on map of Boston in 1969

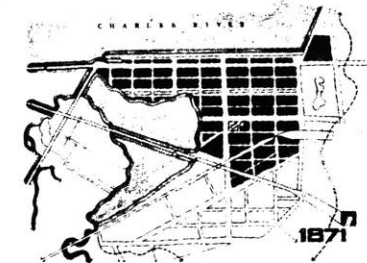


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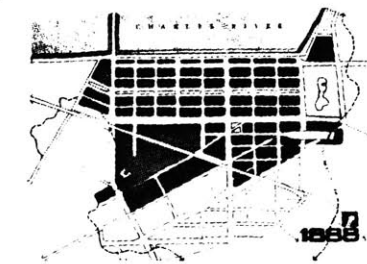
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6



3 The Back Bay in 1836

4 Extent of fill in 1861

5 Extent of fill in 1871

6 Fill basically complete, 1888

37

incorporated to the City of Boston.

Evolution of the Urban Form

The plan adopted by the Commonwealth in 1856, attributed to Arthur Gillman, has changed continuously as the fill advanced and streets were laid out. Moreover, the continuous development of the Metropolitan and the introduction around the turn of the century of the automobile have significantly altered the urban context on which the original lay out was based. As this study is concerned primarily with the general aspects of the Back Bay's morphology today, only a summary of its evolution is presented below. A detailed discussion of the development process, and the districts architectural features, can be found in several other publications.

Despite the City's unwillingness to cooperate in developing the area as one monumental unit, and despite the fact that the Commonwealth did not have full control on the entire filled area, the Commissioners on Public Lands were apparently willing to invest much effort in creating a dignified urban environment. While maintaining the objective of economic profitability, they secured the homogeneity and spaciousness of the area by a number of decisions.

The planners provided five broad avenues in the East-West direc-



NEW BOSTON AND CHARLES RIVER BASIN.

* to secure the adherence of the Boston Water Co. to the plan in its section of the fill, the Commonwealth had to compensate for loss of fillable land by ceding to it 12 acres of State holdings in the lower basin.

tion. Varying in width from 90 to 200 feet, these roadways were amplified by set-backs on abutting property which, in effect, created spatial corridors 112 to 240 feet wide* of the entire state holdings in the Back Bay, 43 percent of the area was devoted to streets and parks compared to 49 percent devoted to salable building lots.

Severe (by the contemporary standards) property restrictions where incorporated into the deeds. Manufacturing was prohibited from the entire area, and along Commonwealth Avenue and Boylston Street commercial uses were prescribed. Stables were discouraged, although not prohibited. Buildings had to be at least 3 stories in height, constructed of masonry and their front had to conform to the uniform 20 or 22 feet set back zone. Detailed ruling encouraged and controlled the size and shape of projections into the set back zone. Even after desposing of its holdings in the Back Bay, the Commonwealth continued to enforce these property restrictions. The Mill Corporation and the Boston Power Company chose to incorporate the same restrictions into the title deeds of the lots owned by them.

The consistant utilization of the service alley provided a convenient service access and kept the delivery wagons off the main street. The presence of the alley and the fact that no recreational

use of either front or back yards has been uncommon enabled the relatively smooth accommodation of the automobile in subsequent years.

Simultaneously with its growing attractivity and grandeur as a residential area, the Back Bay became a desirable location for institutional buildings. Encouraged by the Public Authorities, who donated lands for religious, educational and cultural institutions, some twenty public buildings were constructed in the area before the year 1900. By 1920, the area between the Public Garden and Kenmore Square was completely built-up, with some demolition and reconstruction already taking place in its eastern blocks. In this period, the Back Bay had had a distinct identity, derived from its homogeneous morphology and the visibility of its church towers.

The technological advancements, particularly in the area of powered transportation, and construction methods have begun to change the original morphology of the area as early as the 1980's. With the expansion of Beacon Street and Commonwealth Avenue to the west, the relation between the Back Bay and the metropolis had changed altogether. From a peripheral neighborhood of Boston Proper it is now served as a thoroughfare, an indispensable link in

the urban structure.

Compounded by the "flight from the South End" and by the growing status of Boston as a major urban center, the introduction of the elevator and steel-frame construction enabled developers to tap the previously unexplored market for apartment buildings. This process is reflected in the large number of such buildings in the western parts of the area. The pressure for land around the Hub (Boston Proper) was reflected also in the addition of fifth and sixth floors to the original houses.

With the automobile now enabling the luxury of suburban living, many affluent home-owners had vacated their residences in the Back Bay between and after the World Wars. As Boston became a leading educational center, many of the original structures were converted into schools and dormitories, particularly along Beacon and Marlborough Streets. In the 1970's, property records show a sharp increase in ground-floor conversions from residential to commercial use along Boylston and Newbury Streets. Large portions of the blocks adjoining Boylston Street were subsequently demolished and replaced by higher, bulkier structures, eventually leading to its current character as "Boston's Fifth Avenue."

By hindering direct access to the Charles River bank, the construction of Storrow Drive in 1938 had further reduced the attractiveness of the area for home-owners. The encroachment of commercial activity along Newbury Street was followed by conversions of houses to apartment buildings and professional offices in other sections of the Back Bay. By the 1950's, the area was declining as a living environment.

The situation arose increasing concerns for its future. Supported by culturalist advocacy (notably Luis Munford and Walter Whitehill), City authorities initiated a major effort to review the area both as a business sector and as a residential neighborhood. In the 1960's, the construction of the Prudential Center was followed by a comprehensive study of the Boston Redevelopment Authority. This effort resulted in a "Plan for the Back Bay" (1967); it regulated the expansion of commercial activity in terms of both location and visual impact, and attempted to improve the interface between the Back Bay (east of Newbury Street) and the secondary urban areas. The majority of the area was declared an "Architectural District," which later was subdivided into Business and Residential Districts; specific guidelines for physical

intervention were developed for each.

The renewed municipal effort to improve the appearance and status of the Back Bay found its symbol in the controversial construction of the John Hancock Tower (1974) and the reshaping of Copley Square. The Tower was only one in a series of high-rises, which together with those built in Downtown Boston have diminished the visual identity of the original Back Bay area in relation to the surrounding metropolitan.

The 1970's also saw a booming building activity in the Back Bay on a smaller scale. As part of a larger move "Back to the city," hundreds of houses were converted into condominium apartments, augmented by the City's investment in street scaping. Reflecting the development of Newbury and Boylston Streets as regular centers of cultural and commercial activities, a significant number of houses along those streets has been demolished or modified. Three of the corner lots along Newbury and Boylston Streets now serve as surface parking.

This process, which is still going strong at the time of this writing presents drawbacks as well as opportunities for the Back Bay as an urban neighborhood. First, despite the nominal increase

in owner-occupants, speculative pressures raise doubt about the stability of its population. Second, an increasing number of houses in the area is turned into non-residential uses, particularly professional offices and service agencies of different sorts. Third, there is a growing pressure to increase density through construction of mid- and high-rise apartment buildings, a process which has already taken place along Beacon Street.

These tendencies are bound to create changes in the visual appearance of the Back Bay. They are already evident in a number of recent planning and design projects published by both official and private groups. Only through the viable characteristics of the existing urban framework can guidelines for the transformation of the Back Bay assure the future integrity of its visual organization.

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