THE ASYMMETRICAL SPINE: A GENERATOR OF DESIGN

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# TABLE OF CONTENTS

Abstract 3
Acknowledgments 4

## PART ONE:
THE ASYMMETRICAL SPINE:
A GENERATOR OF DESIGN
WATERFRONT HOTEL/BOSTON 7

### Drawings:
1. Waterfront/Boston 9
2. Axonometric: Site 10
3. Axonometric: Spine, East Building 11
4. Plan: Ground Level 12
5. Section: A-A' 13
6. Section: B-B' 14
7. Section: C-C' 15
8. Section: D-D' 16
9. Axonometric: Partial View of Spine 17
10. Axonometric: Strong Side of Spine, View From Below 18
11. Axonometric: Weak Side of Spine, View from Below 19
12. Plan: Structure 20
13. Plan: Level Two 21
14. Plan: Level Four 22
15. Plan: Level Eight 23
16. Elevations: West and North 24
17. Elevation: South 25
18. Axonometric: Structure 26
19. Elevation: Structural Pieces 27
20. Section: Structural Pieces 28
21. Plan: Structural Pieces 29
22. Reflected Ceiling Plan 30
23. Floor Paving Plan 31
24. Axonometric: West Facade 32

## PART TWO:
THE ASYMMETRICAL SPINE:
A GENERATOR OF DESIGN
THE ANALYSIS OF THE FORM 33

Appendix I 55
Bibliography 57
Abstract

THE ASYMMETRICAL SPINE: A GENERATOR OF DESIGN

William L. Rawn, III

submitted to the Department of Architecture on February 6, 1979, in partial fulfillment of the requirements for the degree of Masters in Architecture.

The asymmetrical street or spine is a form commonly found in urban settings. Such a form has an inherent opportunity to accommodate interesting physical or natural settings to the cityscape, yet often the form results in an unbalanced and alienating street, a street which becomes unsuccessful in the sense of generating pedestrian activity. Through an analysis of three examples of unsuccessful asymmetrical spines—Lower Ramblas in Barcelona, Boylston Street in Boston, and part of the Prudential Center in Boston—and four examples of successful asymmetrical spines—Upper Fifth Avenue in New York, Alamitos Bay Boardwalk in Long Beach, Rue de Rivoli in Paris, Cafe Fronts in Ibiza—several different factors have been defined which are important in the consideration of such spines at the urban design scale. Thereafter, these factors are applied to the consideration of design elements in a building design project.

That building design project is the Waterfront Hotel adjacent to the Waterfront Park on lower State Street, Boston. The design of the hotel is generated first by the design of a 500 foot long (through two buildings) and 36 foot high asymmetrical spine. A structural system is devised to accommodate the factors important in the review of the asymmetrical spine typology and to serve the particular needs of a hotel and mixed use urban building. The results of this design exploration are set forth in a set of 24 drawings which include numerous plans, sections, elevations, and seven axonometric drawings.

Thesis Supervisor

Imre Halasz
Professor, Department of Architecture
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To the caliphs of Cordoba who for 200 years, beginning in 785, pursued an architectural vision for the Mosque of Cordoba, a vision that is as powerful a statement about design and design potential today as it was 1194 years ago.
PART ONE:

THE ASYMMETRICAL SPINE:
A GENERATOR OF DESIGN

WATERFRONT HOTEL/BOSTON

After the consideration of the issues relating to the asymmetrical spine as both an urban form and a building form, issues set forth in Part Two of this thesis, I looked for a site in Boston which would enable me to further study this form in the process of developing a design for a building. The most obvious requirement of any site is that it be strongly linear in order to provide an opportunity to generate a design around a linear spine. A fascinating, timely, and now very controversial site with this configuration exists adjacent to the Waterfront Park---between the foot of State Street on the south, Waterfront Park on the north, the Chart House and Long Wharf on the east and Atlantic Avenue on the west. I chose to ignore the timely and controversial aspects of the site and instead chose to concentrate on those fascinating aspects of the site, particularly those that might relate to the generation of the form of the building around an asymmetrical spine.

This site is part of the Downtown Waterfront-Faneuil Hall Urban Renewal Plan and was a set of parcels which was opened to architect-developer submissions for January 12, 1978. Due to Boston Re-development Authority (BRA) requirements and subsequent judicially imposed agree-ments between the City and the neighbor-
hoods, several constraints and many recommendations were made regarding the design of a hotel building on this site. The major requirement was that a pedestrian easement be retained through the middle of the site (running from the edge of Waterfront Park southward toward the Aquarium). This constraint, because of its importance and its inherent wisdom, even though it created problems for the building, I chose to keep. Recommendations were made regarding the massing and the relationships to neighboring buildings. I followed most of these, particularly the one asking that the height of the hotel not exceed the height of the New England Telephone Company Building. With respect to the Chart House and the buildings on Long Wharf, I chose to respect that relationship, respond to those buildings, but not to force the massing to be the same height or scale as the buildings to the east. With respect to the site line from Richmond Street across Waterfront Park to the corner of the Chart House, I chose to ignore it since at present, with vegetation, mounding, and the built forms in the Park, such a site line barely exists today.

Important Dimensions:

Length of Building: 532 feet
Width of Major Massing of Building: 78 ft.
Width of Entire Building at Ground: 236 ft.
Height of Building at East End: 116.5 feet
Height of Building at West End: 104.5 feet

Square Footage of Building: 350,000
Square Footage of Site: 110,900

With respect to the program for the building, I have attached the recommended BRA program as Appendix I. The building that is designed here follows that program very directly. Square footage for retail, ballroom, conference, kitchen, and restaurant facilities are similar to the recommendations. The facility designed here has 250 hotel rooms. Those rooms vary in size, but the general size is either 380-390 square feet or 450-480 square feet.

With respect to the structural pattern, the structural ladders are 14 feet by 14 feet. They are 30 feet apart in the east-west direction (parallel to the spine) and 25 feet apart in the north-south direction (across the spine). The spine itself runs the length of the building, and, except for the hotel lobby area, is 25 feet wide and 36.5 feet high.
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III-JANUARY 1979

DRAWING 1

WATERFRONT/BOSTON
THE ASYMMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

DRAWING 3:
AXONOMETRIC:
SPINE, EAST BUILDING
THE ASYMMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

PLAN: GROUND LEVEL
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

SECTION C-C'
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

SECTION D-D'

DRAWING 8
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

DRAWING 9:
AXONOMETRIC:
PARTIAL VIEW OF SPINE
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III—JANUARY 1979

DRAWING 10:
AXONOMETRIC:
STRONG SIDE OF SPINE,
VIEW FROM BELOW
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

DRAWING 11:
AXONOMETRIC:
WEAK SIDE OF SPINE,
VIEW FROM BELOW
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

DRAWING 14

PLAN: LEVEL FOUR
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

ELEVATIONS: WEST AND NORTH
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

ELEVATION: SOUTH

DRAWING 17
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/ BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

DRAWING 18:
AXONOMETRIC:
STRUCTURE
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III-JANUARY 1979

ELEVATION:
STRUCTURAL PIECES
THE ASYMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III—JANUARY 1979

SECTION:
STRUCTURAL PIECES
THE ASYMMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III—JANUARY 1979

DRAWING 21: 4

PLAN: STRUCTURAL PIECES

29
THE ASYMMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III - JANUARY 1979

DRAWING 23: FLOOR PAVING PLAN
THE ASYMMETRICAL SPINE
WATERFRONT HOTEL/BOSTON
WILLIAM L. RAWN, III--JANUARY 1979

AXONOMETRIC:
WEST FACADE
PART TWO:

THE ASYMMETRICAL SPINE:

A GENERATOR OF DESIGN

THE ANALYSIS OF THE FORM

In older cities of the world, the most common street is the long, linear street with similar forms on each side of the street. Most cities of Europe and many in this country are dominated by this generalized form. But sometimes, due most often to a special feature of the natural landscape, a special institutionalized use, to the intersection with another urban form (e.g. a plaza), or to unexplained events of history, one side of a street is different from the other. This asymmetry produces some intriguing form results and has important implications for the nature of the street in the city. Applied to a building context and freed from some of the constraints of the urban scale, other form implications follow. This analysis seeks to better understand some of those form implications of the asymmetrical street and apply some of that learning to design at the building scale.

In its most traditional form, from medieval times to the 19th century, the street has been a linear form, relatively narrow, bordered on each side by built form of roughly the same scale. This "balanced" or "symmetrical" form of the street became institutionalized in the Renaissance; it became almost an absolute rule in the 19th century. Of course, such a form requires a certain
communal care, a community sensitivity often difficult to enforce in the democratic and capitalist societies of the Western world in the 20th century. Likewise certain tenets of the so-called Modern Movement of the 20th century often questioned and usually ignored any reliance on a symmetrical street edge. In addition, the evolving American cityscape ignored this tendency toward symmetrical street edges. The American experience is due to various factors: the consciously anti-urban bias of this country, a bias related in part to the dominant English and German influences on our culture; the agriculturally-based American economy and culture; and the concomitant abundance of land requiring less concentration of and less relationship between buildings within any built form concentrations which might exist; and the fact that much of the American cityscape has been built in the 20th century, long after the dominance of the neo-classical tradition and long after the automobile began shaping the form of the street rather than the pedestrian shaping that form.

This part of the thesis is interested in the nature of the street space and its ability to work successfully in the urban landscape. Success in this sense is measured simply by the ability of the street to generate pedestrian activity. A rule of thumb can be stated most elementally: the greater the activity, the more successful the particular street. Since this thesis is applying its findings to the generation of design of an individual building which must rely on pedestrian, not automotive, movement, this simple measure it even more fundamental for our purposes.

If one considers European streets which generate a large level of pedestrian activity, particularly successful commercial streets, in almost every case, such a street has a symmetrical form---the buildings on both sides of a street are of similar scale and use. That similarity leads directly to a sense of balance. And that sense of balance seems to encourage uses and ambiances which generate a high level of human activity. Particularly in the commercial streets of Europe, this balance is found in almost every instance. Where a well balanced, high-activity commercial street suddenly loses that balance, the level of human pedestrian activity abruptly declines. An example of this can be found in the changes that occur at the harbor end of the Ramblas, the most important walking street of Barcelona.

The Ramblas of Barcelona is justifiably famous around the world. From Plaza Cataluna at the north to some point near Plaza Real (south of the Opera House), an almost unbelievably high level of activity is maintained on the street at all times of day and night. It is a famous walking street, a paseo, a street to which people of all classes
go in order to see and to be seen. It belongs to all of Barcelona, and now in the summer to all the world. Its series of newstands, bird cages, flower stalls, and cafes make the stretch from Plaza Cataluna to Plaza Real very successful in its generation of human activity. This is undoubtedly due to a whole series of physical, cultural and economic factors. The width of the Ramblas compared to its height is one factor. Another is the relative narrowness of the parts of the street devoted to the automobile. A third is the very narrow sidewalks along the storefronts on the edge of the street. A fourth is the generous width devoted to the central walking portion of the street. A fifth is provided by the added definition of the space, volumetrically, by the overhanging trees along the street. A sixth may be its central place in the urban design of the city in that it is the single most straight path through the very dense and complicated Barrio Gotico part of the city.

Nonetheless, shortly after Plaza Real, all this sense of human activity immediately changes. Many of the above physical factors have remained and in fact the last portion of the street goes from Plaza Real to the edge of the harbor. One might think that this would be an important, often exciting, and certainly activity-generating part of the paseo. However, at a point immediately south of the entrance to Plaza Real, one factor of the six listed above
changes, first ever so slightly and then in a more major way. First the edge of the east side of the street is slightly pulled back due to a small square which increases the distance between the central portion of the street and the shops on the street edge. Now this square is filled with parked cars. Some distance farther, on the west side of the street, some of the old buildings have been torn down and several new buildings have been built. These are set back from the street, they are taller than the five or six story norm, and they have been designed in a generally institutionalized Franco governmental style. And here the high level of human activity suddenly stops. Fewer people walk down this portion; even fewer walk beyond here to the edge of the harbor. This change is caused in part by the change in the sense of balance between the two sides of the street.

In the United States, the analysis is somewhat more complicated due to the influence of the automobile generally on our street forms and specifically on our commercial built forms. For example, any generalizations about the balance-lack of balance, symmetry-asymmetry of highway strip development is beyond the ken of this thesis. Likewise the role of the suburban shopping mall is beyond this thesis though one cannot help but note that the highly symmetrical and spinal nature of suburban malls, that result of careful market studies, shows a certain economic, if not physical, bias toward symmetrical spinal organization.
Nonetheless in those commercial sections of our central cities where the pedestrian plays a major role, this tendency toward symmetry is very strong and those commercial streets which lose such symmetry often lose an important level of human activity.

An example of this factor can be found in the many changes that occur on Boylston Street, Boston. Boylston Street between the Fenway and the Commons has always been a major urban street in Boston. Traditionally it has been the major commercial street for the Back Bay. Major elements of the city including Copley Square, the Public Gardens, and the Boston Public Library abut this street. Yet today, physically, it is marked by a loss of any sense of place. Admittedly this is an almost metaphysical concept, but physically it is a very disorienting and inconsistent street.

Economically, this malaise is easier to see. Originally a street marked by strong commercial establishments, today it is full of parking lots, pizza parlors, fast food or fast sales activity. There is an inordinate amount of undefined open space along the street. As one travels eastward on Boylston Street from the Fenway, for the two blocks on either side of Massachusetts Avenue, the entire north side of the street is eaten away by the Turnpike. The street is one-sided here and very weak. Before Hereford Street, the Turnpike crosses under the street and destroys the south
side of the street. The Prudential Center then extends for at least two blocks on the south side of the street. Strange drop-off areas, parking spaces, and up/down ramps occupy the important area immediately adjacent to Boylston Street here. In effect, the south side of the street is pulled away from the street. As a result, the north side of the street is weakened. Farther down the street, the institutionality of the Boston Public Library conceivably weakens the north side of the street between Exeter and Dartmouth Streets, for here on seemingly prime real estate there continues to exist a large parking lot. Likewise the institutionalized nature of an insurance company headquarters weakens both sides of the street immediately east of Clarendon Street. Only the block between Berkeley and Arlington Streets has an urban, well traveled sense of street with vibrant and successful shops. This is due, in part, because this is the only block with generally equivalent forms and uses on both sides of the street. Unfortunately the block facing the Public Gardens has been so adversely affected by its long-time designation as part of an urban renewal area that it is unrealistic to comment on the effects of the Public Gardens on this block. Nonetheless, as a totality, the street is a physical and economic problem, and many aspects of this problem are directly attributable to the unbalanced nature of the physicality of the street.
Likewise even at the scale of a large building project, the same issues emerge. For example, the two parallel commercial "streets" or "walks" in the Prudential Center between Boylston Street and Huntington Avenue are unsuccessful for similar reasons as the two urban examples cited above. The commercial level of the Prudential Center (one level off of street level and connected to the street by escalators) essentially consists of two, single-sided corridors (with stores on the "strong" side and a big glass wall on the "weak" side). These two corridors run parallel to each other on either side of the high-rise building. In effect, the corridors connect Boylston Street with the areas of the city near Symphony Hall, Northeastern University and the Massachusetts Avenue section of the South End. Given the way pedestrians would move from these outlying areas to the center of the city, these two corridors should be bustling with people at all hours of the day and night. Yet, to the contrary, these corridors are almost always empty. This is a physical fact. Also it is an economic fact. The Prudential Life Insurance Company has had continual problems renting out this space; rents are low; there are often empty stores; the more westerly corridor is now filled with more institutional business uses (e.g. stock brokers offices). Normal retail stores find it difficult to survive. No doubt, there are a variety of factors for this condition. Yet given its natural geographic advantage and the
huge economic potential related to the office building and the two hotel buildings, one of the problems is the single loaded aspect of these corridors. The strong side is straight and very continuous. The weak side has no inherent strength; instead it simply looks out upon a dull plaza. Besides being boring, the space has an unbalanced sense to it.

In the face of these generalizations and three examples, one could ask: why even be concerned with the asymmetrical spine model. There are at least three reasons for such a concern:

(1) The asymmetrical pattern is often presented by architects and planners as an important variant to the normal street and built-form patterns of the city. In part, this represents their attempt to consider a set of varied experiences for a cityscape rather than the normal, double-loaded street.

(2) Such a form could become desirable as a response to a particularly important object or condition in the natural landscape. One would think that a city should respond positively to a specific natural edge condition such as an ocean, harbor, river, valley, gorge, mountain, or simply a vista. Yet, given a natural human interest in such vistas, most cities fail to take advantage of such opportunities. For example, the city of Constantine, Algeria, straddles a very deep and spectacular gorge, yet the
city turns its respective two backs to the gorge and instead faces its streets and buildings away from the gorge. The response of many American cities to their riverfront or harborfront settings often is similar. Thus the tendency to consider symmetrical streets as more important than fascinating vistas is very strong. But with the growing interest of our urban inhabitants in their natural settings, the asymmetrical setting will become increasingly important.

(3) Such a form, often in the shape of a single-loaded corridor or hallway, has often been a feature of the individual building, and since this thesis is applying the learning from the urban design level to the individual building level, this learning about the asymmetrical spine from the urban design scale becomes instructive.

Exceptions to the above examples of unsuccessful asymmetrical situations can be found. There exist asymmetrical streets or spines which generate a successful level of pedestrian activity. The term "spine" has been chosen rather than "street" because spine can include linear paths of smaller dimension than a typical street. It thus becomes important to discuss those factors which produce or encourage a successful level of pedestrian activity within the asymmetrical spine pattern. Following are four examples which are successful in different ways:
Upper Fifth Avenue is a well-known street. Though not a commercial street and admittedly quite different from the Fifth Avenue south of 59th Street, nonetheless it is exceedingly vibrant and full of human activity. Here is a street which has no shopping and yet is always full of people. Some are walking fast with a strong sense of mission; others are simply strolling. It should be noted that the strong side of the street is marked by a series of apartment and hotel buildings usually 10-15 stories high. The weak side, along the park, is marked by a set of factors of continuity. There is a high wall (seven feet high, too high to see over) running along the edge of the park. There are several rows of trees paralleling the street. There are periodic openings to the park but these usually occur every three or four blocks. Walking along this street, one is not really part of the park, except that the trees and sometimes the hills of the park can be seen over the wall. One knows that he is part of the street; one sees what is ahead and behind. There is a sense of balance. In effect, one does not feel he is about to fall off the edge into an undefined park setting, but instead he feels that he is part of a well defined street setting.
(2) Alamitos Bay Boardwalk, Long Beach, California

In this rather quiet, very residential section of Long Beach, a narrow peninsula is defined by three linear paths: (a) a cement walkway along the bay; (b) a four lane, slow-moving main street running down the middle of the peninsula; and (3) an older wooden boardwalk running along the edge of the ocean and its wide sandy beach. Unlike other places with this almost tri-partite separation of streets, the edge street (in this case, the boardwalk) is the center of pedestrian activity. In fact, only the dead ends of the side streets abut the boardwalk; there is no possibility for "driving by" to see who or what might be on the boardwalk. And yet it is a very crowded street. And no commercial establishments are on the boardwalk; only private homes. All the houses are one or two stories high; there is an occasional three-story apartment building. And the boardwalk works successfully not only on hot, sunny, summer days but also on cold, foggy, and windy winter days. Some factors which contribute to this success include: the continuity of the edge of the boardwalk; the variety of elements on the strong side; the constancy of the railing on the weak side; the almost invisible but still felt volumetric forms of the ocean and the wide beach; the perpendicularity of the wooden boards of the boardwalk to the line of movement. These factors, pulled together, produce a very successful asymmetrical spine.
(3) Rue de Rivoli, Paris

When one tries to think of major shopping streets in Europe which are single-sided, it is difficult to name very many. Yet always Rue de Rivoli comes to mind. Yet this is due probably to two factors. One is the relation of the strong side of the street to the Louvre and the Tuilleries. That relationship is marked by a certain sense of balance. The strong side of the street is first balanced by the Louvre as a built form; one might say that the trees and edge of the Tuilleries also balances the built, strong side. Nonetheless, in other cities, buildings can face a park with the same balancing elements (e.g. trees, rail fence) and yet that street is not necessarily successful in our terms. Therefore, in this case, a far more important factor may be the nature of the edge on the strong side of the street, namely the arcade. And in effect, the success of the Rue de Rivoli with its admittedly very high level of activity, is due more to the arcades and the nature of the space within the arcades than to the relationship of built and unbuilt sides of the street. The arcades provide a continuity, a permeability, and a perpendicularity that is important. They also provide a sense of balance, a sense of edge that makes the path a pleasant one to follow. The arcade keeps the pedestrian from falling off into the dangerous and open space of the street, and in effect, substitutes for the lack of building on the opposite side of the street.
At a very different, much smaller scale, is the set of cafes fronts facing the harbor in Ibiza. Ibiza, the town on the island of the same name, ia an old hill town made up primarily of narrow little streets running parallel to the contours of the hill, with occasional paths moving up and down the hill. The streets parallel to the contours are the primary streets, and even as the town has changed today from a quiet fishing village to a bustling center of the international chic, the roles of the streets remain the same (only the numbers of people have increased). This set of streets comes down the hill to the harbor edge, in a rather undefined way (e.g. there is no continuous street along the harbor). Thus there is no sense of the paseo or evening walk along the harbor. Indeed, certain parts of the harbor edge are quite vacant at the same time that the inner streets of the town are alive with activity. But there is one part of the harbor edge which is exceedingly active. This is an area, down three or four steps from street level, marked both by that level change and by a row of trees, and then further defined by a series of rows of cafe tables set in front, and across the spinal path, from the actual cafes. These cafes are very small (15 feet wide) and there are only three or four rows of tables. But along the cafe fronts is formed a small path. It is this path which is always full. People do not walk along the parallel path.
at the top of the three steps (a little closer to the harbor); they wall in this well defined path at the building edge. Again, the level change, the continuous row of trees, the continuity of the tables, the perpendicularity of the storefronts on the strong side all give the pedestrian a sense of ease in an inherently unbalanced situation.

From this analysis, it seems that there are various factors which can help to generate activity or more particularly make people feel relatively comfortable along an asymmetrical spine. Of course, if a sense of comfort can be achieved, it is then much more possible to take positive advantage of site circumstances which in many asymmetrical situations can be quite spectacular. These factors include:

(1) A SENSE OF BALANCE

It appears critical that the spine, in order to encourage human use, must have the sense of being balanced. The symmetrical spine, by definition, has this balance; the asymmetrical spine, by itself, is not balanced. There is a general sense that if human activity is to be encouraged, particularly in a commercial setting, a person must feel that he will not fall off the edge of the spine and indeed that as he moves from one edge of the spine to the other (or more reasonably, as he feels the
sense of one edge and another), he has the feeling that he is continually moving between (and indeed almost bouncing off of) one edge and another. This balance is achieved in a variety of ways:

(a) Relationship of Scales. Somehow the scale of the weak side (meaning the less built side) must relate to the scale of the strong side (the built side). For instance, in the Fifth Avenue example, the stresses of the sidewalk and more importantly the trees and hills of Central Park begin to have the same scale as the buildings on Fifth Avenue. That balance at the urban design scale starts giving a clear definition to the street. Moreover in the Fifth Avenue example, the seven foot high wall along the park edge provides a sense of balance at the human scale. In the Rue de Rivoli, the balance is direct (and in a sense symmetrical) in that the arches which form the street edge of the sidewalk are the same as the arches which define the store edges.

(b) Sense of Edge. The sense of edge has a potentially fascinating effect on scale. In the Alamitos Bay example, the weak side edge is well defined by the continuous 29 inch high wall. But in addition to the definition of the spine, in effect that edge starts to define the volume of the beach. Though the beach is huge in comparison to the houses, in a sense the positive volume of the houses begins to be balanced by the necessarily larger negative volume of
the beach. Walking down the boardwalk, one can feel secure, balanced between the built-defined houses on one side and the edge-defined beach on the other. (The edge condition and volume of the beach is made importantly more defined by the fact that it has two well-defined edges, the boardwalk wall on one hand and the water's edge and resultant crest of sand near the water's edge on the other hand). A similar set of edge conditions provide balance to the Ibiza cafe fronts. The buildings on one hand are well defined; the open space occupied by the tables and the low wall form a negative volume which is well defined by its edges. In a sense, here in concert with the trees, a volume is created out of the negative space which is narrow and tall, much like the positive volume of the buildings.

(2) CONTINUITY OF FORM ON THE WEAK SIDE

In all these examples, there is a clearly defined edge on the weak side. In this case, I do not refer to the edge defining a balancing of volume discussed in item one above but instead I refer to a simple, direct edge, a sense of enclosure, a sense of something to "bounce off of" in order to move back to the other side of the spine. To do so effectively, the edge must be continuous. On Fifth Avenue, it is a very tall, seven foot high wall; at Alamitos Bay, it is a very thick and heavy, able-to-be-comfortably-sat-upon low wall; on the Rue de Rivoli, it is
the arch system separating sidewalk from street; in the Ibiza cafe front location, it is the placement of tables and chairs which gives definition to the edge. The continuity of edge not only gives it the strength to be a symbolic edge but also it gives it sufficient definition to form a real edge (in the real experiential sense of walking down the spine and faving a physical edge). Consider the different experience if these were a constantly changing set of edges (e.g. if the boardwalk had a large variety of different low walls instead of one strong image of wall). Likewise, consider if the Central Park wall were made of many different materials, some opaque, some transparent, some short, some tall. At a slightly larger scale, the sense of street of Fifth Avenue would be similarly destroyed if each cross-town street penetrated the wall of Central Park, a circumstance which would again break down the necessary strength of continuity on the weak side of the spine. Likewise the continuity gives the weak edge sufficient strength to begin to balance the stronger side of the spine.

(3) BUILT FORM ON THE STRONG SIDE; PERPENDICULAR TO THE SPINE; PENETRABILITY YET CONTINUITY OF SENSE OF MASS ON THE STRONG SIDE.

The built form on the strong side of the spines analyzed above are clearly perpendicular to the direction of the spine. This perpendicularity
is defined in different ways, in ways to accentuate the divisibility and differentiation of the various elements. Examples include slightly different sizes of buildings (Fifth Avenue), slight separation of similarly scaled buildings (Alamitos Bay), the clear definition of different entrances (Fifth Avenue, Ibiza cafe fronts). Yet in all these cases there is a continuity of the sense of mass on the strong side. In short, there is a discontinuity of the individual elements yet a clear continuity of the sense of the whole.

Likewise this continuity yet differentiation implies that each element is somehow penetrable. They may not all be public spaces, but in their appearance with doors and activity, there is the sense of the strong side of the spine being penetrable. In the Fifth Avenue example, the sense of penetration is further enforced by the constant repetition of the entrances to the crosstown streets. With regard to penetrability, imagine the opposite condition in the built form of the strong side if it were a long continuous singular wall. To walk along such a wall would deny a person any sense that the built form were anything but a wall, and the strong side of the spine would simply be a wall rather than a discontinuous and penetrable street edge.
(4) ELEMENTS IN THE SPINE PERPENDICULAR TO THE PATH

While the spine itself has a very strong direction, in most of these examples there were clear elements in the spine which break up that long path and give the participant a sense of progress along that path. Examples include the 2x12 board perpendicular to the boardwalk path in Alamitos Bay and the arches along the Rue de Rivoli. At the larger urban design scale, the very clear penetration of the space by the rapidly occurring cross-town streets plays the same role on Fifth Avenue. In a sense, these elements act just like the continuing sets of storefronts or doors or buildings which mark a person's progress on a symmetrical, double-sided street.

(5) DEFINITION OF VERTICAL CORNERS OF THE SPINE

This element os a well defined set of vertical corners to the Volume of the spine arises directly from the clarity of the edge condition which has already been discussed in two related ways in item 1 (definition of volume of negative space) and item 2 (continuity of edge to give it strength) above. Likewise, the clarity of the edge of the weak side and the continuity of edge of the strong side clearly defines the vertical edges of the volume of the actual occupied spine. Sometimes that vertical edge is itself built (Rue de Rivoli); sometimes it is
clearly defined if not quite built (trees along Fifth Avenue); and sometimes it is implied by the clarity and continuity of the edge (wall of Fifth Avenue, low wall of Alamitos Bay). In all cases, it further defines the spine and makes movement along it much easier. Consider how undefined such a spine would be, in the volumetric sense, if there was no edge to the weak sides of any of the spines analyzed here.

(6) CONTINUATION OF PART OF THE FORM FROM A PREVIOUSLY BALANCED, AND OFTEN DOUBLE-LOADED) CONDITION.

Another way of improving the sense of volumetric continuity and the sense of continuing a sense of balance in a less balanced setting occurs when the asymmetrical spine is a direct continuation of a previously symmetrical spine situation. Upper Fifth Avenue is a continuation of Lower Fifth Avenue, a generally symmetrical spine; the memory and clear association with the other end of the Avenue can become powerful. Likewise, the Ibiza cafe front area is a continuation of a narrow and well defined two-sided street (with similar 5-6 story buildings) and that associative aspect of the asymmetrical spine with its symmetrical predecessor is a part of that spine experience. On an urban design scale (and thus more related to the experience of the street rather than the experience of the arcade), the Rue de Rivoli itself is single loaded opposite the Tuilleries, yet farther to the east, opposite the Louvre, that street has a symmetrical setting.
When considering the design of an individual building and developing a set of typologies for such a building, the sources of learning about those typologies are varied. In this case, I chose one set of typological sources: sources from the urban design scale. The varieties of organization and the generation of design from such organization is, of course, infinitely more varied at the building scale than at the urban design scale. For example, the major constraint of street making, the accommodation of transportation, is a more minor constraint at the building scale and in fact circulation patterns can be incredibly varied at the building scale. Nonetheless, in the case of asymmetrical linear paths, there is much to be learned from the urban design scale. The patterns of successful accommodation to this form at the urban design scale can, I think, have major impact on the success or failure of the asymmetrical spine at the building scale.

In addition, with specific regard to the asymmetrical spine, there is a general bias in favor of such a form at the building scale. The hatred of double-loaded corridors and the love of the single-loaded variety is but the most obvious example. Yet even the most recent history of architecture abounds with dreadful examples of single-loaded corridors. Perhaps the nature of that asymmetry has not been considered seriously enough. Perhaps opportunities have been lost in the almost blind pursuit of the single-loaded prototype.

Thus this thesis does not attempt to evaluate all typologies which might apply to asymmetrical spines at the building scale. But it does attempt to be very complete in its consideration of those factors which can be learned at the urban design scale and applied to the building scale for this typology.

This application of experience from the urban design scale to the building scale is even more important in the design problem presented in Part One. For here, I have designed a very public, very populated mixed use facility. Thus the factors which encourage a high level of pedestrian activity at the urban scale might very well be the same factors encouraging such activity in a mixed use, urban building. The integration of a wide variety of public and semi-public (hotel) uses in the same building requires even more care in this regard. Also, given the nature of the spine in this design solution and the formal possibilities of "streets" and "buildings" within the building become even more analogous to the same objects at the larger urban design scale.

Moreover, the investigation of this typology, through the device of designing a single building, might shed new light on the typology itself. This inves-
tigation has certainly focused attention on the issue of scale in the asymmetrical spine situation. It has focused attention on the various types of continuity and discontinuity found on the strong and weak sides of an asymmetrical spine. The design has attempted to resolve some of these issues in order to make a more lively, more used and more usable street and public space. Indeed the design has focused attention on the careful planning and design of the public space of a building in a way which hopefully can provide for a more intriguing public experience in that building. Perhaps in this way, an inherently asymmetrical spine can develop some of the positive aspects of the symmetrical shopping street and yet retain the advantages of light and vista inherent in its asymmetrical setting.
APPENDIX I:

BOSTON REDEVELOPMENT AUTHORITY
PROGRAM FOR WATERFRONT HOTEL.
2.2.

AREA REQUIREMENTS

Ballroom:  800 people x 12 sq ft per person  10,000 sq ft
       (♀, 2 toilets; ♂, 2 toilets)

Pre-assembly area for Ballroom:  25% of 10,000  2,500 sq ft

Restaurant:  300 people
       (♀, 3 toilets; ♂, 3 toilets)

Restaurant:  300 people

Restaurant:

Cocktail Lounge:  (holding room for restaurant)
125 people x 20 sq ft per person  2,500 sq ft

Coffee Shop:  (should be near kitchen)
60-70 x 20 sq ft per person  1,400 sq ft

Kitchen (Central)
       Can be split
Total Kitchen:

Roof-Top Cocktail Lounge
  a. Interior:  150 people x 20 sq ft  3,000 sq ft
  b. Terrace:
  c. Support Facilities:  2 toilets;
       ♀, 1 toilet, 1 urinal
       (1,000 offices)

Lobby:  (Include a lounge and bar for 40 people and office
       (Four elevators, plus 2 service elevators, as needed)
Function Rooms for 400 people x 20 sq ft per person
       (this is a variety of room sizes)  8,000 sq ft

Guest Room sizes:
       (80-90% are 400
       (20-10% are 550 ,
       luxury suite

Storage areas, mechanical and circulation, etc., are not
included in this listing


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