

EDGEWAYS: THE DESIGN OF MEDIATING
ZONES ALONG PUBLIC PATHS

by

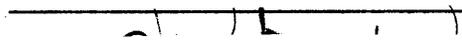
LEE ZAURIE ZIMMERMAN
B.S.A.D. M.I.T. 1978

Submitted in Partial Fulfillment of the Requirements
for the Degree of

MASTER OF ARCHITECTURE

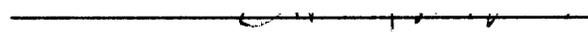
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September 1980

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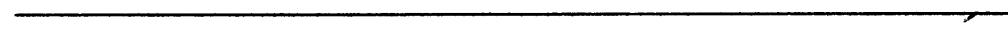
Department of Architecture
June 16, 1980

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EDGEWAYS:
THE DESIGN OF MEDIATING ZONES ALONG PUBLIC PATHS

by Lee Zaurie Zimmerman

Submitted to the Department of Architecture on June 16, 1980 in partial fulfillment of the requirements for the degree of Master of Architecture.

Our society places greater value on individualism and privacy than on sharing and public use of space. This attitude is apparent in the form of our physical environment. Given the need for spontaneous, informal bonds of community and the increasingly privatized environment in which we live, architects must strive to provide opportunities for social interaction in the public realm. For this to occur, the public structure must be legible, accessible and foster a sense of place.

Of the many ways to encourage such interaction, this thesis chooses to demonstrate, through design studies, one attitude calling for a spatially-defined edge-zone between buildings and public paths. This means imbuing a path with qualities of place and providing transactional zones rather than abrupt boundaries along enclosure walls.

Operating at both large and small scales, architectural design studies and accompanying text describe possible ways of applying this attitude. At the urban scale, the thesis project addresses the extension of the Charles River basin water-edge pedestrian use zone, structuring the margin between the busy roads surrounding the basin and the water itself. Within the Charles basin context, I have proposed a scheme for a new museum of science and housing complex on the site of the Charles River dam.

A major portion of the thesis focusses on the design of two very different edge-zones mediating between the architecture and the public paths that move along it; the skylit Passage between parts of the museum and housing descending from an elevated transit stop to the water's edge and the Promenade along a south-facing expanse of river next to an auditorium, cafe and sluice.

"Biographies" of the elements forming the edgeways explain the design process at each stage.

Thesis supervisor: Shun Kanda
Title: Associate Professor of Architecture

ABSTRACT

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Edgeways (adv.) - on, by; with, or toward the edge; having the edge foremost.

Edge (n.) - a dividing line or point of transition; a margin; a border.

Stroke (n.) - an inspired or effective idea or act.

Passage (n.) - a path, channel or duct through, over or along which something may pass.

the act of passing; a movement from one place to another.

(from French passer, to pass)

Promenade (n.) - a leisurely walk, especially one taken in a public place for such walking.

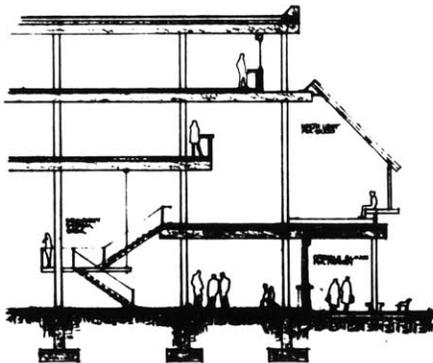
(v.) - to go on a leisurely walk.

(from French se promener, to take a walk)

The goal of this project centers around the development of an architectural vocabulary for a spatial zone which encourages volumetric overlap and interlocking between differing conditions; indoors to outdoors, public to private, water to land, large to small, etc. Often this "zone" is thought of and treated as a "line" without much thickness or volume, a planar wall or a sheet of glass. This is especially true in the case of new, larger, public buildings. Whereas residential environments, even when poorly designed at the edges can be remedied by actions taken by their inhabitants, public buildings usually don't provide the opportunities for personalization in terms of time and territorial claim as occupants of housing have, thus inhibiting the softening of their more anonymous edges. Therefore, the architect must invest special care when designing public buildings. Larger public buildings such as the present Boston Museum of Science or the addition to the Boston Public Library are often described as cold, alienating and inhospitable. These adjectives are often applied when only a thin boundary line serves to establish the point where public becomes private, outdoors becomes indoors, etc. When coupled with the usage of inapproachable, rough facade materials in huge, non-human scale dimensions, there is little doubt why such adjectives persist. An awareness of what occurs inside these large buildings is difficult to ascertain as their exteriors reveal little information about them at the level the passerby can see.

The experience of passing by or along a built edge is probably a more customary occurrence than the act of entering it, so the quality

INTRODUCTION



of treatment of the zone at the edge is an important ingredient in the qualities of the public environment.

The public path simultaneously expresses its functions as a system of movement, communication and access, as a framework for uniting people in time and space, as a potential public forum, and as a means for personal exchange of goods and services. The path is part of a larger system linking multiple destinations and goals. It has the capacity to manifest special character contiguous to or away from the edge and to transform when it encounters other conditions, intersects with other paths and accepts varying uses and contexts.

A good zone at the edge must function both as path and place in order to accommodate meaningful activity. This transitional space should inform passersby as to the nature and use of the interior spaces and invite stopping and possibly entering. A richly-designed shared mediating zone incorporating a variety of spatial and dimensional conditions would go far towards alleviating the alienation fostered by walls impervious to everything. Treating a building's perimeter as a membrane rather than considering it an envelope will lead more easily to establishing an inter-use territory.

Therefore, as it is more crucial that public, rather than private buildings employ a spatial edge-zone vocabulary, I have turned my attention to a large public building, in this case a museum of science, as a context for development of this vocabulary.

BUILDING EDGE

This pattern now sets the stage for the development of the zone between the indoors and the outdoors. Often this "zone" is thought of as an edge, a line on paper without thickness, a wall. But this is altogether wrong . . .

And compare it with this older, warmer building, which has a continuous surrounding of benches, galleries, balconies, flowers, corners to sit, places to stop. This building edge is alive. It is connected to the world around it by the simple fact that it is made into a positive place where people can enjoy themselves.

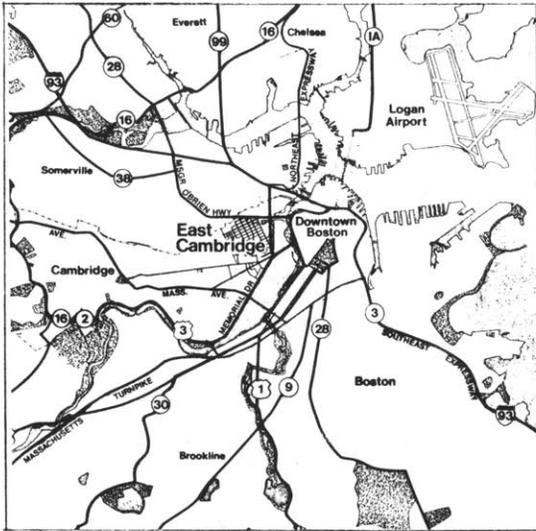


An edge that can be used . . .

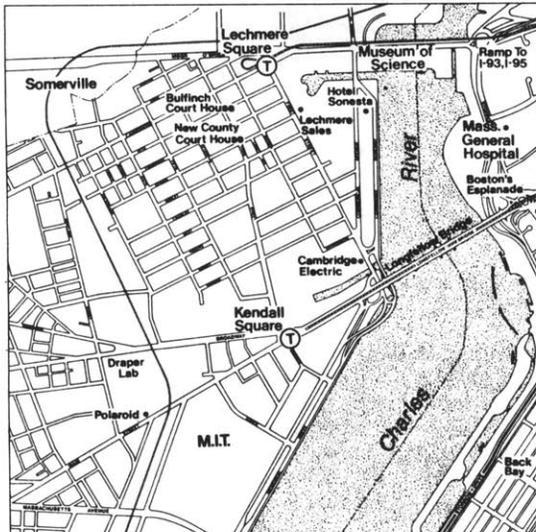
When it is properly made, such an edge is a realm between realms: it increases the connection between inside and outside, encourages the formation of groups which cross the boundary, encourages movement which starts on one side and ends on the other, and allows activity to be either on, or in the boundary itself. A very fundamental notion.

Therefore:

Make sure that you treat the edge of the building as a "thing," a "place," a zone with volume to it, not a line or interface which has no thickness. Crenelate the edge of buildings with places that invite people to stop. Make places that have depth and a covering, places to sit, lean, and walk, especially at those points along the perimeter which look onto interesting outdoor life.



1. REGIONAL CONTEXT



2. LOCAL CONTEXT

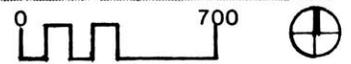
The site for the larger scope of this thesis is the Charles River basin between Boston and Cambridge, Massachusetts bounded by the Harvard bridge to the south and the Charles River dam to the north (fig. 1).

The site for the more detailed studies is the 6.4 acre area bounded by the Charles River basin on the south, Bridge Street on the north, a ship lock on the east and Commercial Avenue in Cambridge on the west (fig. 2).

PART ONE : SITE CONTEXT



3. AERIAL VIEW OF SITE CONTEXT



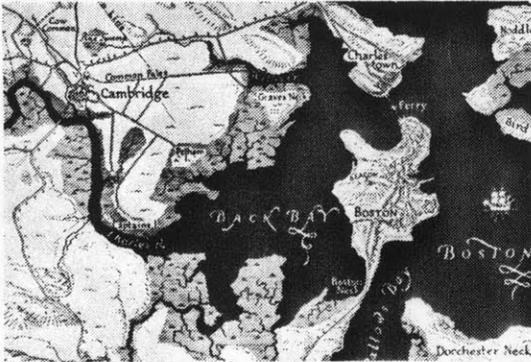
In the 17th century, what we today refer to as the Charles River Basin, was part of the Back Bay of Boston Harbor (fig. 4). Extensive salt marshes bordered the Cambridge side, isolating it from Boston. By the turn of the century however, a period of great change and development had begun. The construction of two bridges across the Charles River, the Longfellow Bridge in 1793 and the Craigie Bridge in 1807, led to the development of Cambridgeport and East Cambridge. From then on, Cambridge was oriented primarily toward Boston.

In 1805, an Act of Congress made Cambridge a customs port of entry and canal dredging and marsh filling got underway. People and industry surrounded by tidal basins and enormous marshes were cramped for space and began damming and filling the marshes and tidal flats, first for commercial and later for residential purposes.

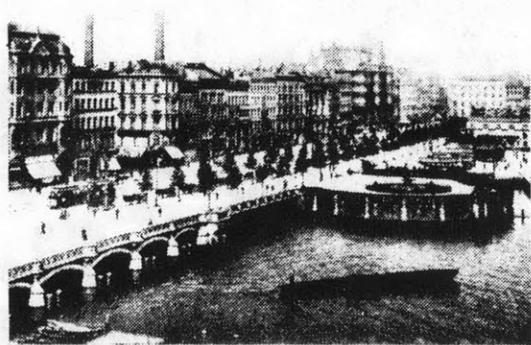
Charles Davenport was one of the many developers who in the 1870's acquired title to many acres of tidal salt marsh. He envisioned the draining and filling which later, in fact, came about. His dream was that both the Boston and Cambridge banks of the Charles River would one day be rimmed by luxurious residences promenades and parks, which he felt could rival New York's new Central Park or Hamburg, Germany's Alster Basin (fig.5).

The first step to developing the half-drained river marshes was the construction of a granite sea-wall. By 1883, one-thousand feet of the wall was built and tons of river silt deposited on the lands behind it; large scale filling was underway.

HISTORY OF RIVER EDGES



4. BOSTON IN 17th CENTURY

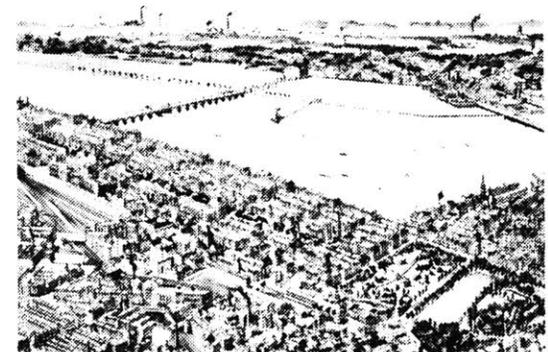


5. ALSTER BASIN, HAMBURG

Charles Eliot, partner in the landscape architecture firm of F.L. Olmsted saw great potential in the landfill and urged, in his report on park location that Cambridge acquire "every purchaseable portion of the riverfront." He perceived that the river itself was Cambridge's primary open space. His planning for the East Cambridge Riverfront was praised in Cambridge Park reports from 1895 to 1940, but was never implemented.

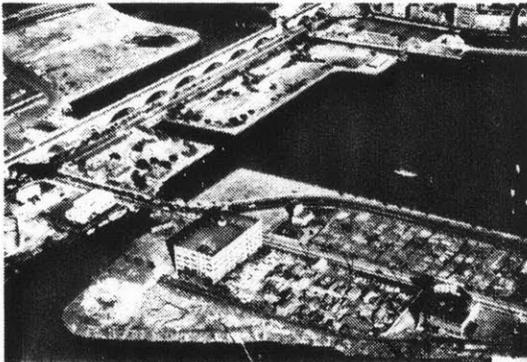
The proposed damming of the Charles River became a subject of debate during the 1890's, continuing until the dam was completed in 1912. During this industrializing period, the river, as it was, was an increasingly cherished resource. Many lamented the obliteration of the once primitive and beautiful salt meadows.

Proponents of the dam saw the possibility of valuable real estate gains made along a more stable shoreline and others who found the tidal flats unsightly, smelly and unhealthy made it seem virtually a civic and moral duty to drain and fill the marshes. Meanwhile, conversion of the shorelines accelerated. By the end of the 19th century landfilling had quadrupled the available land in East Cambridge, and the new Boston Back Bay residential area was rapidly forming (fig. 6). A two-hundred-foot-wide public esplanade was created with the intention of forming one of the finest urban riverfronts in the world, with continuous granite seawall, broad promenade, wide planting space, and roadway serving as a pleasure drive.



6. CHARLES RIVER IN 1899

The dam was constructed for the purposes of maintaining the waters of the river at a constant level and excluding the harbor tides; eliminating the twice daily unsightly mud flats. Improvement and beautification of the banks of the newly created basin followed (fig 7). With the conversion of the basin into an agreeable body of fresh water and the construction of the Charles River Parkway (later named Memorial Drive) along the part of the Cambridge shore, M.I.T. decided to move from Boston to the new Cambridge waterfront in 1916.



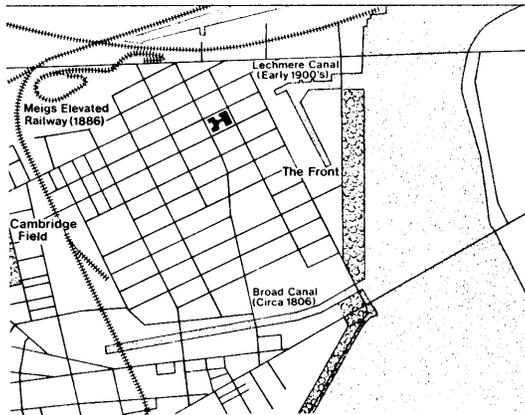
7. THE PARK ON THE DAM



8. THE ESPLANADE

In 1928, the treelined Charles River Parkway was completed. This parkway meant that the river bank was no longer used for wharves, warehouses and shipping as it once had been. However, a 1929 state Commission to investigate methods of making the Charles River Basin more suitable for recreation and civic welfare purposes concluded that the Parkway system should be completed with uninterrupted parkways on both sides of the river (i.e., build what is now Storrow Drive). Another feature of the above plan proposed the widening of the Esplanade on the Boston side of the river to up to three-

hundred to four-hundred in places. Through a million dollar gift of Mrs. James J. Storrow at this time, a more spacious park, beautifully planted, with facilities for outdoor music, and the construction of islands, lagoon refuges and landings for sailboats, were begun (fig. 8).



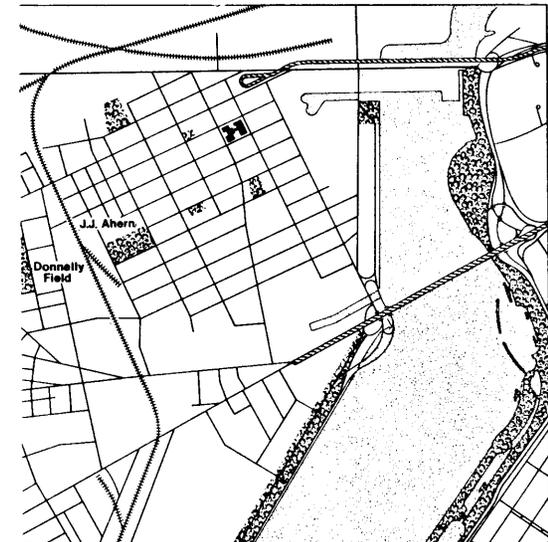
9. OPEN SPACE IN 1900

For a few years these improvements lent singular charm to this Basin designed for the sauntering pedestrian, but by 1950, not only had Storrow Drive ripped apart Boston's connection with the Basin, but all the East Cambridge riverfront property owned by the city since 1893 was sold for industrial use, leaving only a narrow strip of land for strolling. Suggestions for remedying this situation such as the Cambridge Community Development Department's East Cambridge Riverfront plan of 1978, have again brought attention to Cambridge's riverfront.

This thesis' proposal for museum and residential uses on the dam site addresses this great loss of open space (figs 9-11) by including as one of its most important aspects a continuous pedestrian water-edge route traversing the length of the site and connecting up both sides of the river, as well as providing for a large urban park on the northwest corner of the site.



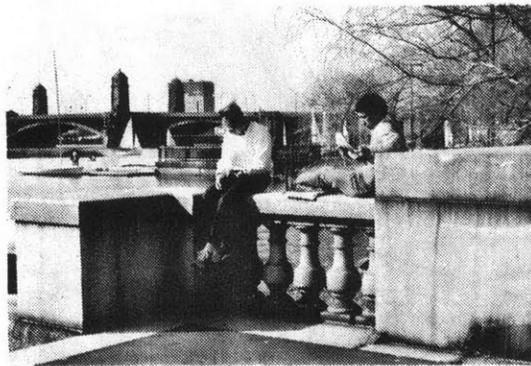
10. OPEN SPACE IN 1947



11. OPEN SPACE IN 1980



12. BIKING, JOGGING



13. READING, SAILING



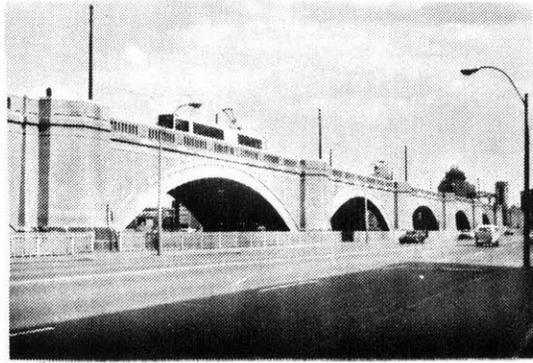
14. STROLLING, SUNNING

- A. an abrupt edge; the view from the site to Boston
- B. a hard edge; part of the original granite seawall
- C. a soft gradual edge of stones; a floating dock beyond
- D. the barren street edge; rapid transit track on bridge
- E. a sheltered water edge; under the transit bridge
- F. built edges; northwest corner of site
- G. built edge; police station on northeast corner of site
- H. a water-edge; ship lock at east end of site
- I. Structural edges; detail of pavillion visible at right in figure H

ACTIVITIES AT THE WATER'S EDGE



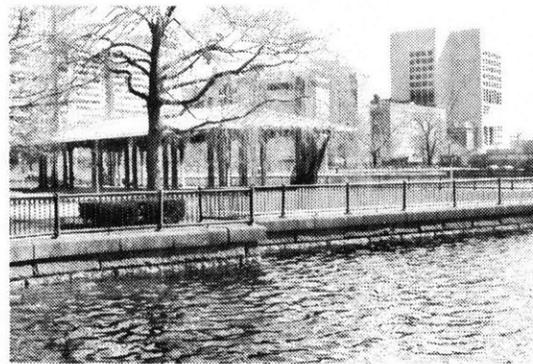
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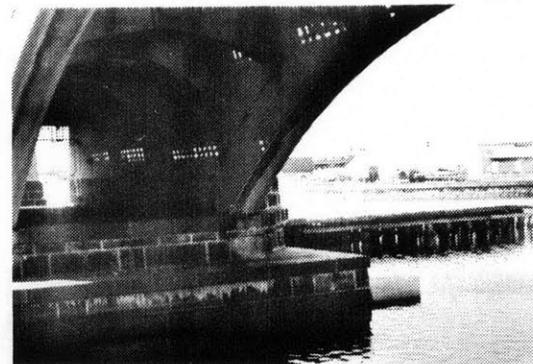
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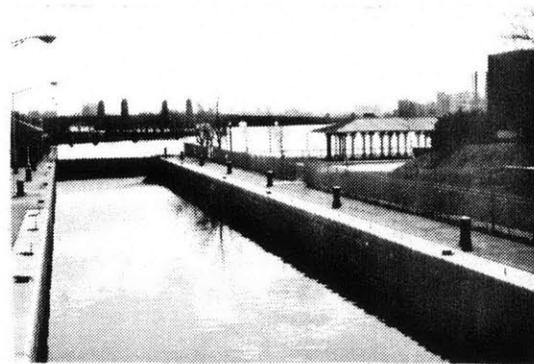
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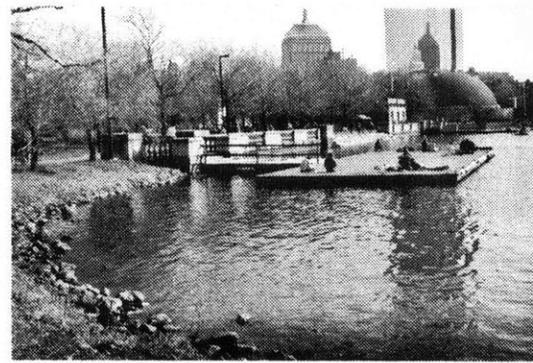
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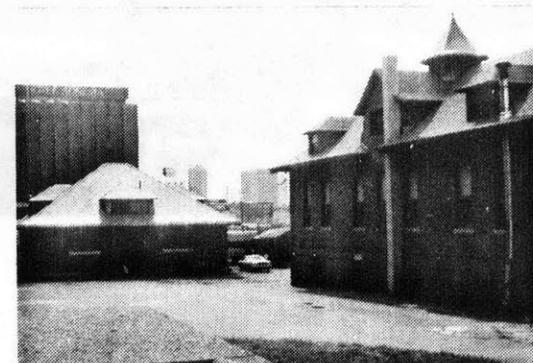
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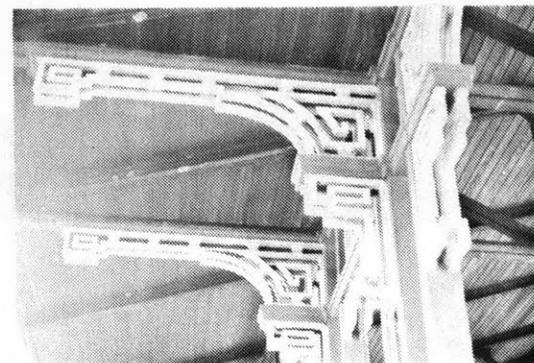
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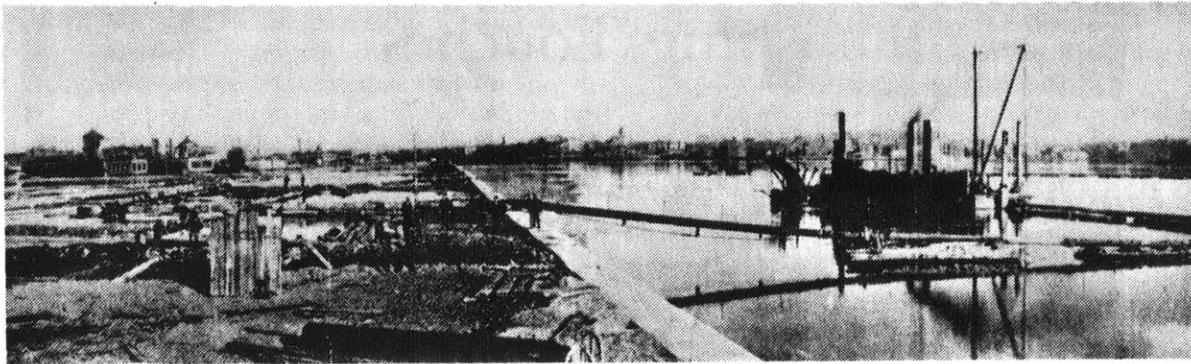


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15. EDGE CONDITIONS AROUND THE SITE



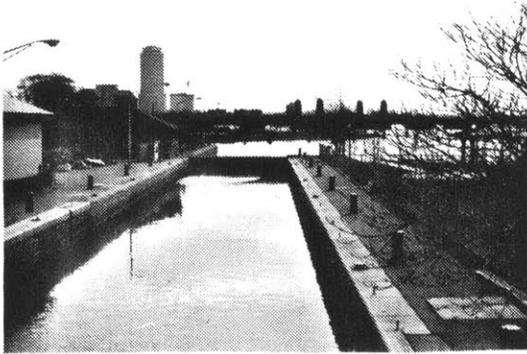
PART TWO : BOLD STROKES

At the urban scale, the most important bold stroke was to re-establish a continuous pedestrian water-edge route down the Boston side of the river, across the dam site and up the Cambridge side. At the present time it is necessary to walk along Charles River Bridge Street, a busy barren road, to get from one side of the river to the other. Secondly, the sluice, which regulates the flow of tidal water into the basin, was uncovered to view again. Currently a five-level parking garage is built over it, totally obscuring it. Thirdly, the site was integrated from hosting a purely institutional use to mixed uses; it now has museum, residential, commercial and community facilities. The mix of functions will attract a wider variety of visitors to the site, establish a round-the-clock populace to give life to the site day and night, and better serve the larger community. The last bold stroke was to promote use of public transportation by providing the easiest public access to the water edge directly from the elevated rapid transit station. The sloping passage boldly slices through the site. The parking garage is a bit out of the way.

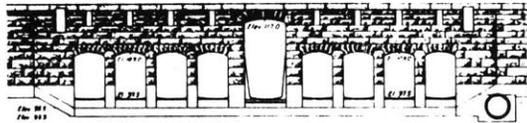
As can easily be seen in both figures 16 and 20, the pedestrian and recreation areas along the Charles are completely contained by major vehicular roadways, except at the dam site where there is no through access.



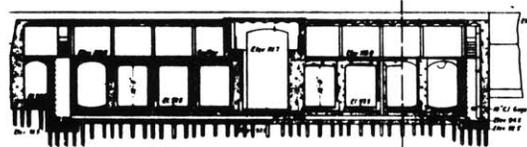
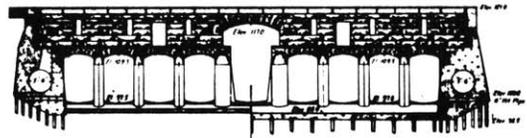
16. TRAFFIC VOLUME



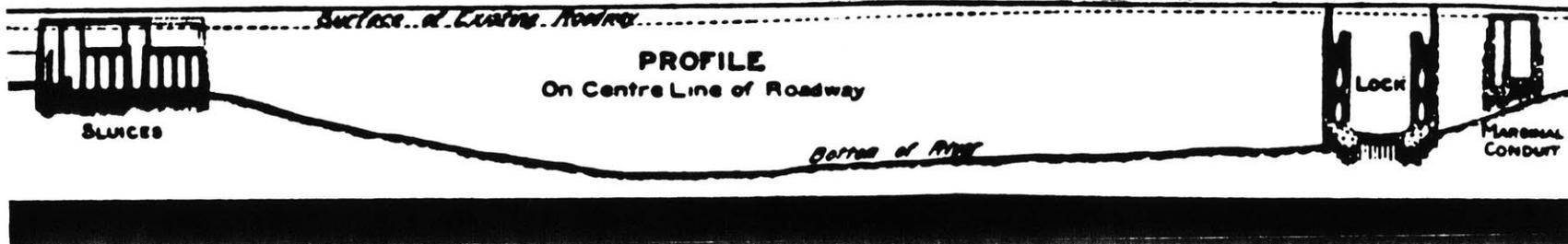
17. LOCK



HARBOR ELEVATION



18. SLUCE

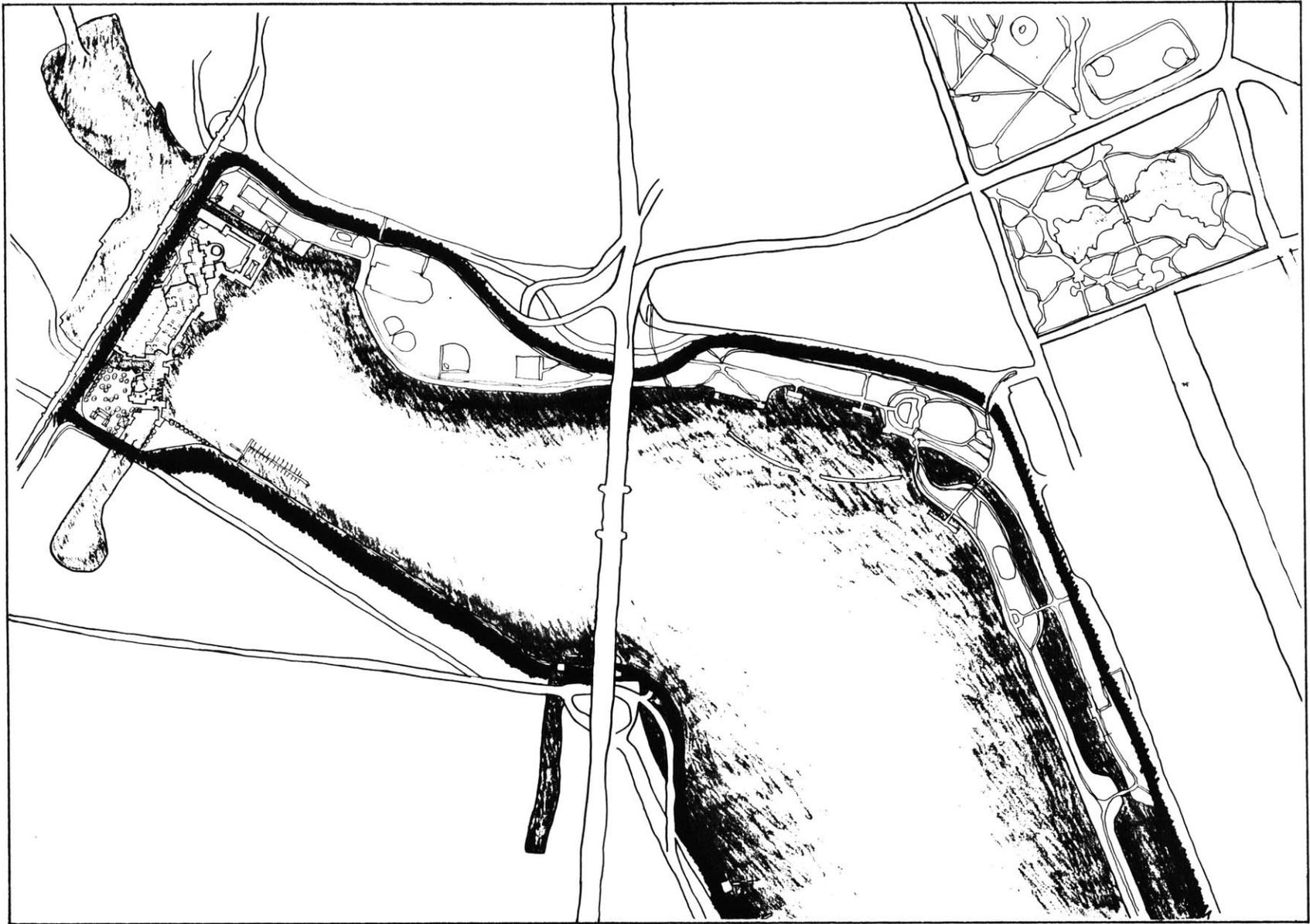


19. LOCATION OF SLUCE AND LOCK RE: BOLD STROKES

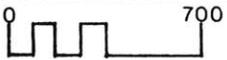
One of the nicest features of the esplanade area of the basin is the use of the chain of islands. These strips of land form a thickened water edge-zone that allows visitors on the banks the possibilities of looking out past them to the river itself through a filter of people, trees, etc., and permits visitors on the islands the experience of being surrounded by water and detached from land looking back at it. The islands give the water edge an added depth that piers or decks jutting out into the water could never reach.

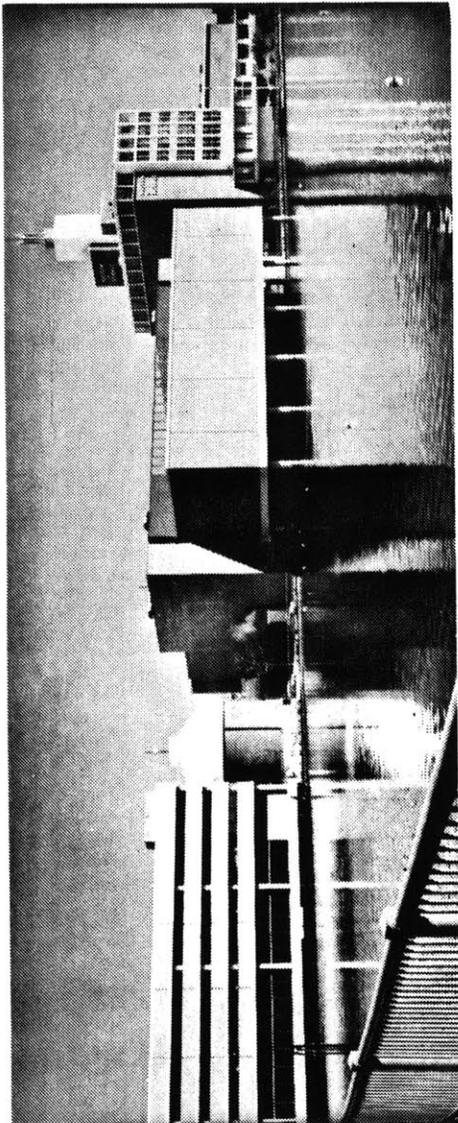
The ship lock (fig. 17) at the east end of the site is still in use, its accompanying drawbridge periodically halting all traffic on Bridge Street to allow small boats to pass through.

The sluices under Bridge Street at the west end of the site once were the sole means of controlling flooding in communities up river from Cambridge, but they will soon be retired when the new greatly enlarged dam and sluice facility near the Tobin Bridge is completed. Currently the sluice's handsome granite block facade (fig. 18) is barely visible in a corner inside a parking garage structure. Nearly six vertical feet of granite including a water level walkway are exposed of the eighty-foot-wide structure. My scheme calls for displaying this early engineering feat at the end of a re-opened sluiceway.



20. SITE CONTEXT INCLUDING DESIGN PROPOSAL





21. EXISTING STRUCTURE

The Boston Museum of Science began building its current facilities in 1949 on the site of the Charles River Dam. Since then, it has exceeded growth estimates by four times. The subsequent additions were grafted onto the Cambridge end of the site rather brutally; the most recent one locating a parking garage over the sluice and providing neither windows overlooking the river nor any natural light in the new exhibition areas (fig. 21).

In addition to turning its back on its magnificent and significant scientific resource, the river, the majority of the museum's exhibits look like donations from industrial trade fairs plastered with company logos. Though the roots of the museum are in the Boston Society of Natural History, the nature-related exhibits are the most static and boring of all.

This thesis proposes to imagine away the existing museum and build on the same site a new one adding housing, commercial and community facilities. Such a mixed-use complex would enrich the lives of people visiting the site and strolling the expanded water edge pedestrian network.

The museum as it is today announces its subject matter on its facade: "Astronomy, Energy, Industry, Man and Nature" the signs read. These topics fall into the three following categories: Science - which in our society carries connotations of both demon and savior, making it important to emphasize the positive aspects of it as a descriptive explanation of natural phenomenon; Technology, the application of science to commercial and industrial objectives, which bodes

greater evil; and Nature, which pertains to all living or once living things in the physical world and is generally given favorable press. Nature's basis in organic order seems an excellent reference for use in the design of a museum of science. At least I found it to be so.

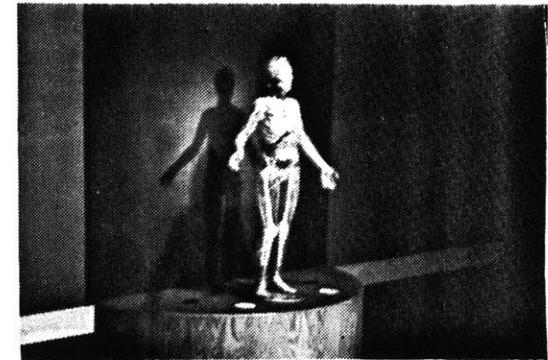
My goal for the museum would be to entertain and arouse curiosity in people, as well as educate them. It would be a participatory innovative learning center merging emotional experience with intellectual satisfaction. It would be a museum of popular science with emphasis on the popular; a place where visitors could become involved in animal care, an organ transplant or steering a spaceship. It would be a place of wonder for people of all ages and would fuse them with ideas through active participation.

The program for the 6.4 acre site includes:

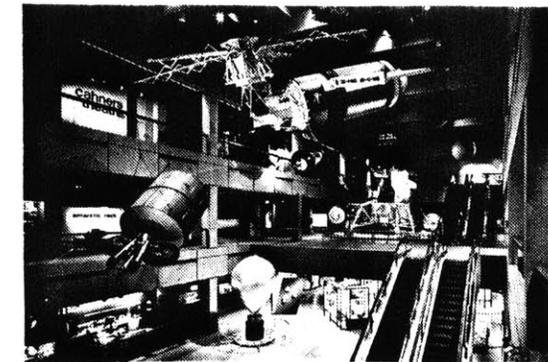
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| New museum of science | 250,000 | ft. ² |
| including: exhibits | 180,000 | ft. ² |
| and offices, library, auditorium, etc. | | |
| Community auditorium | 15,000 | ft. ² |
| Planetarium | 10,000 | ft. ² |
| Cafes | 5,000 | ft. ² |
| Retail shops | 4,000 | ft. ² |
| Rental housing (120 units) | 150,000 | ft. ² |
| including office space | 40,000 | ft. ² |
| and grocery, health club, parking, etc. | | |
| Parking for 500 | 160,000 | ft. ² |



22. NATURE



23. SCIENCE

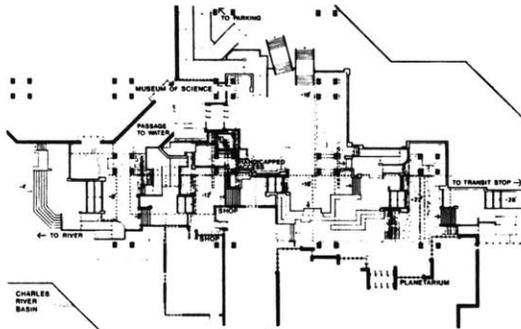


24. TECHNOLOGY

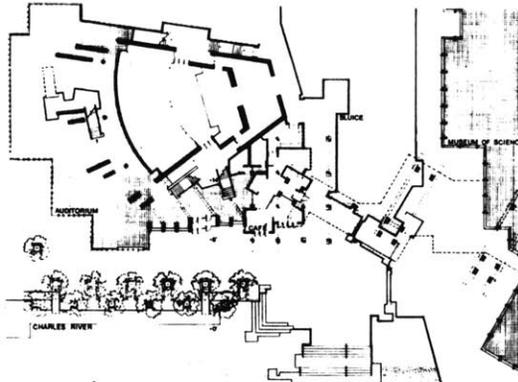
As stated earlier, the intention of this thesis is to demonstrate an attitude calling for a spatially-defined edge-zone between buildings and public paths. Explorations of three very different cases fitting this description form the body of the thesis. The first, the bold stroke of connecting up both sides of the river through the site has already been discussed. The other two explorations are contained within the first. The Passage (fig. 25) and the Promenade (fig. 26) were chosen because they represent widely different variations on the same theme.

The Passage is a public path moving between two built edges on a series of descending levels. It is strongly affected by the uses that define its extent, making it seem less public near those zones of influence. The uses are active ones; the Museum of Science, its planetarium and retail shops, inviting participation and vying for attention. The Passage is a volume of space defined on two sides by buildings and above with a glass roof; spatial overlap is a major concern. Solid elements define the edge-zone; concrete column clusters, platforms, stairs and ramps. The nature of this space is lively and active as a reflection of its boundary uses. Its character changes when the uses are closed; it can become more claimed by its users.

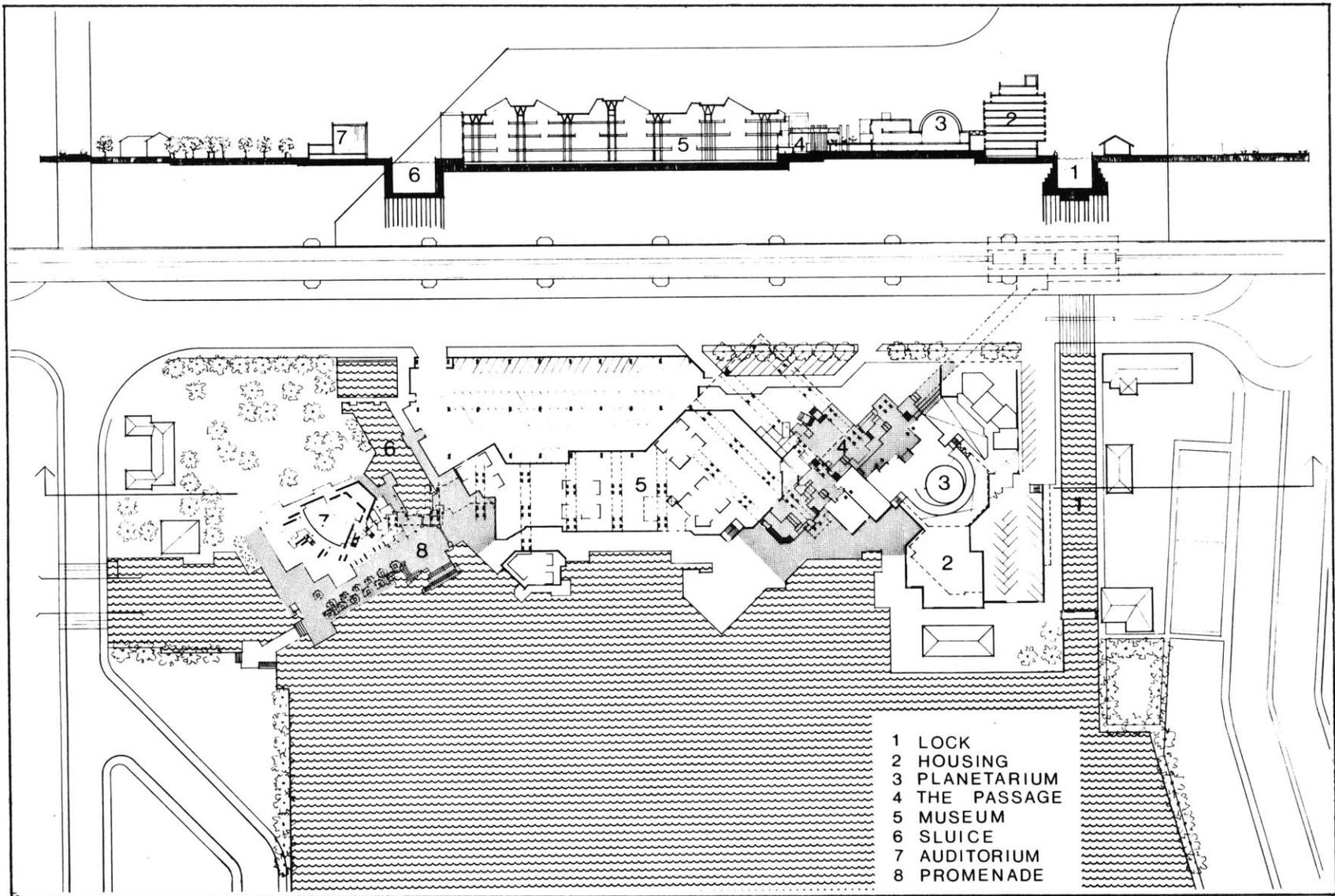
The Promenade is a public path moving between one built edge and an unbuilt one -- the Charles River. It is completely level except for a small lower partial path on the water. The Promenade seems very public; its adjacent uses; a community auditorium and cafe, are passive and don't demand attention vigorously. It connects to outlying destinations, especially the residential areas of East Cambridge, and is intended to attract people throughout the Boston area. The sky above and the south-facing expanse of water stretching outward create a strong feeling of openness. Thus, the surfaces composing the Promenade are of more concern than built edges or volumes of space. Light, airy elements work to maintain the openness; a trellis structure, rows of small trees and a floating platform. The nature of this space is somewhat anonymous; its ambiance is created by the people using it; it is always receptive to their actions.



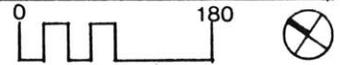
25. THE PASSAGE

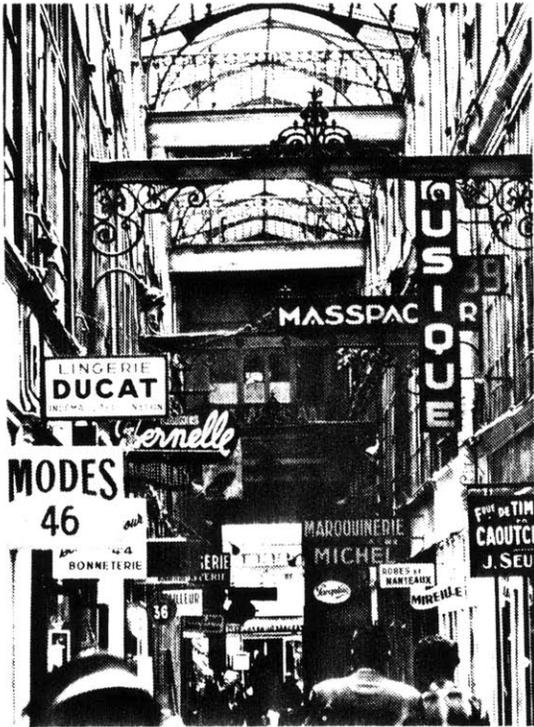


26. THE PROMENADE



27. DESIGN PROPOSAL: SITE PLAN AND SECTION

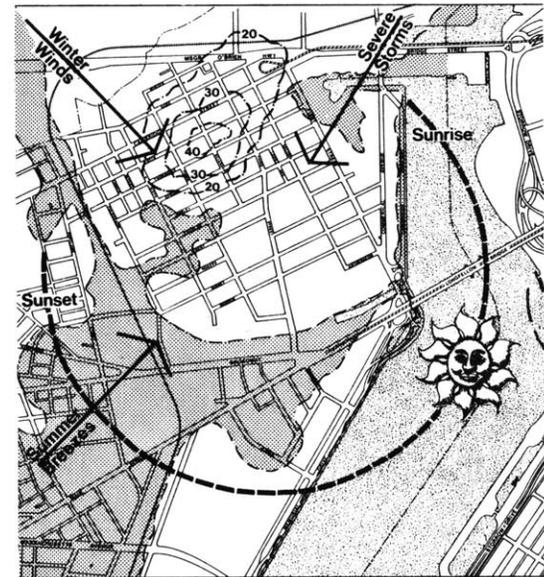




PART THREE : THE PASSAGE

The Passage edge-zone is a public link negotiating a twenty-four-foot level change between an elevated transit stop and the Charles River basin. It is intended as a direct unobstructed connection to the water as well as a multi-level activity zone in itself. The main entrances to the Museum of Science, its planetarium, and to two retail shops in addition to numerous exhibit windows occur along the path, as does a passage under the Museum connecting from the street and parking directly to the water.

This east-west Passage can be bathed in shafts of southern sunlight, yet is protected from rain and snow by a series of stepping skylights. The image to the left represents the lively nature that is desired for the Passage.

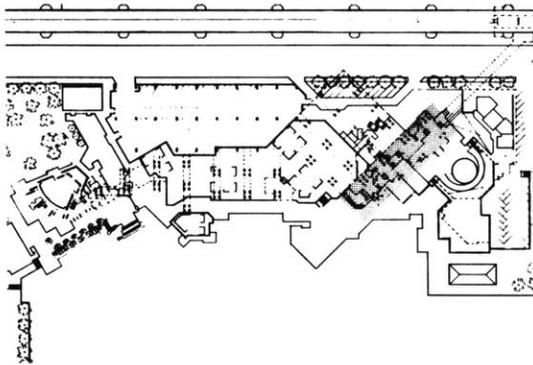


28. NATURAL CONDITIONS

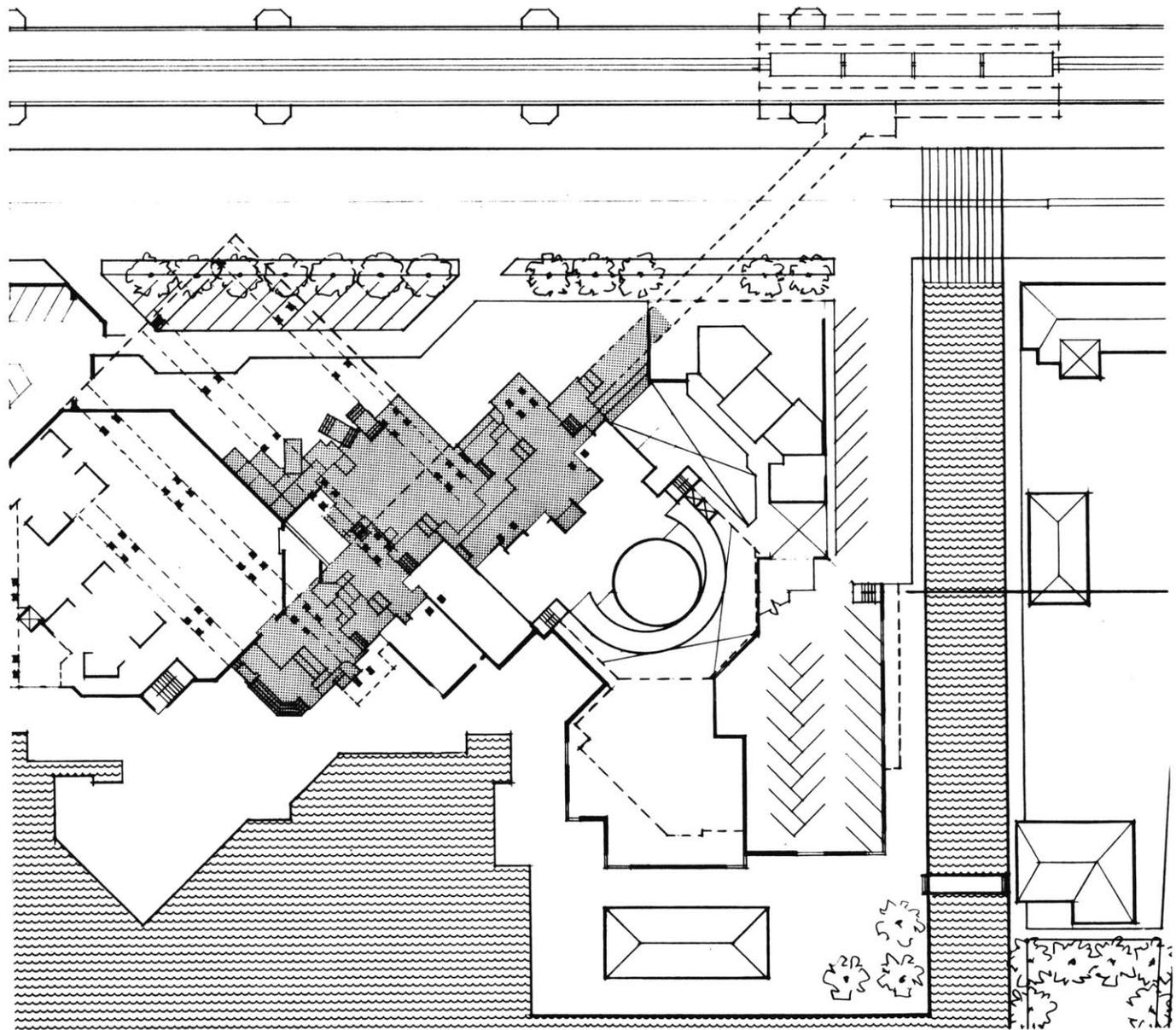
The Passage is shown here in its context. The museum is to the left and the office and housing complex is to the right. An auto drop-off point and bus parking are provided, in addition to a large parking garage (off to the left of the drawing) for museum visitors. A grocery store fronts the street next to the ship lock. Customer parking and a parking garage for residents are provided. A skylit lobby, beginning just beyond the pedestrian bridge running overhead, leads to the vertical circulation which serves two levels of offices and six levels of housing. One-hundred twenty units of housing wrap around the planetarium (fig. 31, B and C).

The design of the Passage as a spatial "thickened-edge" zone began with the development of a vocabulary of elements which would distinguish the exterior movement and gathering zone from the interior uses. The wall where the Passage meets the closure is the boundary of public and private activity. This perception is recognized differently in different times and places. Therefore, to be variable through time, the elements employed must not lock a permanent boundary in place. For example, a columnar primary structural system was chosen to establish a zone along the path in which infill closure could be built and modified as needs changed.

After making an assessment of a given design situation and deciding on a few underlying principles, I would define the element needed and go on to research it typologically, historically, and experientially. Good form and use references applicable to my design would usually be uncovered and applied.

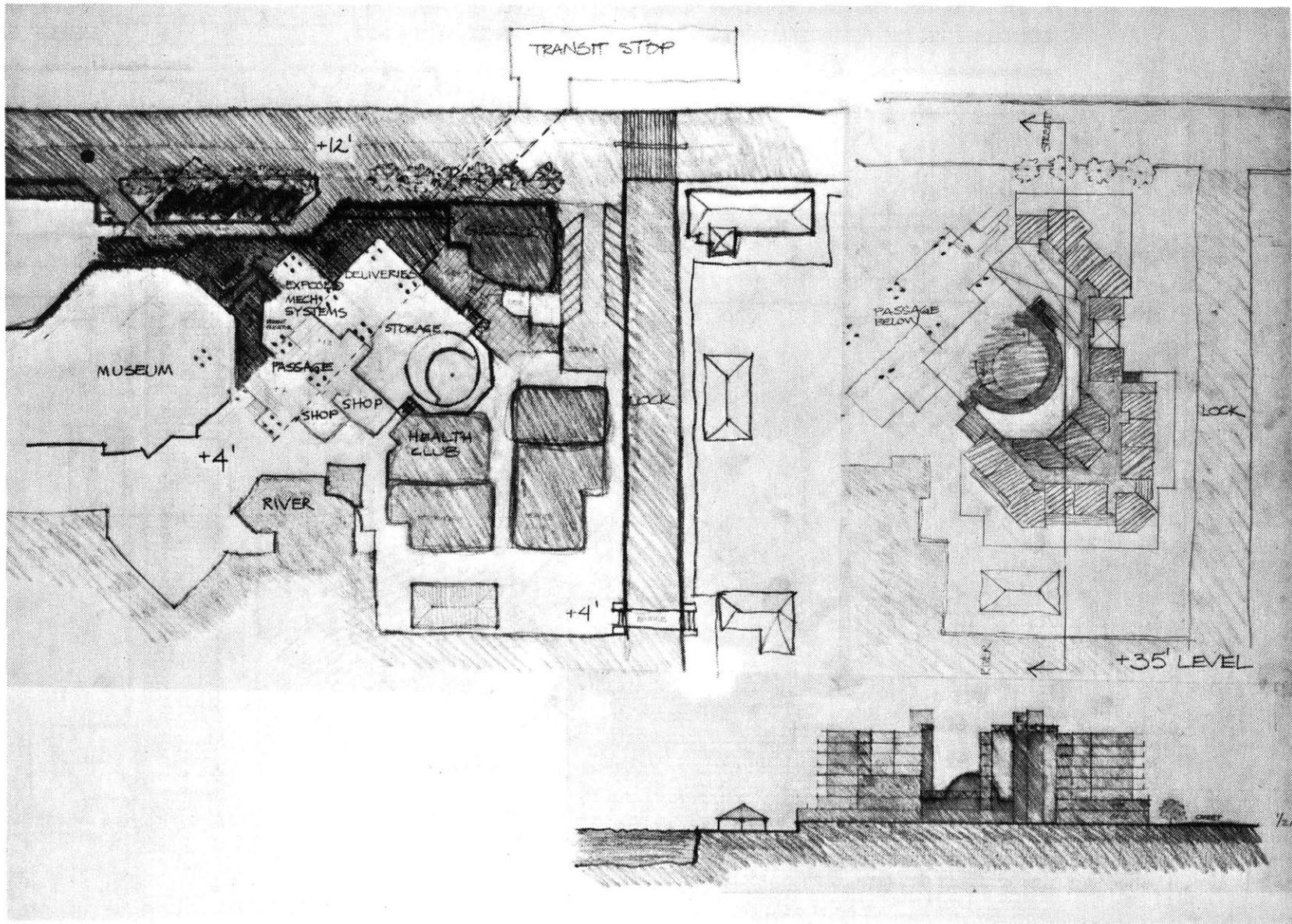


29. KEY PLAN



30. THE PASSAGE IN CONTEXT



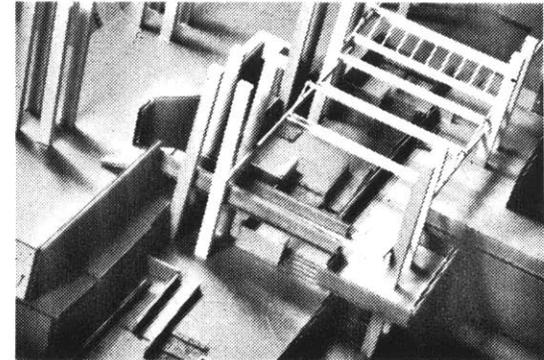


31. GROUND LEVEL STUDY OF PASSAGE AND SECTION THROUGH HOUSING

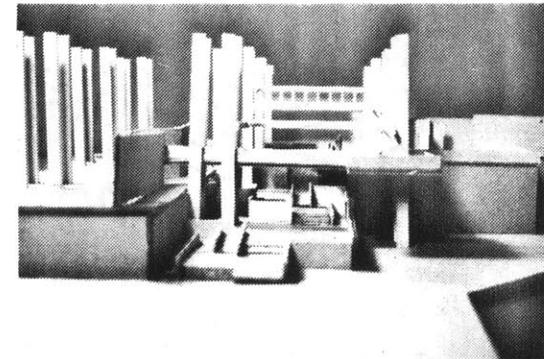
My primary concerns for the design of the Passage are reflected in the following elements: the qualities of the sloping path; the nature of its edge and context, the primary structural system; column clusters and beam direction in relation to the path and the location of closure, nodes or path intersections; access points onto the path, stairs and ramps and hydraulic devices for negotiating level changes, uses within the path, shelter and modulation of climate with skylights and a secondary structural system and closure within a thickened zone.

The set of qualitative information gathered on these topics includes form, use, context, dimensions, materials, use of light, color, time and much more. In the following catalogues of prototypes and precedents the most important of these qualities and the most useful of the references collected will be discussed. These "element biographies" are to be complemented with design sketches prepared concurrently with the research.

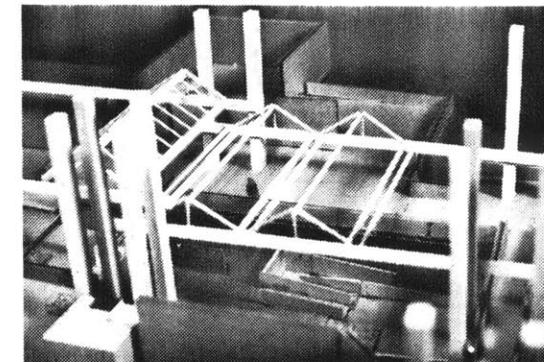
ELEMENTS OF THE EDGEWAY



32. BIRD'S EYE VIEW OF MODEL



33. VIEW UP PASSAGE



34. VIEW TO WEST



35. SPANISH STEPS

The sloping site is a condition found highly desirable by many architects as it lends itself more readily to creative and challenging results than a flat site. The allure of hilltowns is due in part to the dramatic overlooks and vertical overlaps which occur naturally. A sloping path affords changing experiential qualities not possible on a level one. The Spanish Steps in Rome (fig. 35) are a good example of this. However, for Boston's climate, a partially covered path seemed more appropriate and references for more sheltered paths were sought.

Nante's Passage Pommeraye (fig. 36) was a primary inspiration as it negotiates a large level change between two destinations and because it is flanked by prominent columns and active uses. Though it is skylit it is also quite interior, a quality I wasn't seeking for the Boston Passage. The slower, more gradual sense of ascent and the alternately illuminated and dark areas of the path intrigued me with Paris' Passage Vendome (fig. 37). The sensation of being sheltered by rows of trees arching over one's path is a powerful and appealing one, though where trees aren't feasible trellised vines and hanging foliage could evoke some of this quality.

While the route of the path is usually singular in nature in the European passage examples; I sought a more varied experience for the design of this Passage. Secondary paths intersect the main route from two directions and large inhabitable areas are designed within the main movement zone. Streets in Italian, Greek and Spanish hilltowns also served as excellent form and use references (fig. 38).

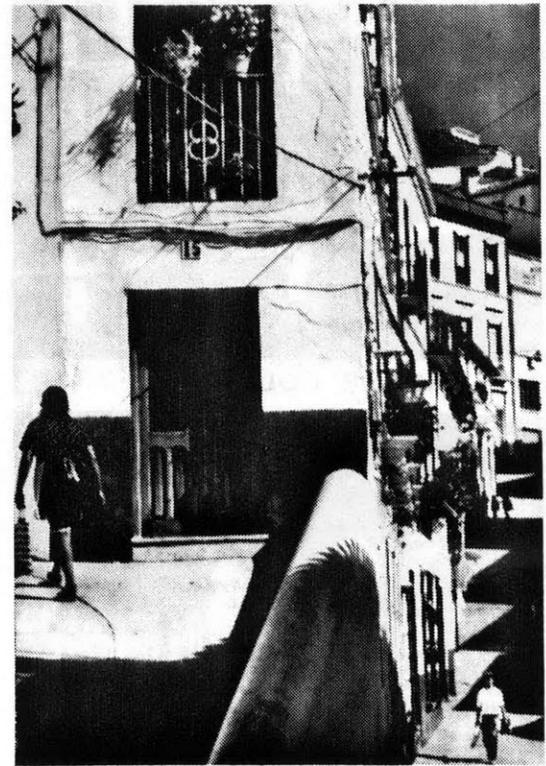
SLOPING PATH BIOGRAPHY



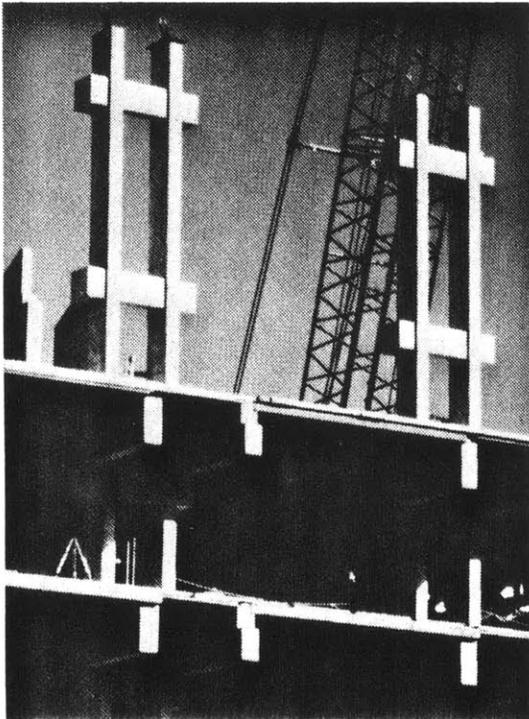
36. PASSAGE POMMERAYE



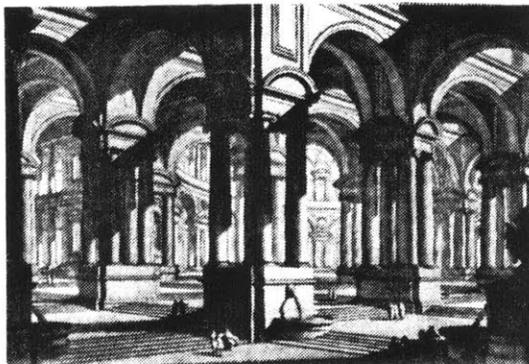
37. PASSAGE VENDÔME



38. SPANISH HILLTOWN



39. LADDER COLUMNS



40. GROUPED COLUMNS

A fully precast concrete structural system was chosen for the museum and planetarium. Pairs of two-story tall stacked ladder columns (figs. 39, 43) with haunches support precast beams which support hollowcore slabs. The beams run perpendicular to the direction of the path.

In keeping with the huge size of the museum (eleven hundred feet long) large scale four-poster column clusters are used. The four-column cluster occupies a twelve-foot square zone and is conceived of as a giant carved-out pier (figs. 40, 42). It defines habitable space inside and outside of itself that can be interpreted in a variety of ways. The closure can occur behind the clusters, transforming them into a kind of partially-sheltered outdoor room or between the two pairs, breaking down the distinction between inside and outside and increasing the continuity of ongoing territory. In addition, because the closure would be a screen wall and independent of the columns it could be built and changed easily, further extending the options of the edge-zone.

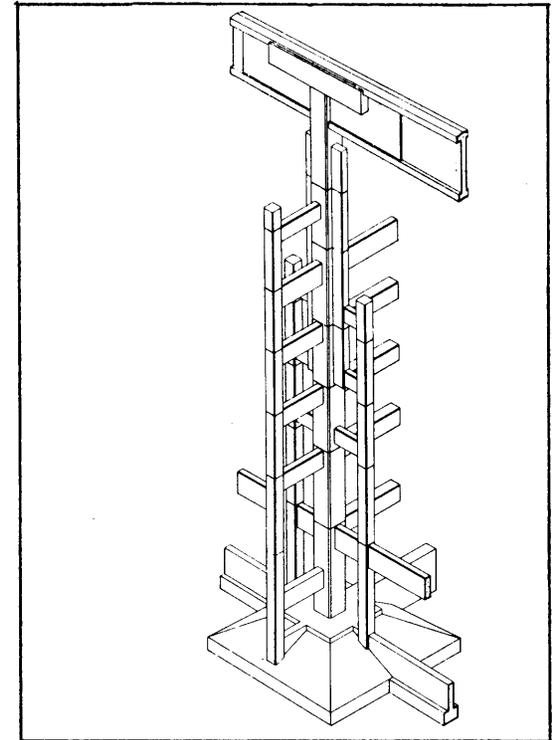
PRIMARY STRUCTURAL SYSTEM BIOGRAPHY

The column cluster's strong repetitive form can be recognized at a distance thus making it useful as an orientation guide. The clusters of four are always on the north side of the Passage and the pairs of two are on the south. There are four pairs of clusters that reach across the Passage, each set resting on one of the major levels. In addition, the column clusters provide support for the secondary skylight system.

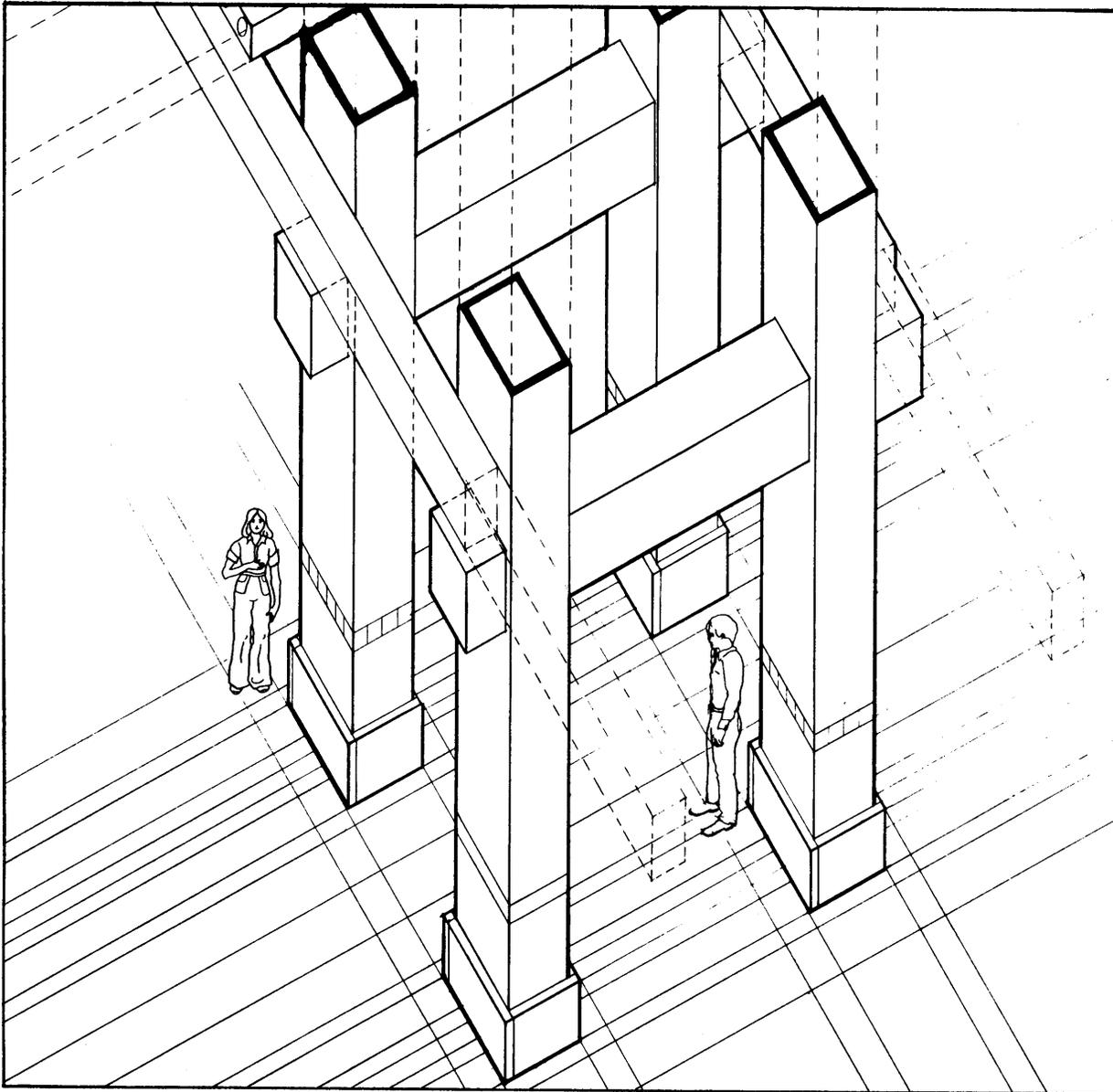
The large size of the clusters suggest that they support a huge building. Smaller structure members would be dwarfed by the great expanse of the museum.

The actual design of the individual columns was directed by the notion of their having distinct bottoms (bases), middles (shafts) and tops (capitals or something different going on). Figure 44 illustrates the development of each of these aspects. Figure 45 illustrates the decreasing size of the column shaft as it grows upward and supports less weight as well as the transition from concrete to steel when it reaches the sky.

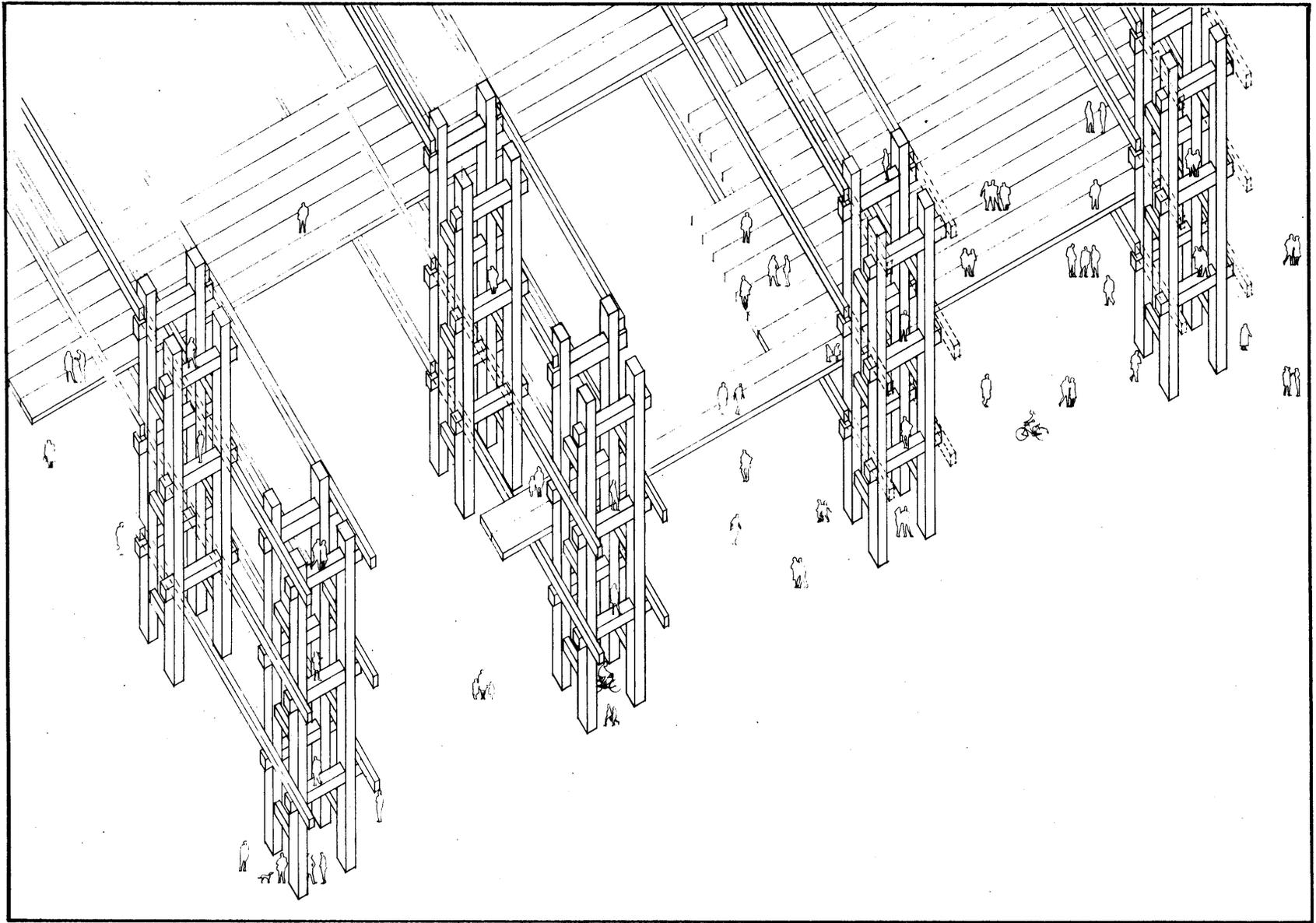
To generalize: having established the location of the Passage between two sets of column clusters, the roughest form of edge-zone came into being. The stage was set for the development of the thickened edge.



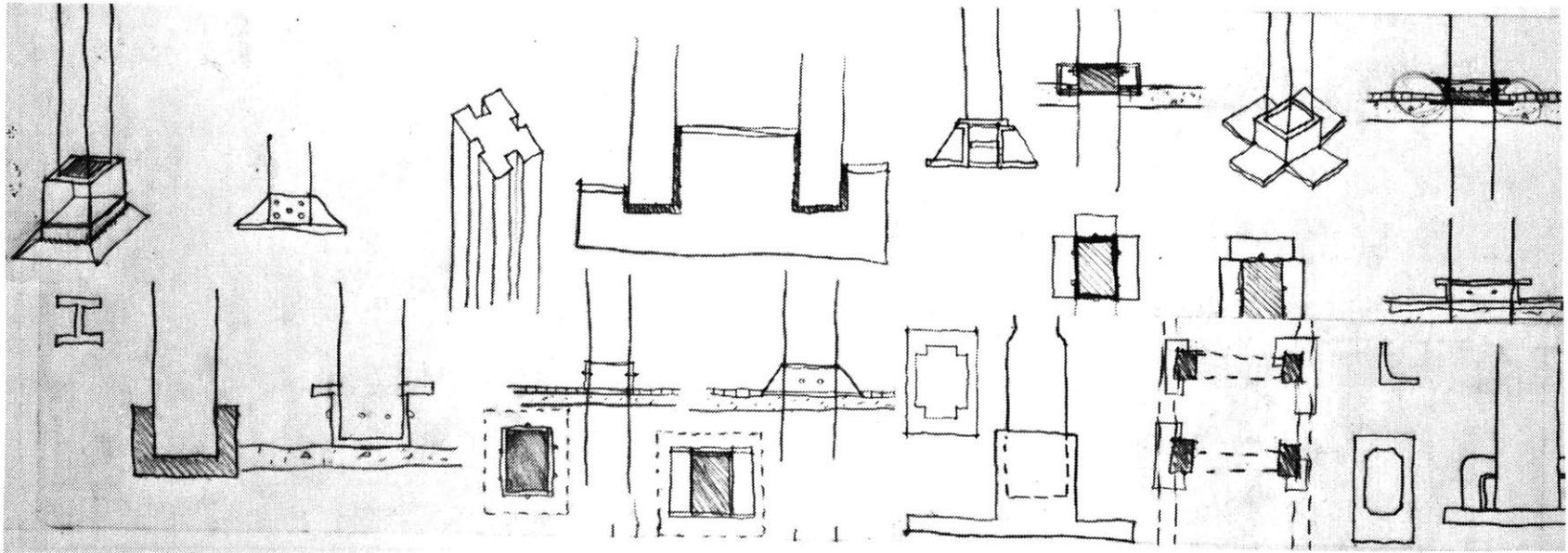
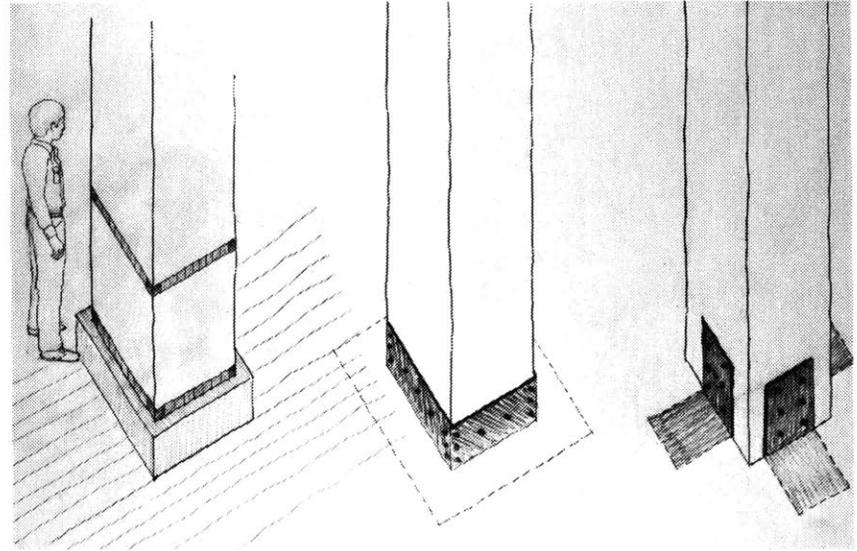
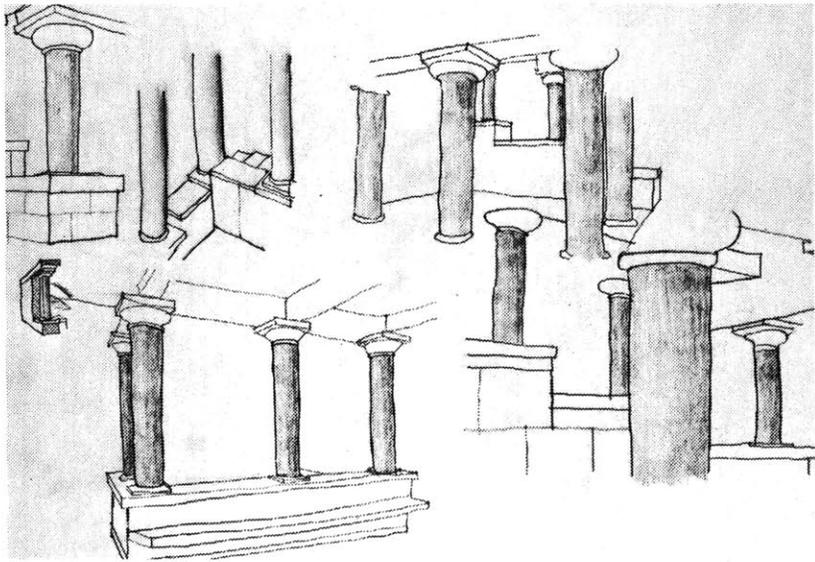
41. ADDITIVE COLUMN



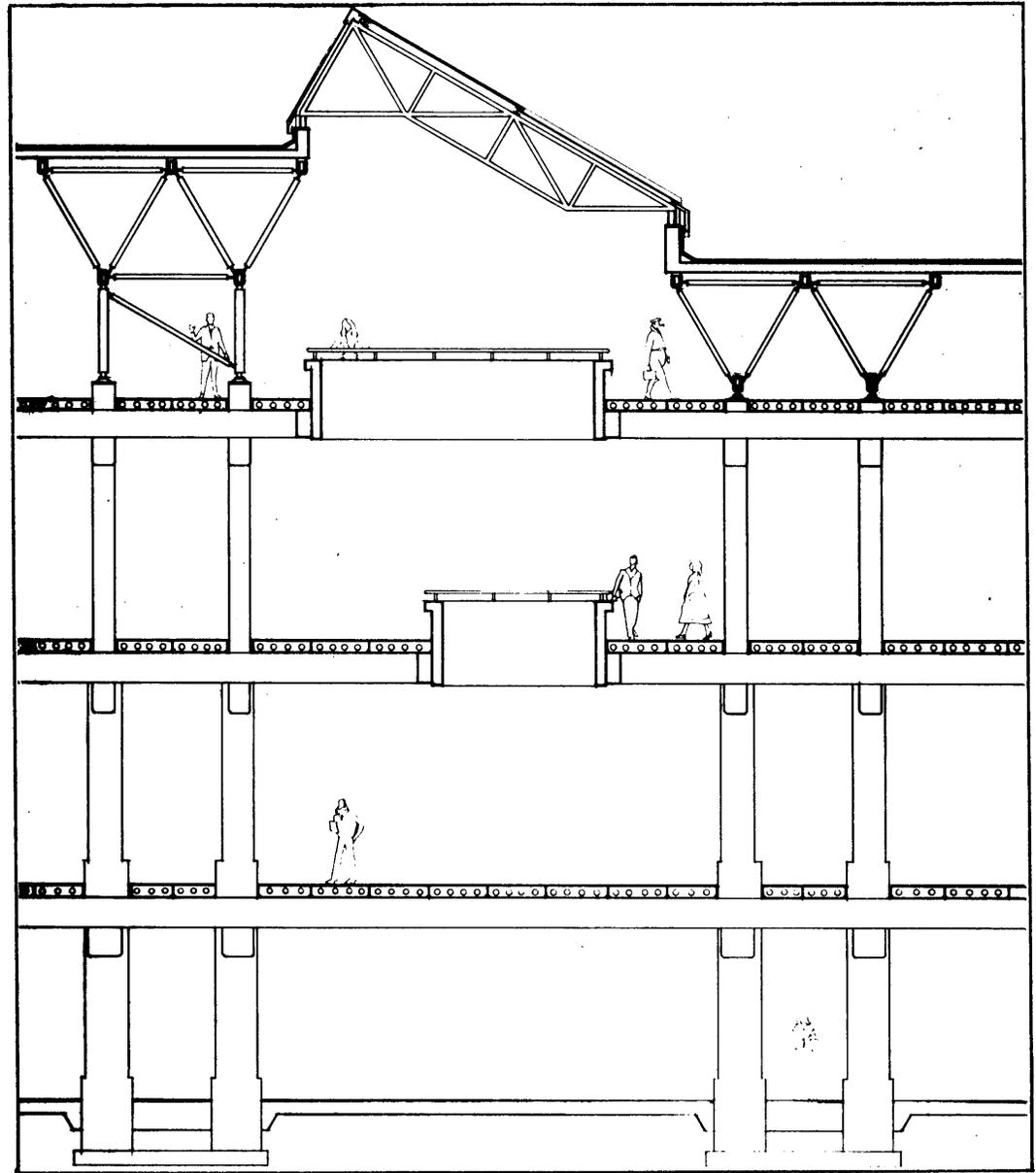
42. COLUMN CLUSTER STUDY



43. STRUCTURAL ASSEMBLAGE

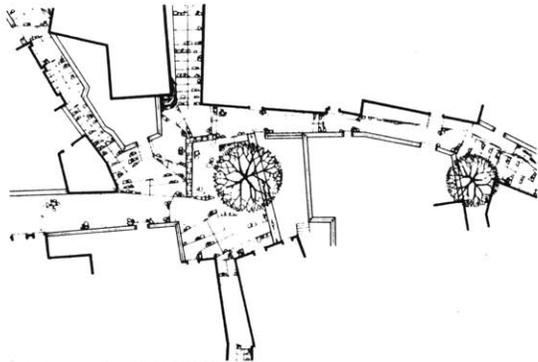


44. STUDIES FOR COLUMN CAPITALS AND BASES



45. SECTION THROUGH STRUCTURE

The Passage, sloping down east to west through sets of column clusters needed to accommodate access from directions at angles to it. While the majority of visitors will be arriving by rapid transit in the energy-conscious future and walking or rolling themselves over the street on the bridge leading directly into the Passage, a parking garage, bus parking area and an auto drop-off point have been provided for those who don't (fig. 48A). Their access to the Passage will be perpendicular to its main direction and up six feet. A ramp and pair of stairs lead to a "node" (fig. 46) off the main movement zone of the Passage at which is also the entry to the museum. Visitors choosing to go directly to the river may by-pass the Passage almost entirely and descend a four-foot ramp leading to a skylit corridor passing under the museum (fig. 47). This corridor arrives at the last platform of the Passage a few dozen feet from the site-long water edge walkway.



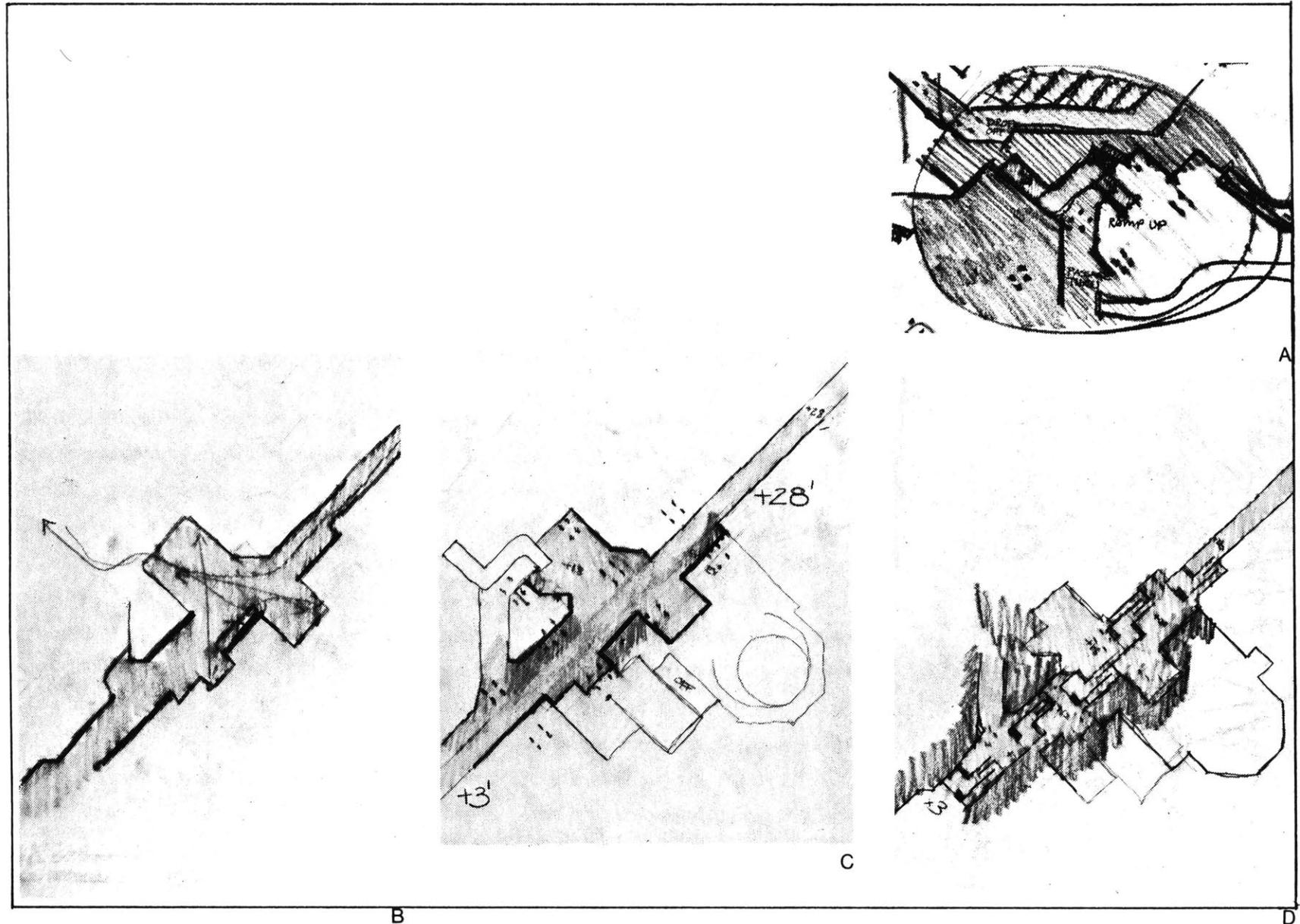
46. A "NODE"



47. SKYLIT CORRIDOR

The entry zones of each of the program components off the main Passage also required study. Correlating which level they operated off of, how large and therefore important a space preceded them, and the juxtaposition of hard path edges and receding spaces was the subject of the three path shape, link-and-node-sketches at the right (figs 48B - D). The higher end of the Passage was to be more open (wider) with deeper set-backs at the entries to the museum and planetarium to accommodate the large numbers of anticipated visitors. While it was to reflect its specific public, the lower part of the passage was to evoke more of a general public sense.

PATH INTERSECTIONS BIOGRAPHY



48. STUDIES FOR ACCESS POINTS ONTO THE PASSAGE

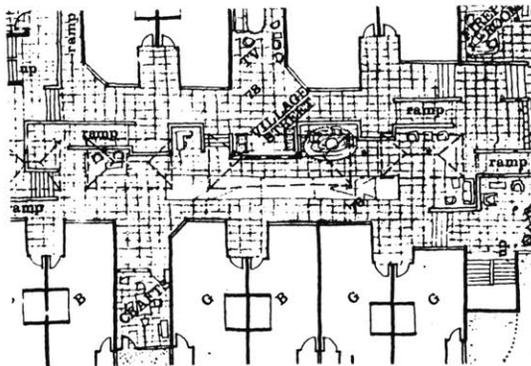
Having a twenty-four foot level change to deal with and hoping for a lively public place which would draw people from all over metropolitan Boston, led me to a barrier-free scheme. Granted three hundred feet of ramp seemed a bit overwhelming at first, but from the outset ramps and stairs were considered as partners and worked well together in the end (figs. 49 and 51A - F).

The stair and ramp location was based on rough information about the location of the major uses. The stairs were always to lead the visitor in the direction of the main use at that level. The landings were designed to provide overlooks as they progressed downward.

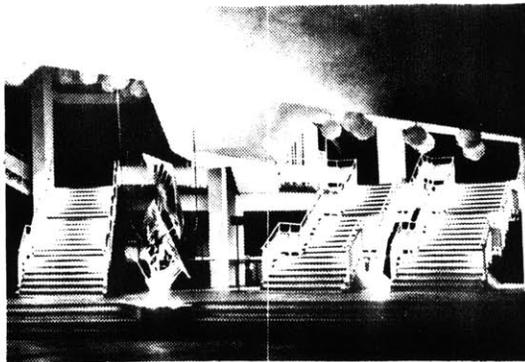
Dimensional research and studies of stairs were a very important aspect of this design phase. Widths of exterior stairs ranging from the Spanish steps to hilltown alleys to Scharoun's branching stair-lettes (fig. 50) inside the Berlin Philharmonic informed the search as did my pocket-size measuring tape.

Figures 51A - F show the Passage in an early stage of development. Decisions regarding location of uses (m = museum, p = planetarium, s = shops) and their frontage on the path are firming up (figs. A, E) and issues of where and how the stairs and ramps will work are being confronted.

At this stage the stairs are showing their directionality as they direct themselves toward the entrances of the major uses on the level below attained by them (figs. B, E). One ramp and stair combination, (fig. D) demonstrates the impossible obstructionism of one

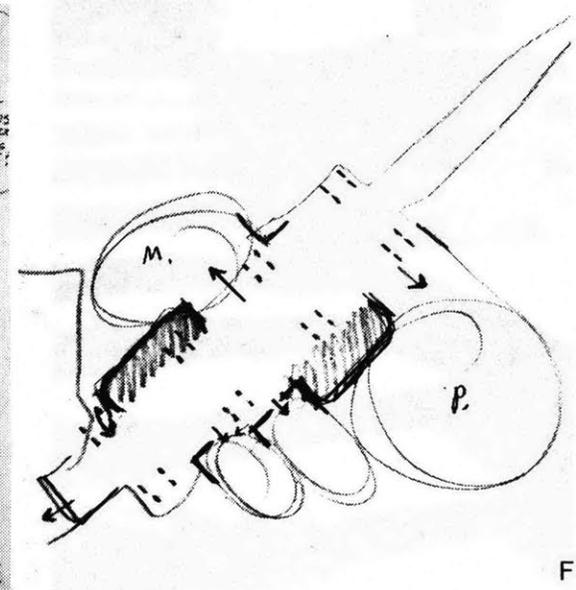
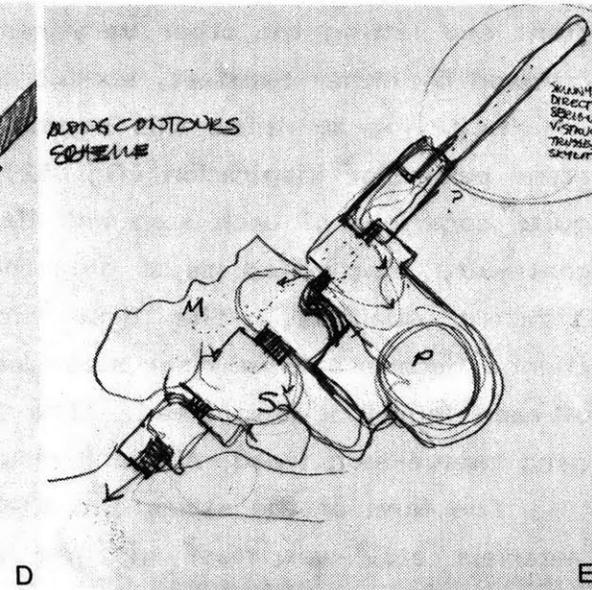
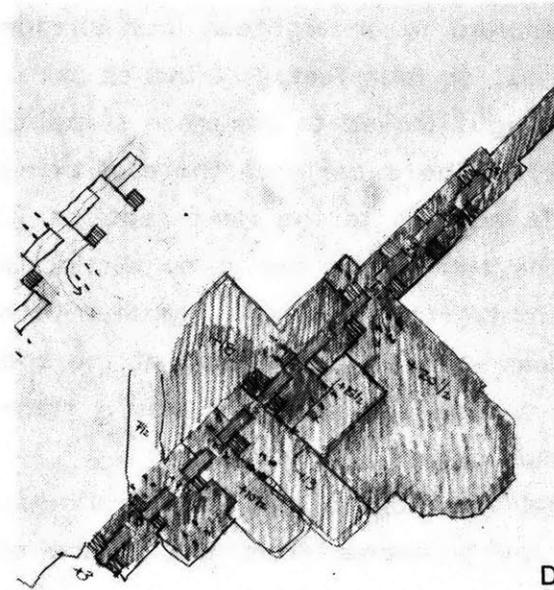
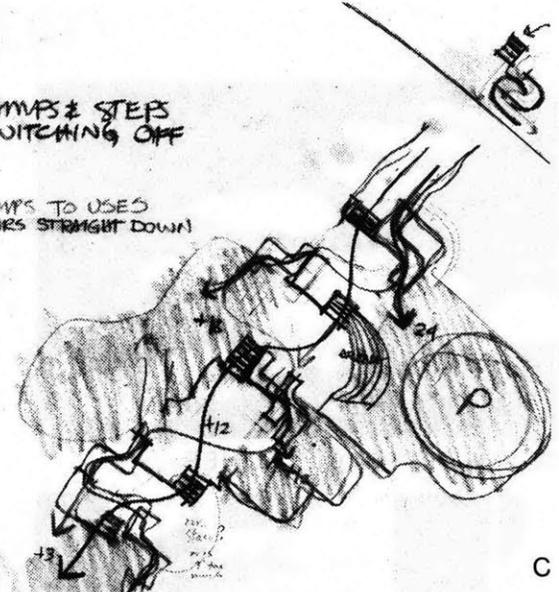
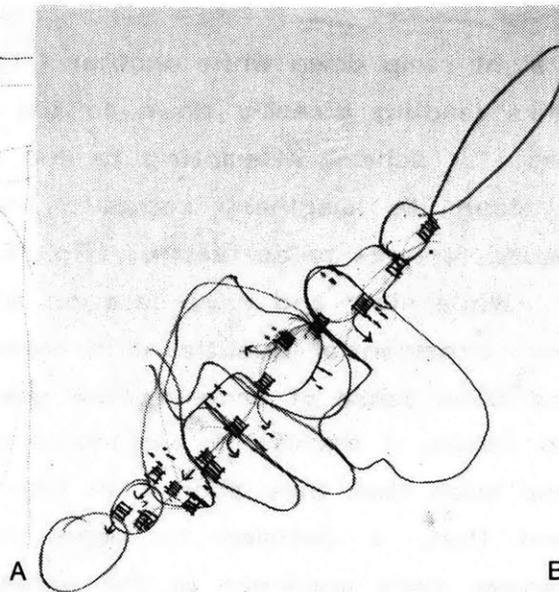
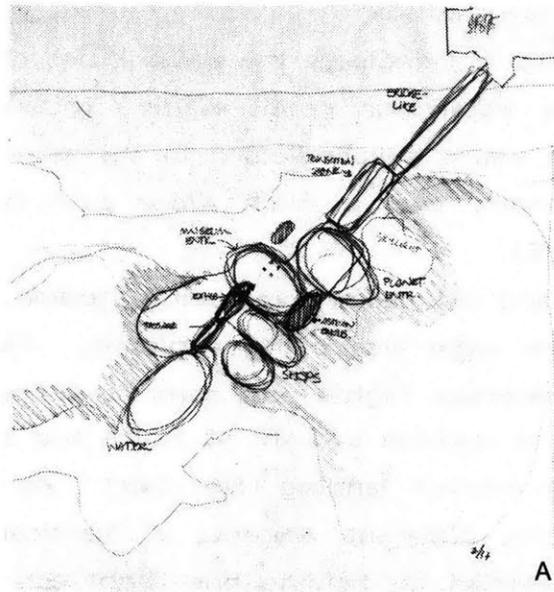


49. WORKING TOGETHER

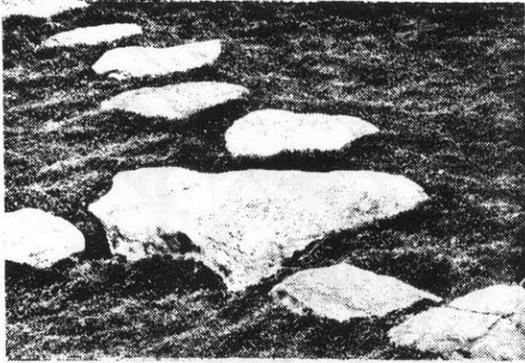


50. MULTIPLE STAIRS
IN PLACE OF GRAND STAIRWAY

STAIRS AND RAMPS BIOGRAPHY



51. STAIR AND RAMP STUDIES



52. STEPPING STONES



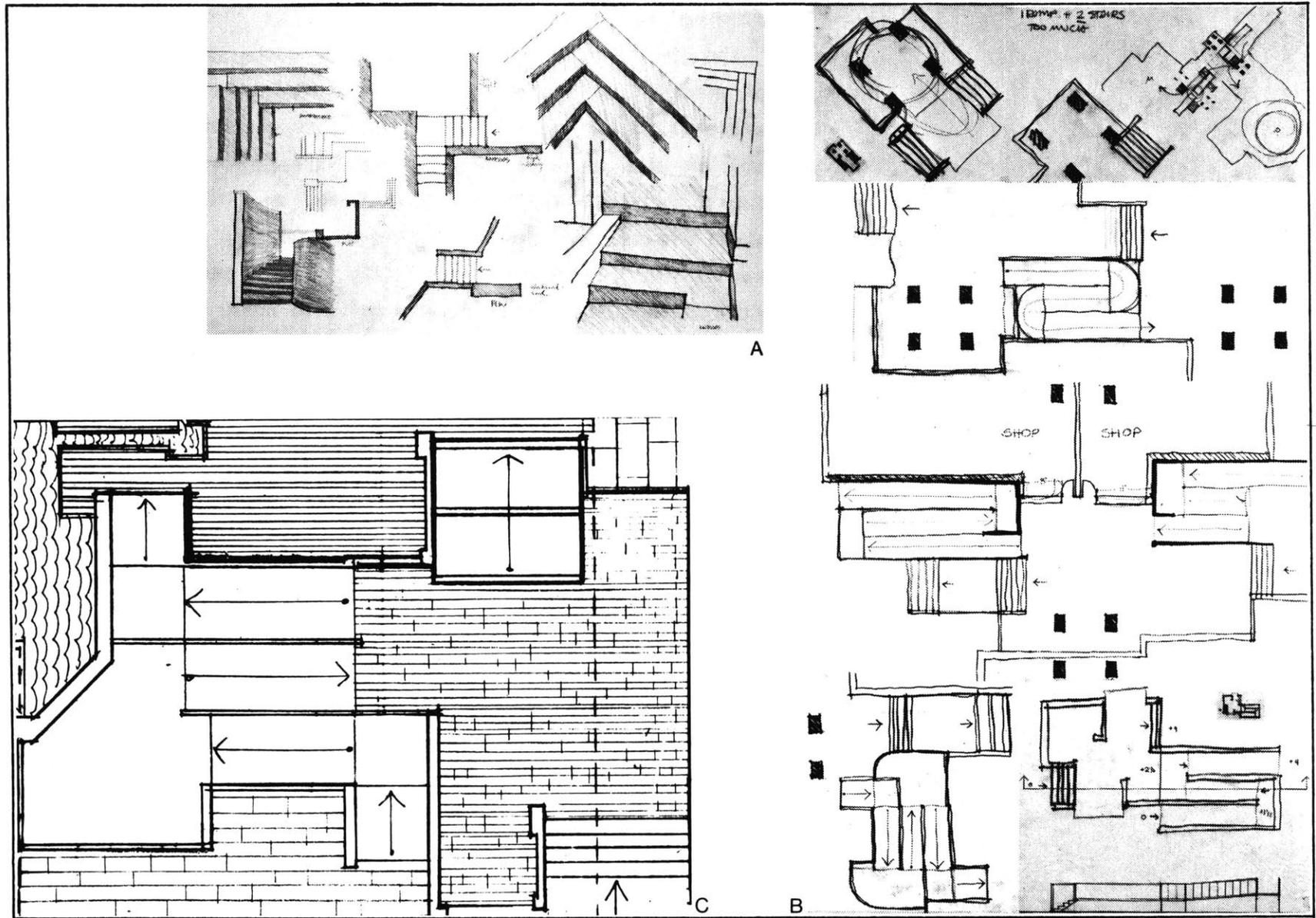
53. STEPPED WALLS

straight ramp down while another (fig. C) explores the possibilities of stairs leading directly down to the water and ramps leading to the uses. A scheme attempting to run stairs perpendicular to the slope or along its imaginary contours shows that a much wider path is needed for this to be feasible (fig. E).

While stair and ramp location and dimension were being studied, their experiential qualities and form were also being explored. To lend some sense of order to the numerous flights and runs of stairs and ramps, I decided to test ways to combine a flight of stairs and a ramp such that they shared an intermediate landing (fig. 54B). Beyond that, a decision to make the different amounts of vertical changes more apparent to the pedestrian by holding one flight constant and letting the other vary resulted in an eighteen inch change followed by either two-feet, six-inches, or four-feet, six-inches more.

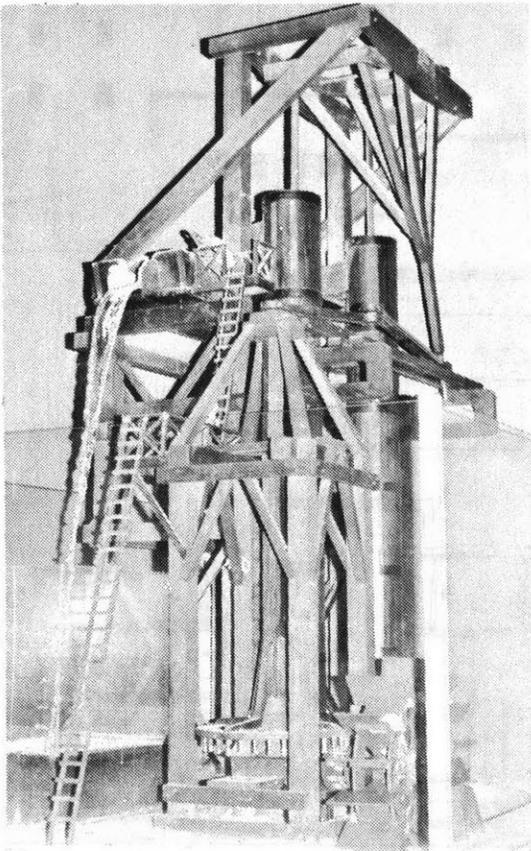
In trying to refine this beginning I looked to Japanese stepping stone paths for inspiration (fig. 52). The experience there of being quite conscious of each step and its relation to the next (options in continuity), prompted me to give the two flights per ramp distinctly different qualities. The first flight, the constant eighteen-inch change became a three-riser step-ramp with a stone nosing at the end of each four-foot long tread. The second run of stairs was a standard twelve-inch tread, six-inch riser affair (fig. 54C).

The form of the stairs and their relation to low walls, railings, materials etc. was most inspired by examples from the palace of Knossos in Crete (fig. 53).

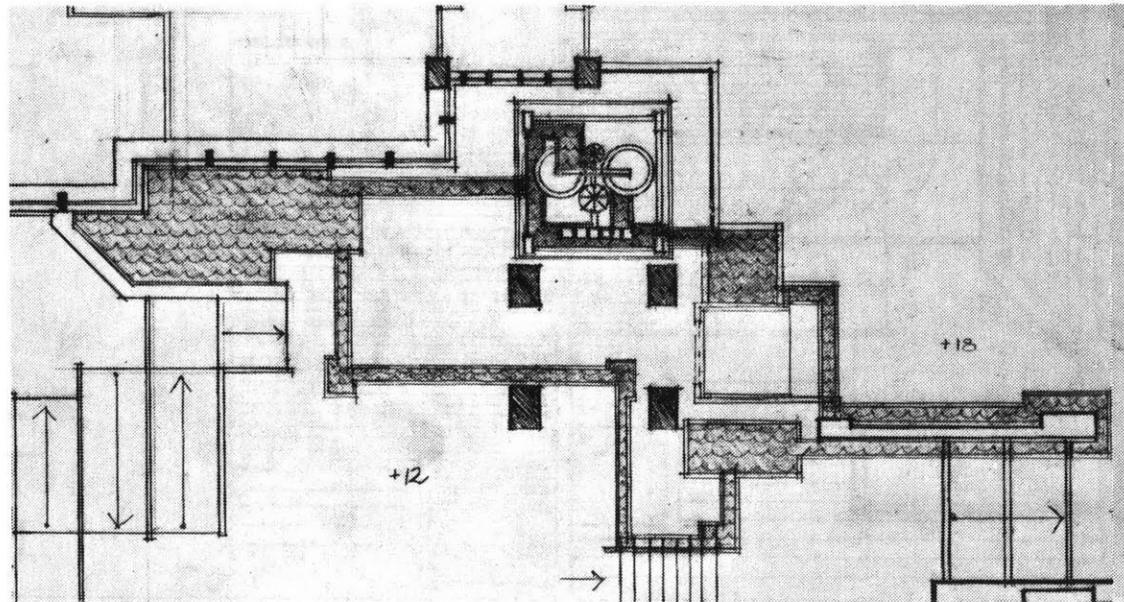


54. STAIR/RAMP DESIGNS (A) STUDIES, (B) EARLY ATTEMPTS, (C) FINAL DESIGN

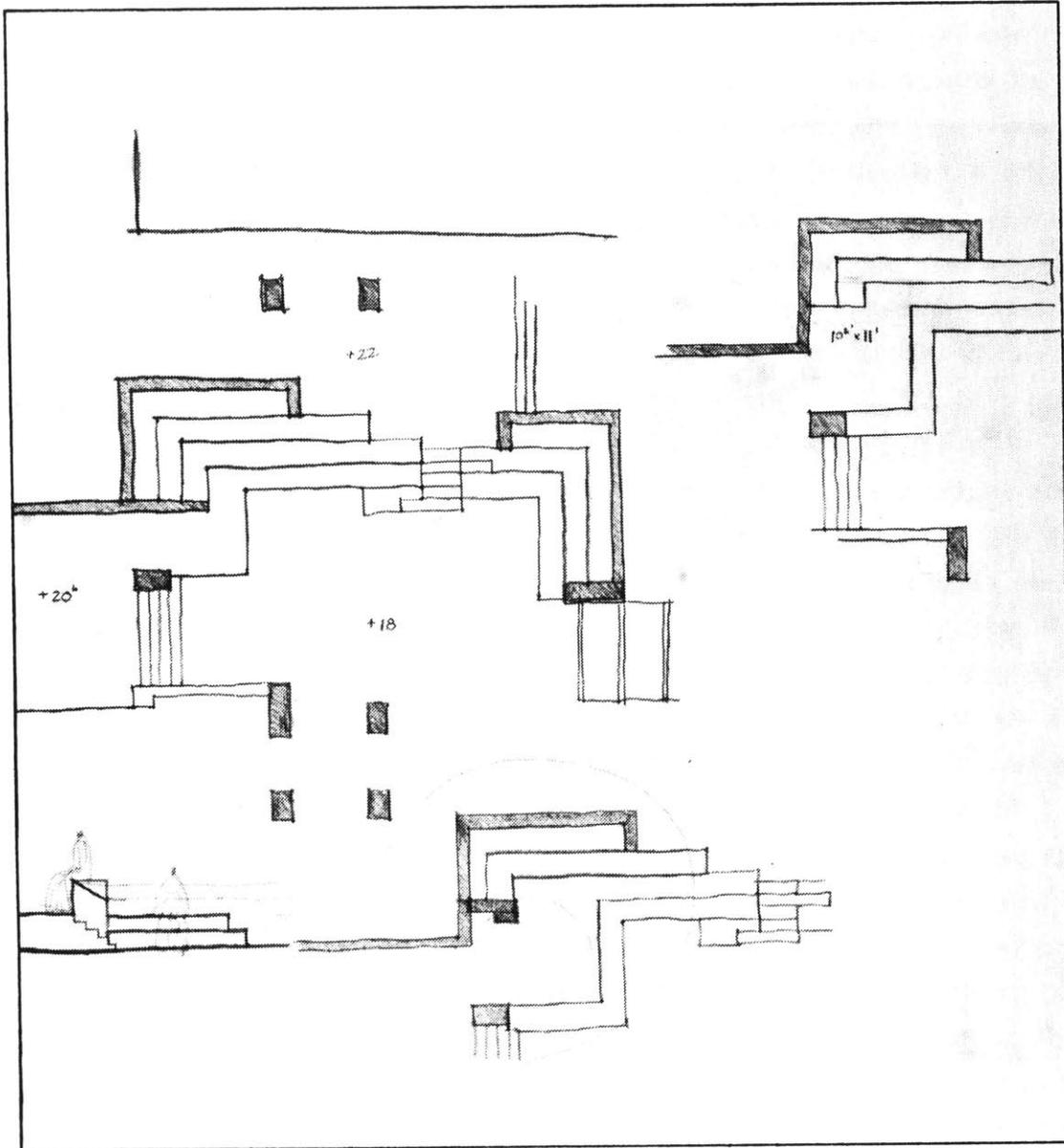
Combining ramps and stairs worked quite well except on the level of the two shops. Trying to give each shop a reasonable amount of window frontage on the path and fit in the ramps was nearly impossible (fig. 54B center, page 43). As museum exhibition windows were on the opposite side of the Passage, moving the ramps there caused the same problem. Therefore, an alternative means of handicapped access was devised using an existing museum exhibit: the Leonardo DaVinci water pump (fig. 55). Occupying a much smaller area, the pump simply uses gravity to lower and raise a small wheelchair platform: water added to a reservoir on the platform causes it to descend, when drained, allows it to rise. As well as being practical, it is an educational and entertaining exhibit.



55. DAVINCI WATER PUMP



56. HYDRAULIC WHEELCHAIR LIFT



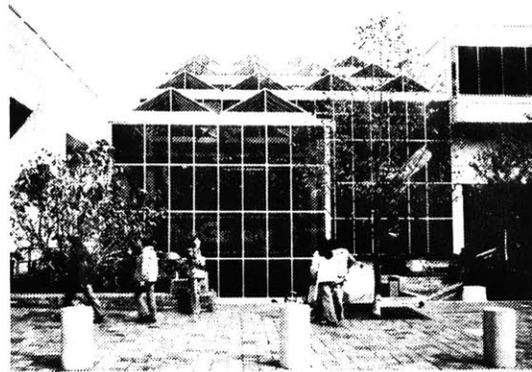
57. STAIRS AS AMPHITHEATRE SEATING



58. STAIR SEATS IN ROME



59. SKYLIGHT REINFORCING SPINE



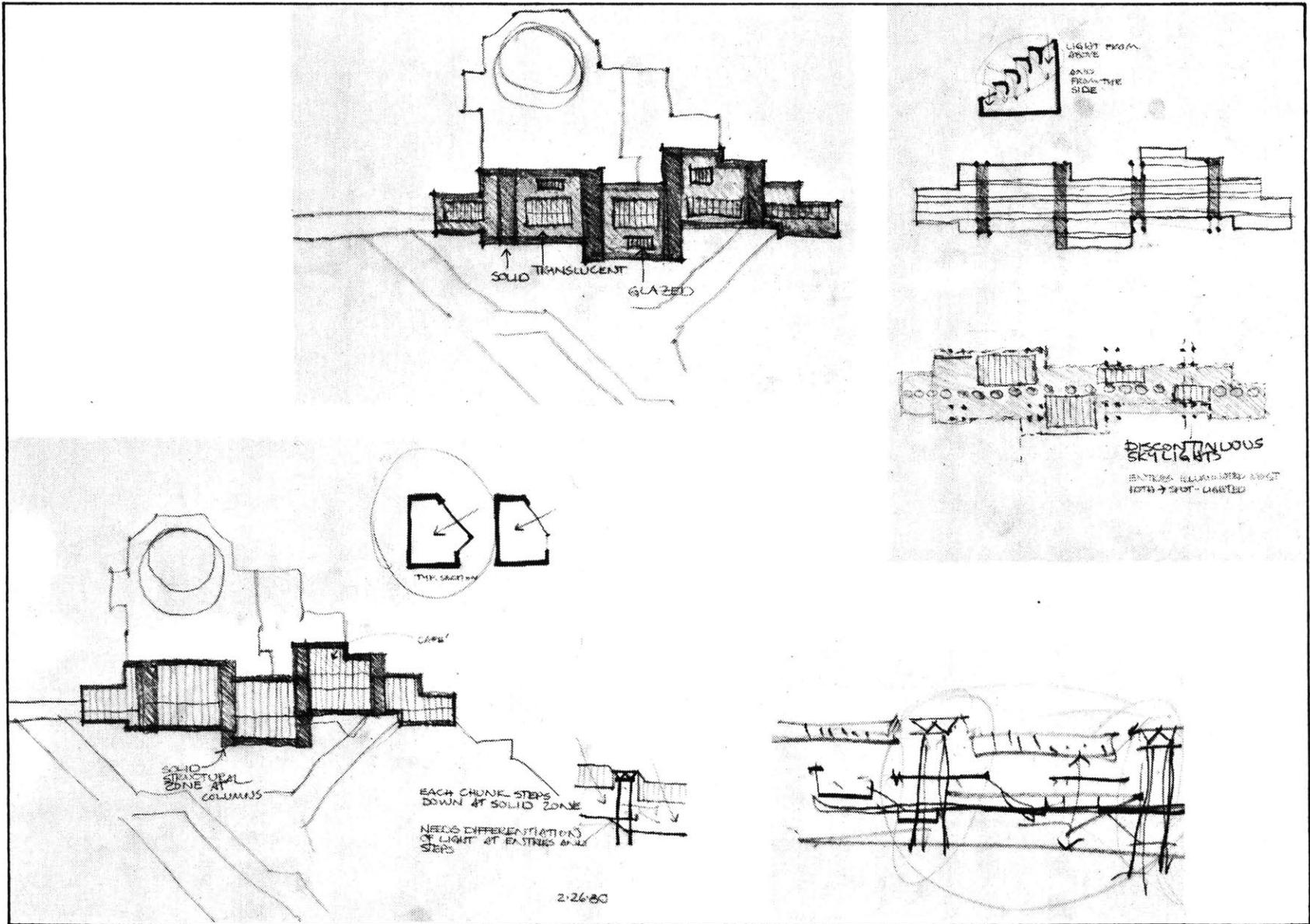
60. ASCENDING SKYLIGHTS

Having used several European passages as references at the onset of design work on this Passage, I again turned to them; this time to see how they used skylights. In most cases the glass roof was simply a reflection in glass of the path (fig. 59). This seemed too simplistic and aggressive a statement. The converging lines of the skylight system rushed madly toward the end of the passage carrying pedestrians along with them. One of my favorite passages, however, broke up the straight shot of glass with bands of structure and darkness (fig. 37) and my sketches (figs. 61A, B) followed that lead.

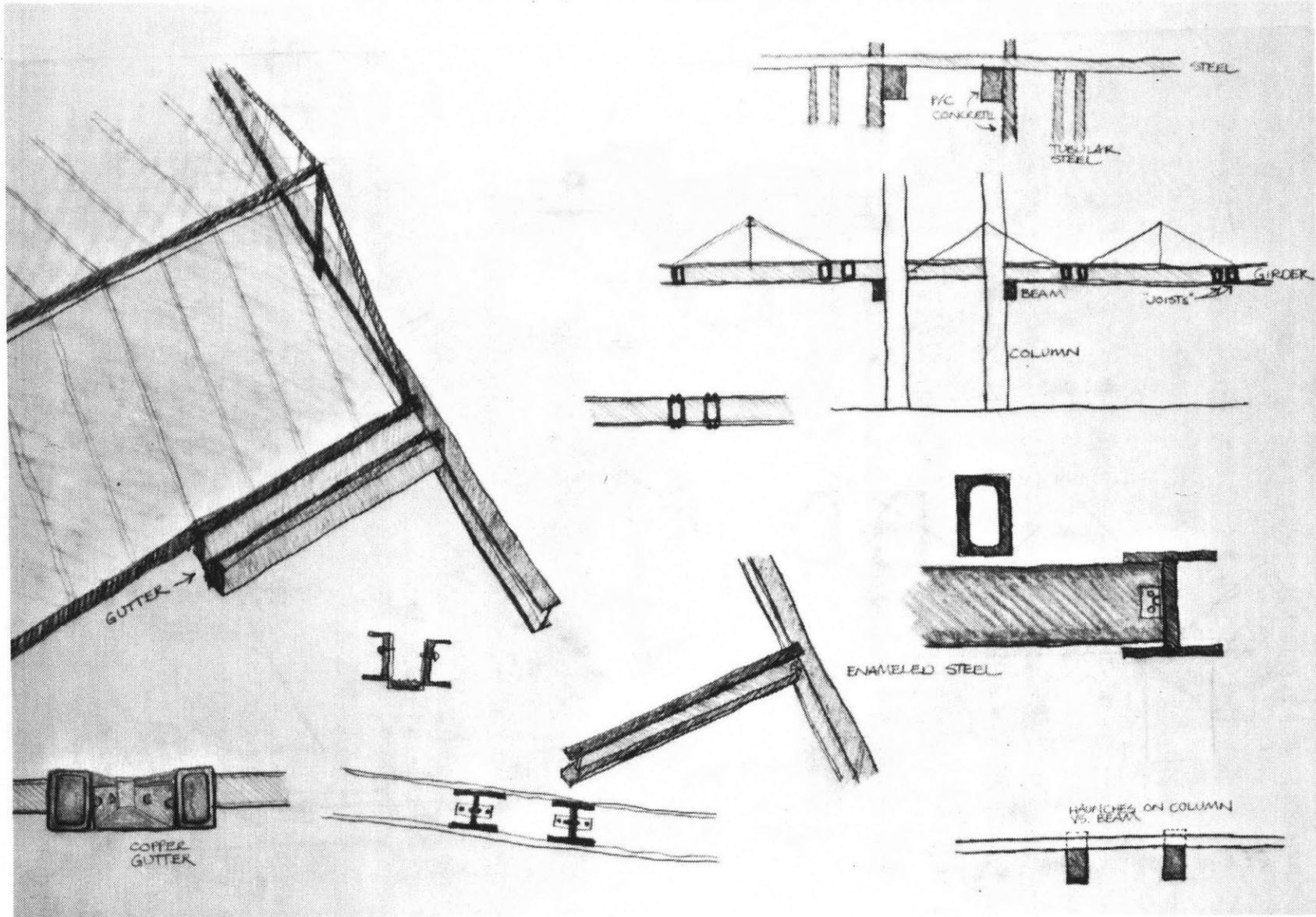
The issues studied centered around which directionality the skylight system should take, parallel to the path or normal to it; whether the path should be covered with continuous skylight or intermittent bands of glazing and solid material; whether the skylights should act as a system or respond to local conditions along the Passage; whether they should step down with the path or in fewer bigger increments and finally, whether the ends of the skylight should be lower than the middle part over the main movement zone.

At the end of a half roll of trace, the verdict favored a skylight system characterized by: unison (the Passage was such a major move on the site that piecemeal skylights seemed out of scale); beams running perpendicular to the path to slow movement and encourage strolling; continuous glazing making it more a glass roof than a skylight; and pitched-roof modules stepping down with the path at varying heights across their width depending on what they were covering. An example of this type of skylight disposition is shown in figure 60.

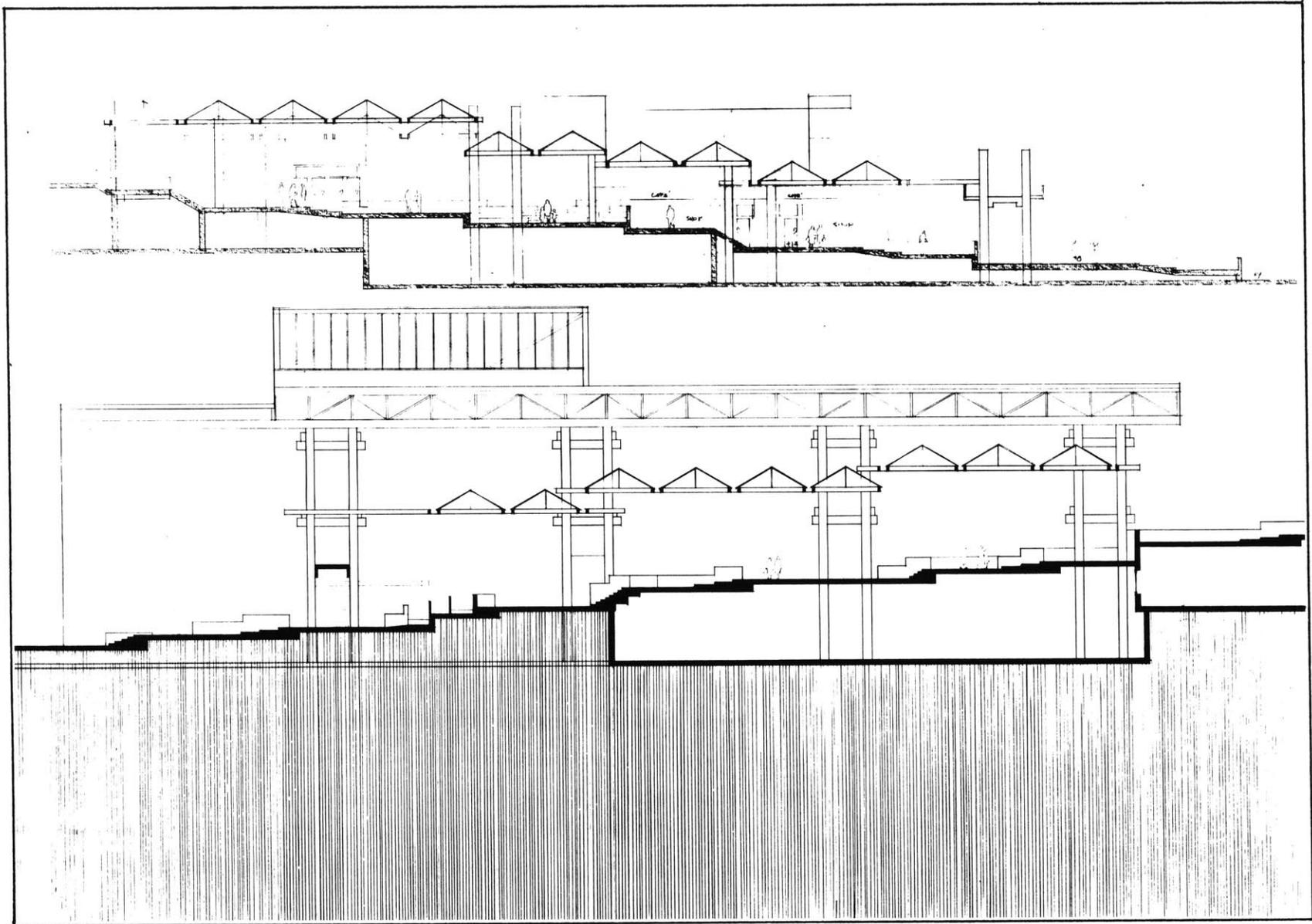
SKYLIGHTS BIOGRAPHY



61. SKYLIGHT STUDIES



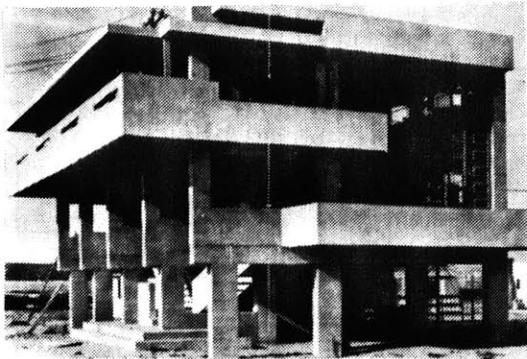
62. STUDIES FOR SKYLIGHT STRUCTURE



63. LONGITUDINAL SECTIONS SHOWING STEPPING SKYLIGHTS (A) TO WEST (B) TO EAST



64. CLOSURE ZONE

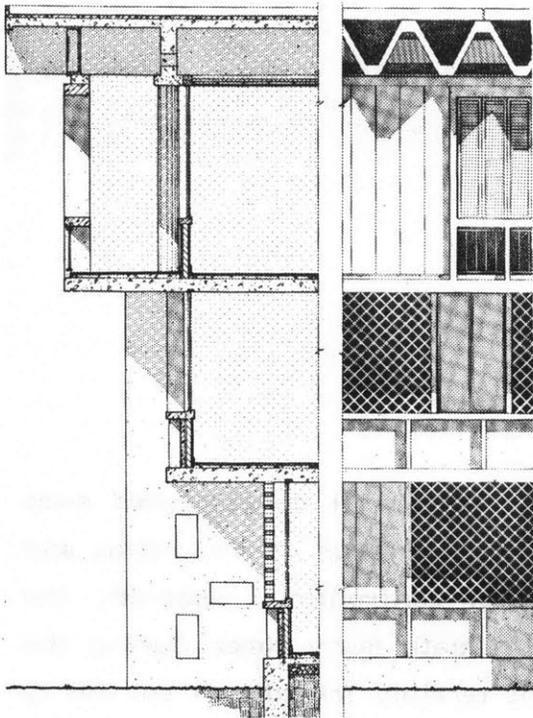


65. PERMEABLE EDGE

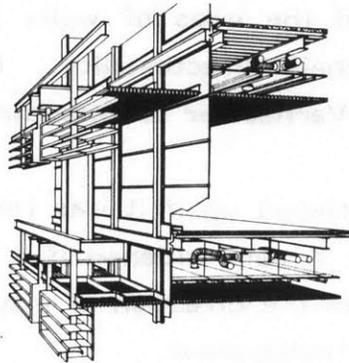
The actual weatherseal between interior and exterior territories is not of crucial significance in the intention to design a spatially defined edge-zone. The arrangement of solids and voids and location of mullions is not terribly important either, aesthetically perhaps, but not ultimately. The reader may notice that there are no elevation studies as part of this thesis and that the closure walls shown in the plans are diagrammatic. I have chosen not to design these walls, i.e., the weatherseal, as they should respond largely to the interior layout of the spaces behind them, the design of which was not within the scope of this project. I did, however, establish the zone in which the final closure would be built.

The next guiding principle is to envision the zone as both path and place. It must be inviting enough to encourage people to walk next to it as well as claim spaces within the zone. Here the idea is to push some of the interior uses out into the exterior and allow some of the exterior uses to push in; this double niche allows the inside and outside to coexist in plan within the thickness of the wall (potential for access and communication between them occurs within that thickness). Appropriable spaces such as these invite lingering next to a wall, stopping, talking, sitting, etc. This increases the awareness of what's on the inside and encourages entering. It also permits interior uses to move out and become more visible, as bay windows do.

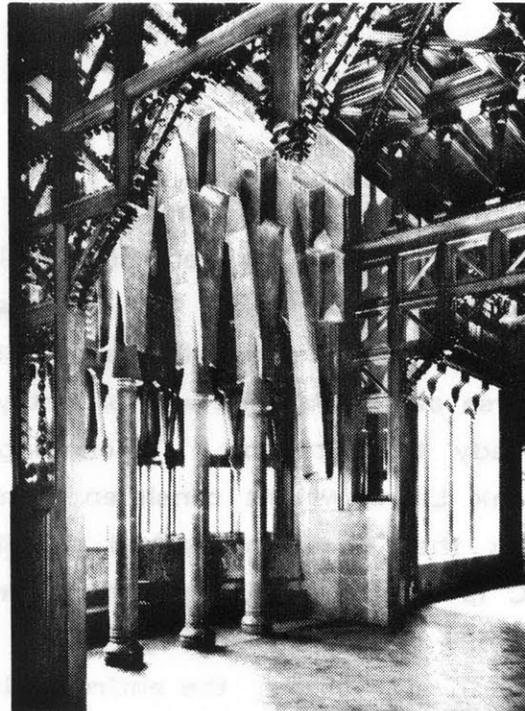
CLOSURE WITHIN A THICKENED ZONE BIOGRAPHY



67. THICK EDGE IN SECTION



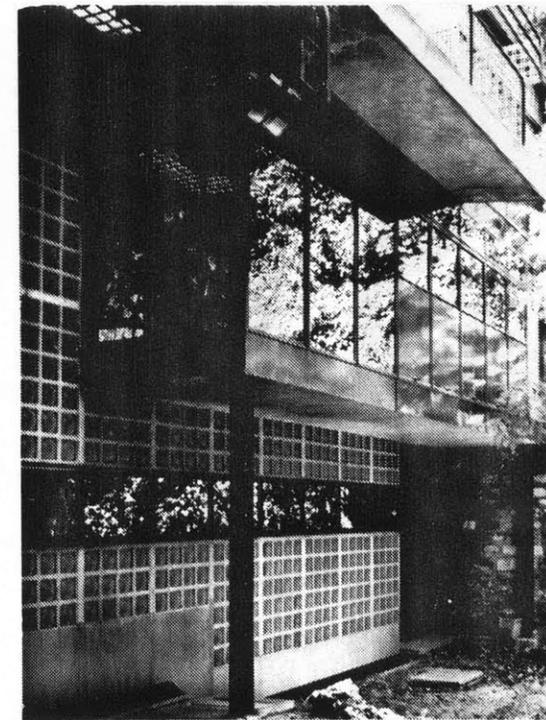
66. SUNSHADES



68. SPATIAL LAYERING OF WALL



69. LAYERED COLLAGE



70. DETAIL OF COLLAGE

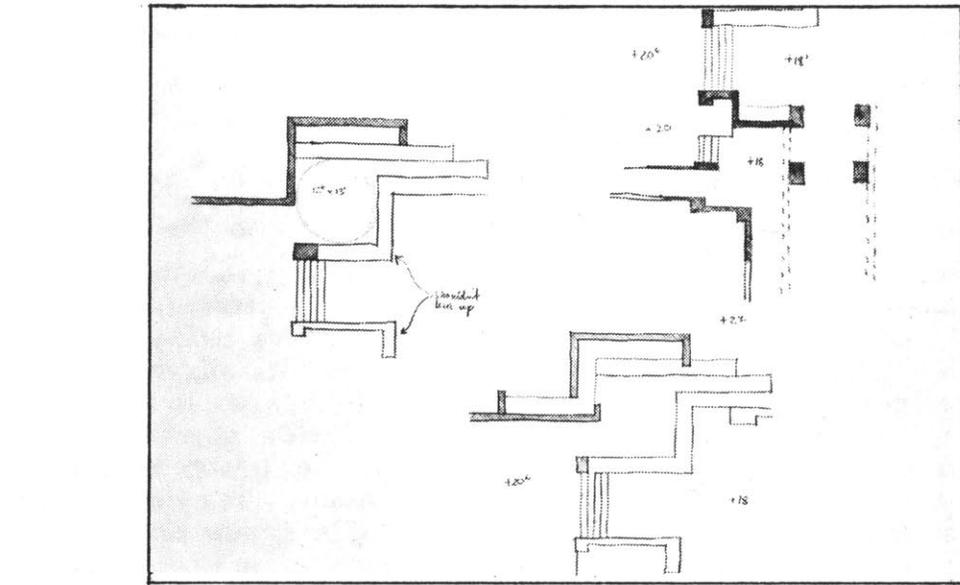


71. VERNACULAR WALL ENDS

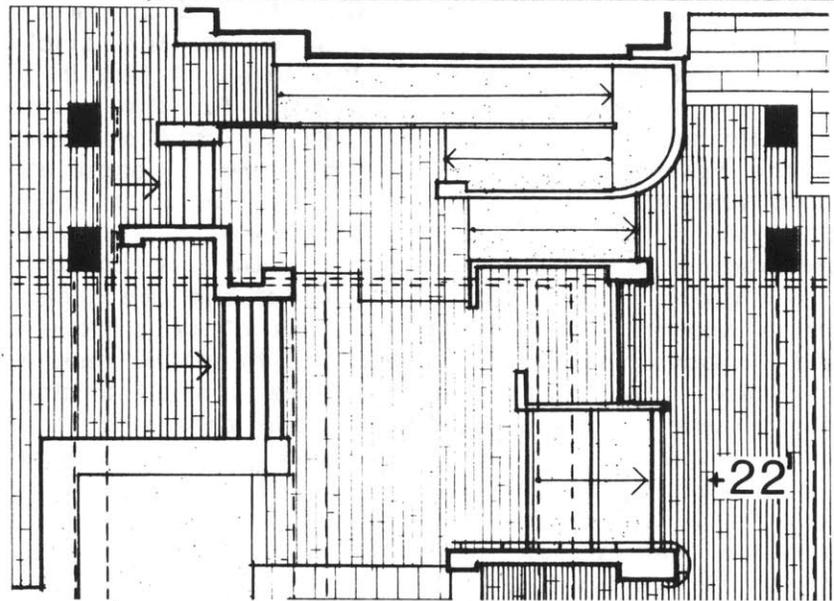
Realizing their importance to the Passage, I concentrated some attention on the low walls that define the numerous stairs, ramps and landings. Given that the experience of confronting, head-on, the narrow ends of the walls parallel to the path many times during the course of the Passage was probably not terribly friendly, I set out to remedy the situation. Thickening the edge seemed a good start. Frank Lloyd Wright consistently thickened the ends of walls in his work that were approached parallel to their directionality. Figure 72C is a study of examples from Wright. Vernacular architecture also exhibits this approach (fig. 71).

In my scheme, the entire wall was fattened up if it was relatively short in length while only the ends of it were widened if it was a longer low wall. The walls perpendicular to the direction of movement were treated as catches and are light and transparent.

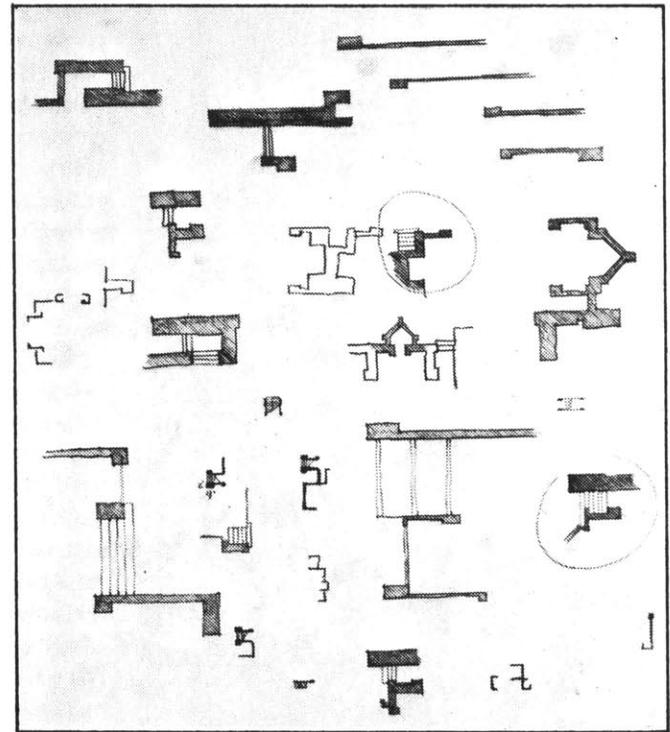
THICKENED WALL ENDS BIOGRAPHY



A



B



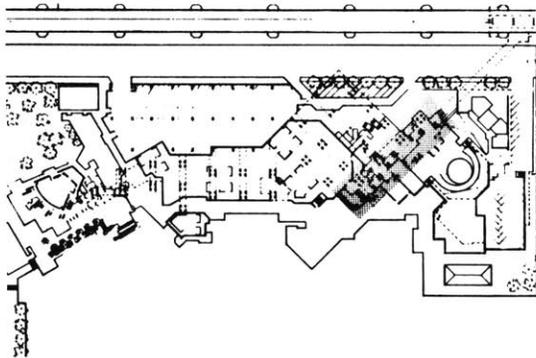
C

72. THICKENED WALL ENDS STUDIES (A) EARLY, (B) FINAL (C) EXAMPLES FROM F.L. WRIGHT

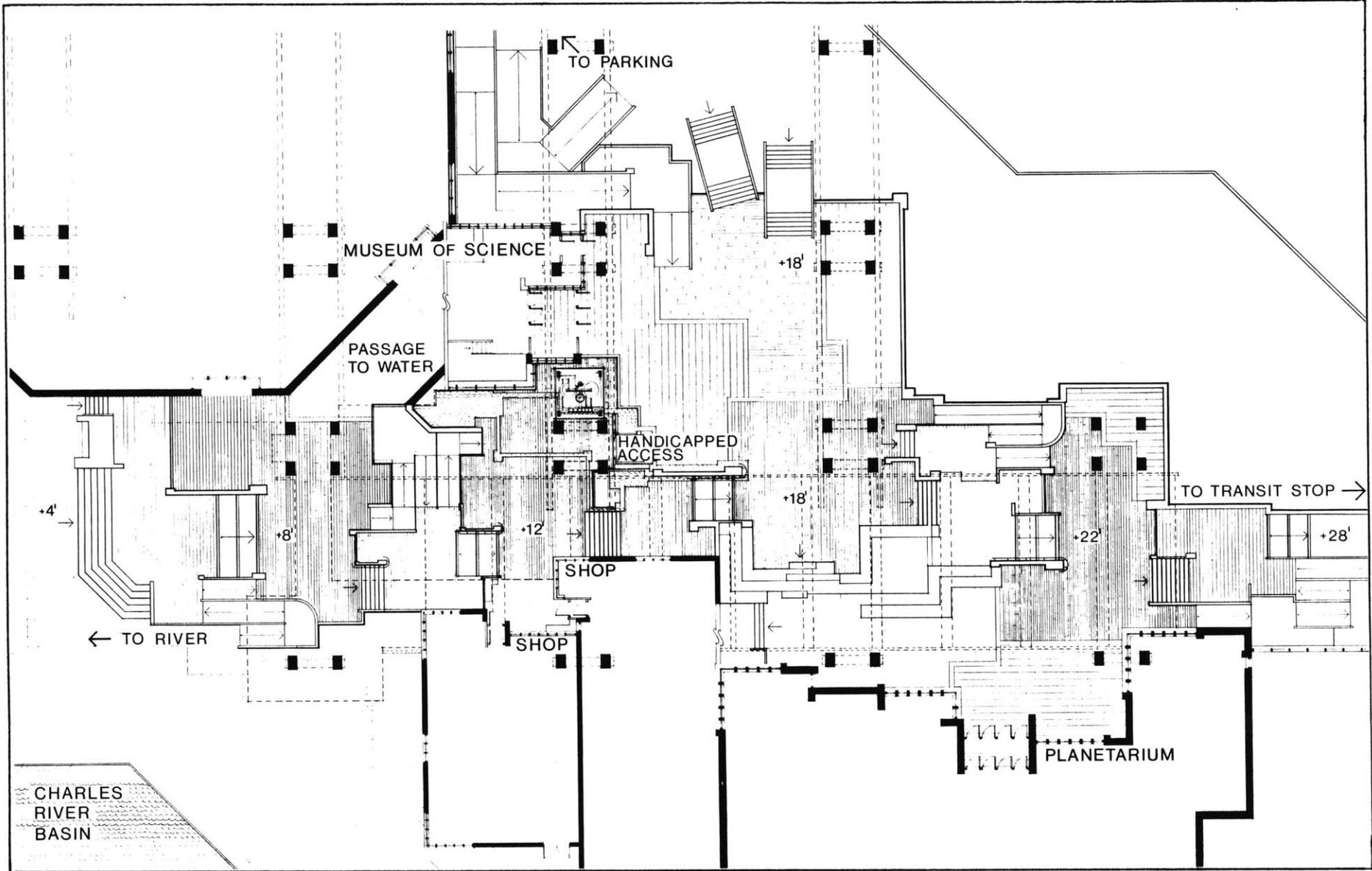
Here is the final Passage plan. It is drawn such that the uses adjacent to the Passage are shown at the corresponding level of the Passage. This results in some break lines that may look a bit confusing at first.

To increase the understanding of what one might experience while descending this Passage, let's take a walk down to the Charles.

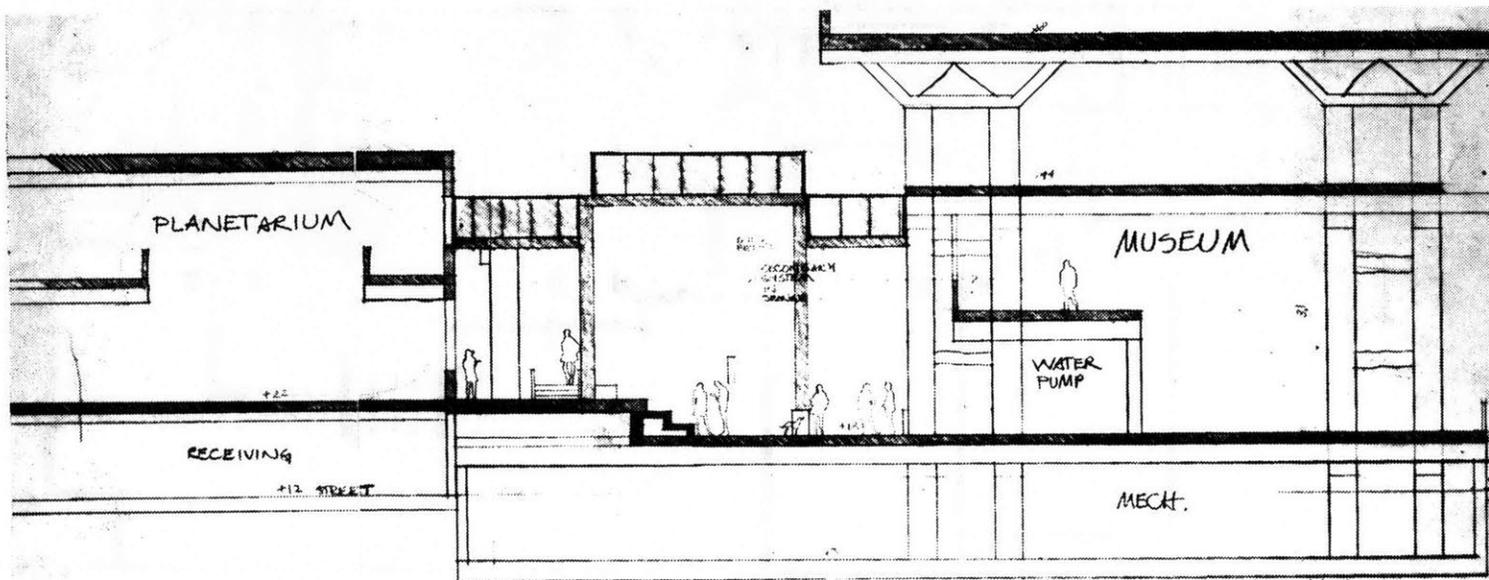
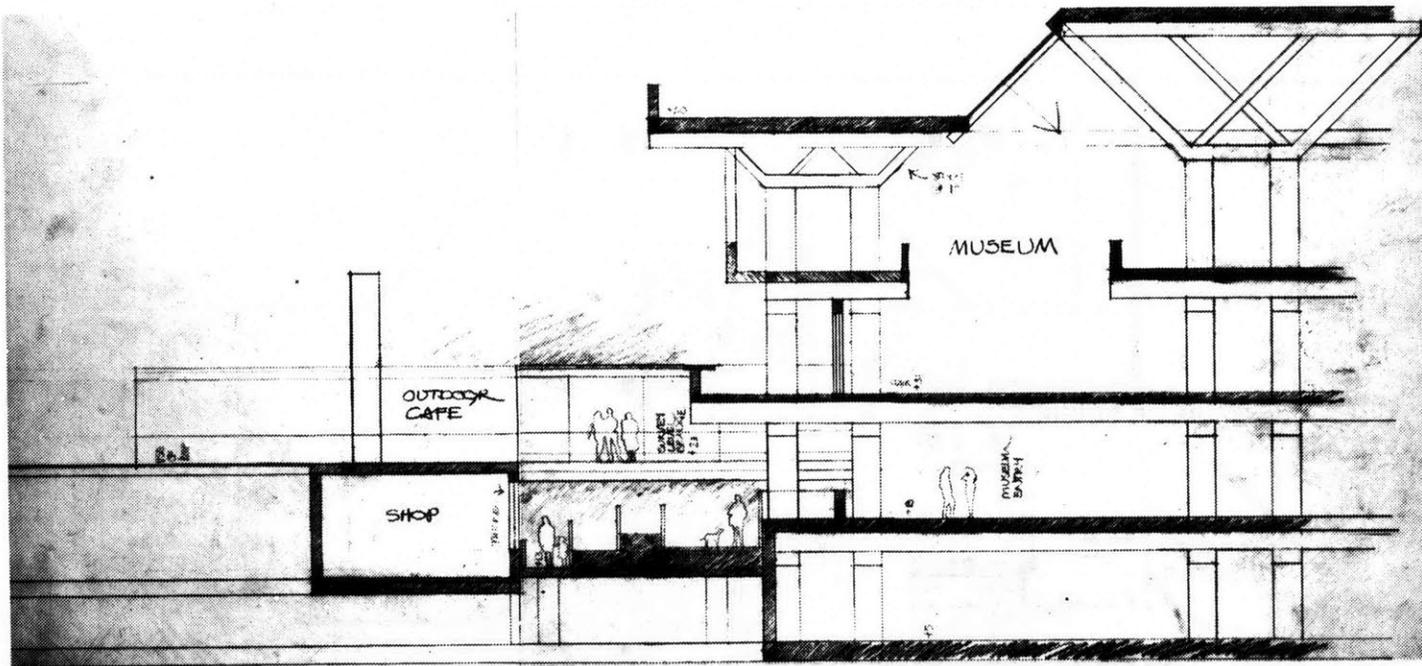
We arrive at the Museum of Science stop on a green-line train. The doors slide open and we cross Bridge Street, sixteen feet above the whiz of the traffic. When we reach the end of the bridge we are struck by the dramatic view down the Passage and its aliveness with activity. Descending the first flights of stairs brings us to the level off of which the planetarium beckons. We look inside at some of the exhibits and decide to return later to see more. A group of people playing guitars and flutes next attract our attention. They're sitting on the steps of the informal amphitheatre facing a group of Chinese visitors ascending the stairs from the bus parking area. Another group of people are exiting the museum and strolling toward the musicians. The sun is causing rainbow colors to dance on the brick pavement via prisms hung under the stepping skylights. A boy in a wheelchair rolls out of the museum and heads straight for the water pump wheelchair-lift. He and his friends excitedly watch the water being pumped up to the reservoir on the moving platform. People all over the Passage stop and watch as the boy slowly descends amid cheers and gurgles of the water pump. We step down to the next level and contemplate wading in the small canals of water cut into the pavement. Instead, we gaze in the display windows of the two shops on that level -- one a bookstore/newsstand and the other a flower and fresh fruit stand. Above the shops we see the heads of people sitting at an outdoor cafe. In front of us, we see a small bridge running between two column clusters connecting the cafe with the museum. Still being primarily interested in walking along the Charles, we resist backtracking to the planetarium level from which stairs lead up to the cafe, and step down to the next to last level before the river. Here we take a look into an exhibition area of the museum and look down the skylight corridor leading to the parking areas. Finally, we descend the last four feet and marvel at the expanse of water before us.



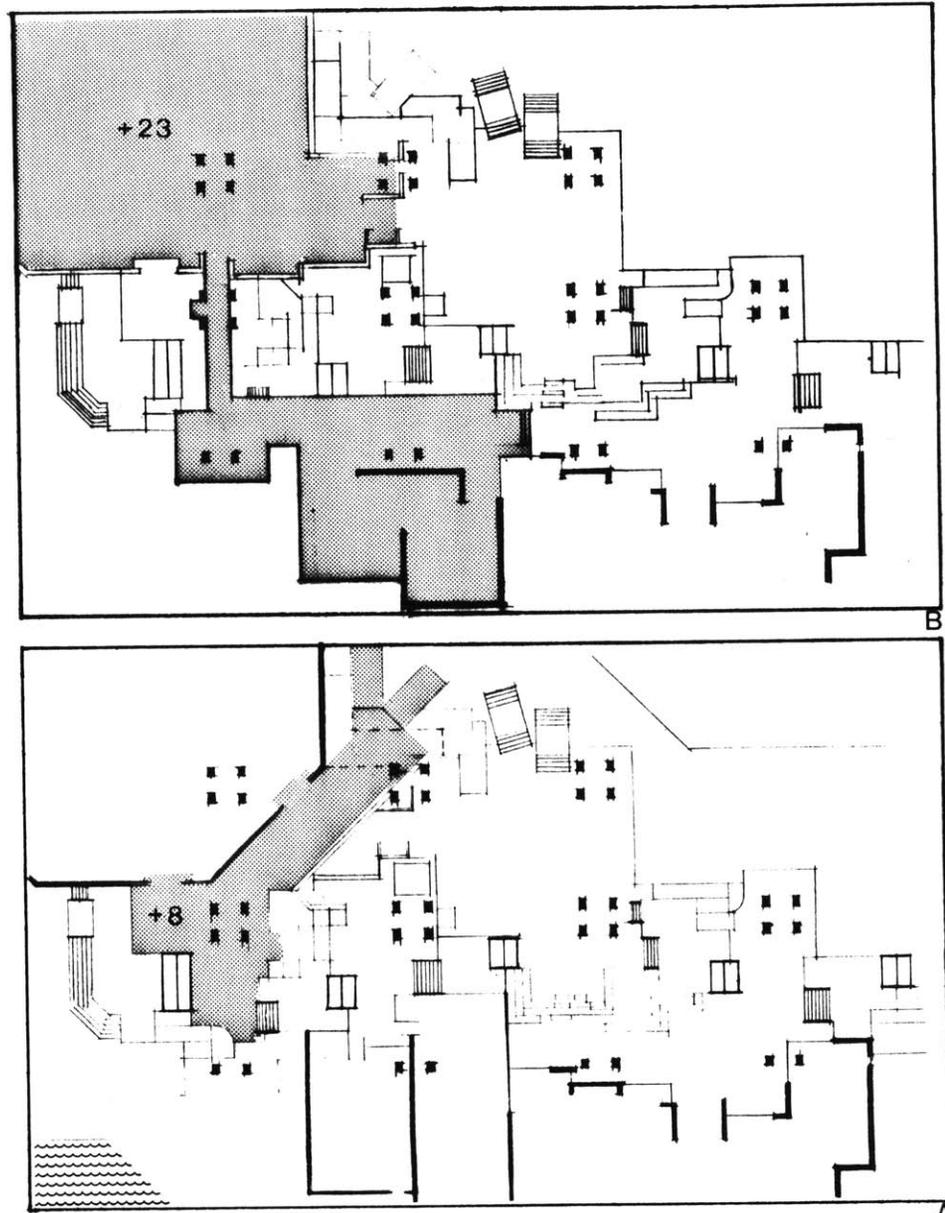
73. KEY PLAN



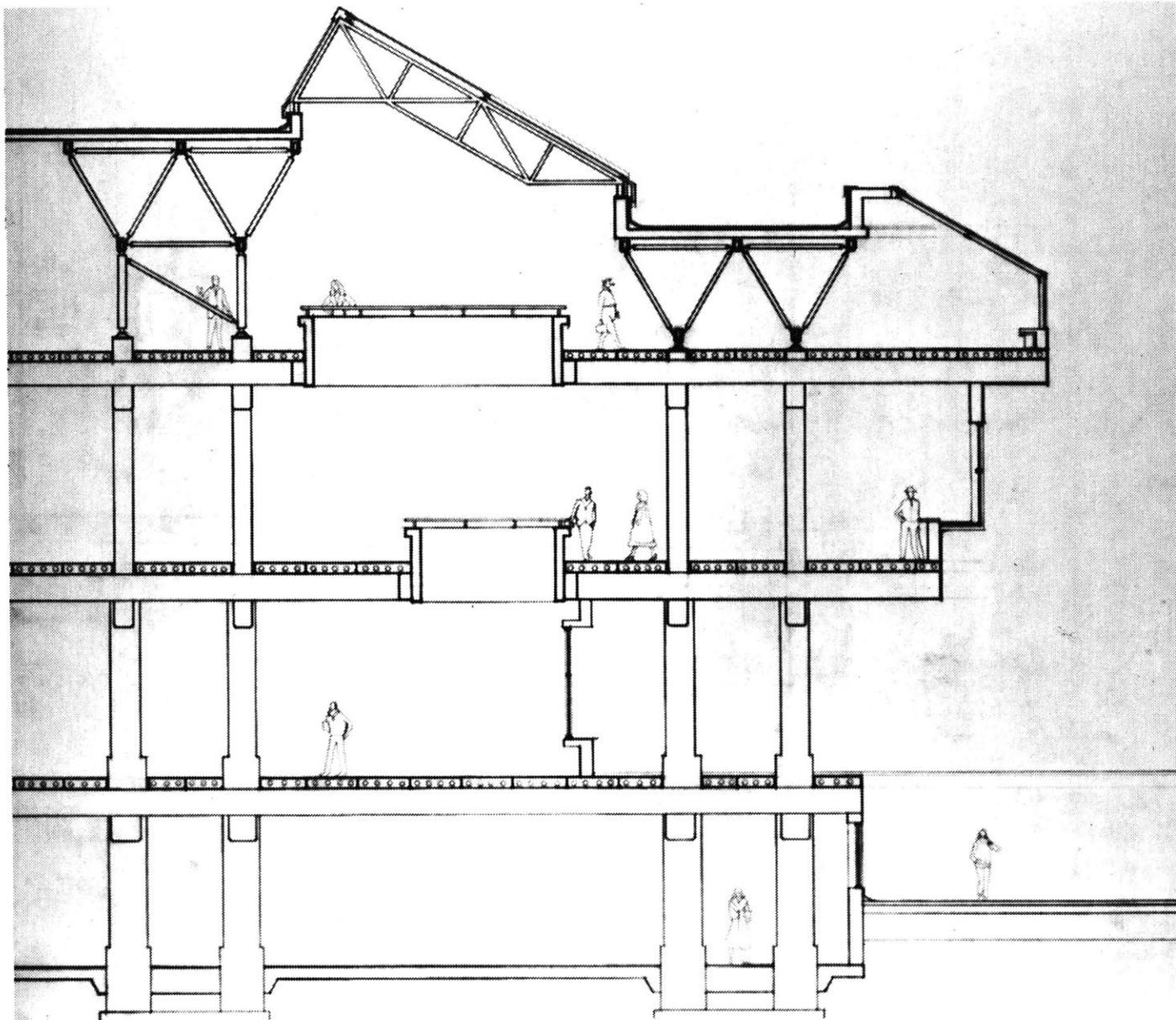
74. THE PASSAGE



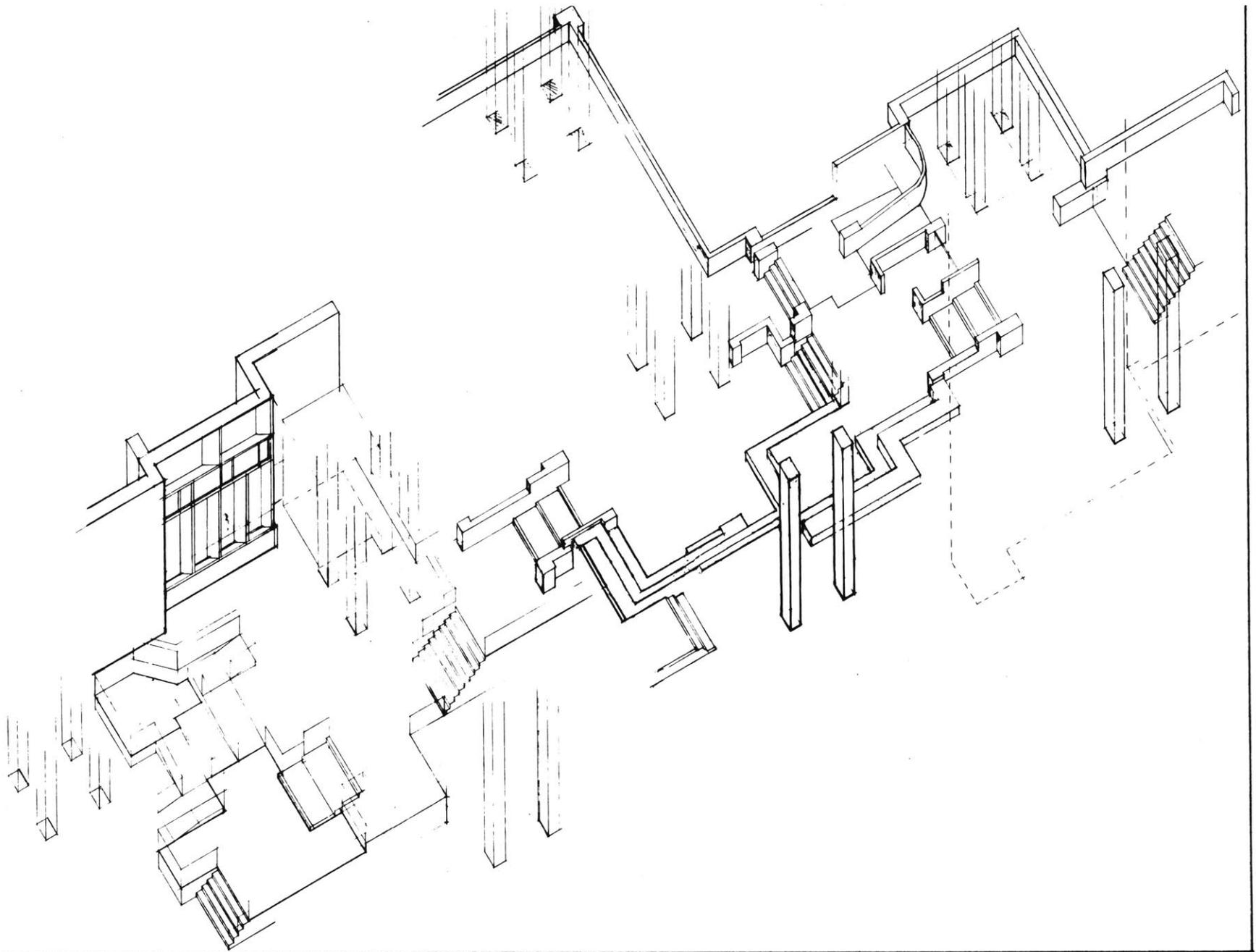
75. CROSS SECTIONS LOOKING TOWARD RIVER



76. OVERLAPPING CONDITIONS, PLANS (A) MAIN LEVEL, (B) SECOND LEVEL



77. CROSS-SECTION LOOKING NORTH

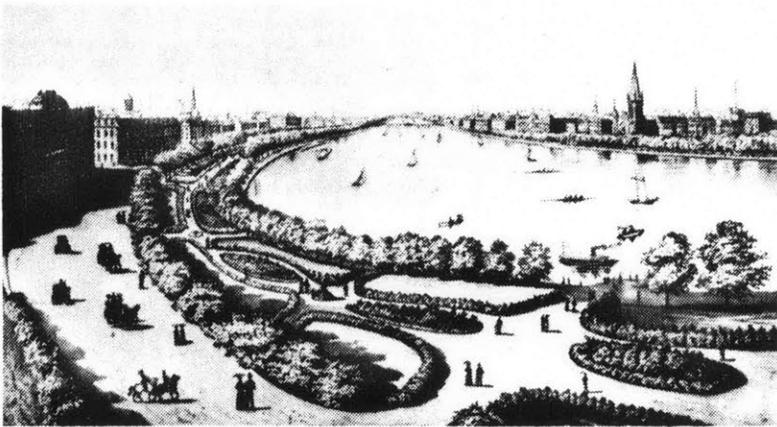


78. AXONOMETRIC SKETCH OF THE PASSAGE LOOKING EAST

How do all these elements tie together this edgeway? The intent was to design the zone near the boundaries of the buildings that would support social interaction and give the Passage sense of place. While we can only speculate on how it would function in built reality, I feel that it incorporates a good variety of sizes, volumetric differences, spatially overlapping zones and interlocking levels to promote interaction. Certain parts of the Passage were designed more intensely than others when added articulation seemed appropriate in relation to importance.

I like the gentle flow of the movement zone and the series of levels that serve to organize the whole while providing a new experience at each stage of the trip up or down the Passage.

CONCLUSION

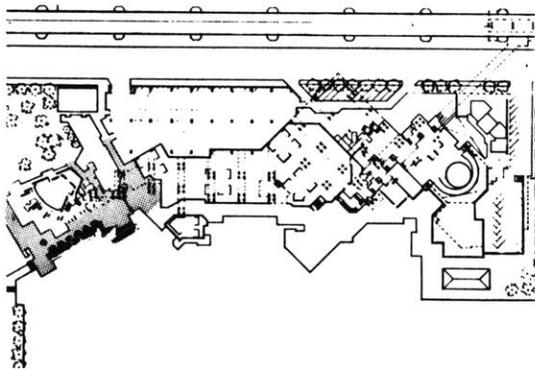


PART FOUR : THE PROMENADE

The water-edge Promenade is a stretch of new public space resulting from the linkage of the dam site with the Cambridge riverfront. The pedestrian arriving at the end of the Cambridge waterfront walk would make a sixty-degree turn onto the Promenade and follow it onto the dam site proper on his or her way across the river. The Promenade is bounded on the north side by a large auditorium and a cafe, which are used by both the Museum of Science and the larger community. The re-opened sluice defines the north edge of the Promenade further on until it ends at the Museum of Science and the walk across the site begins. The image to the left represents the open and public character that is desired for the Promenade.

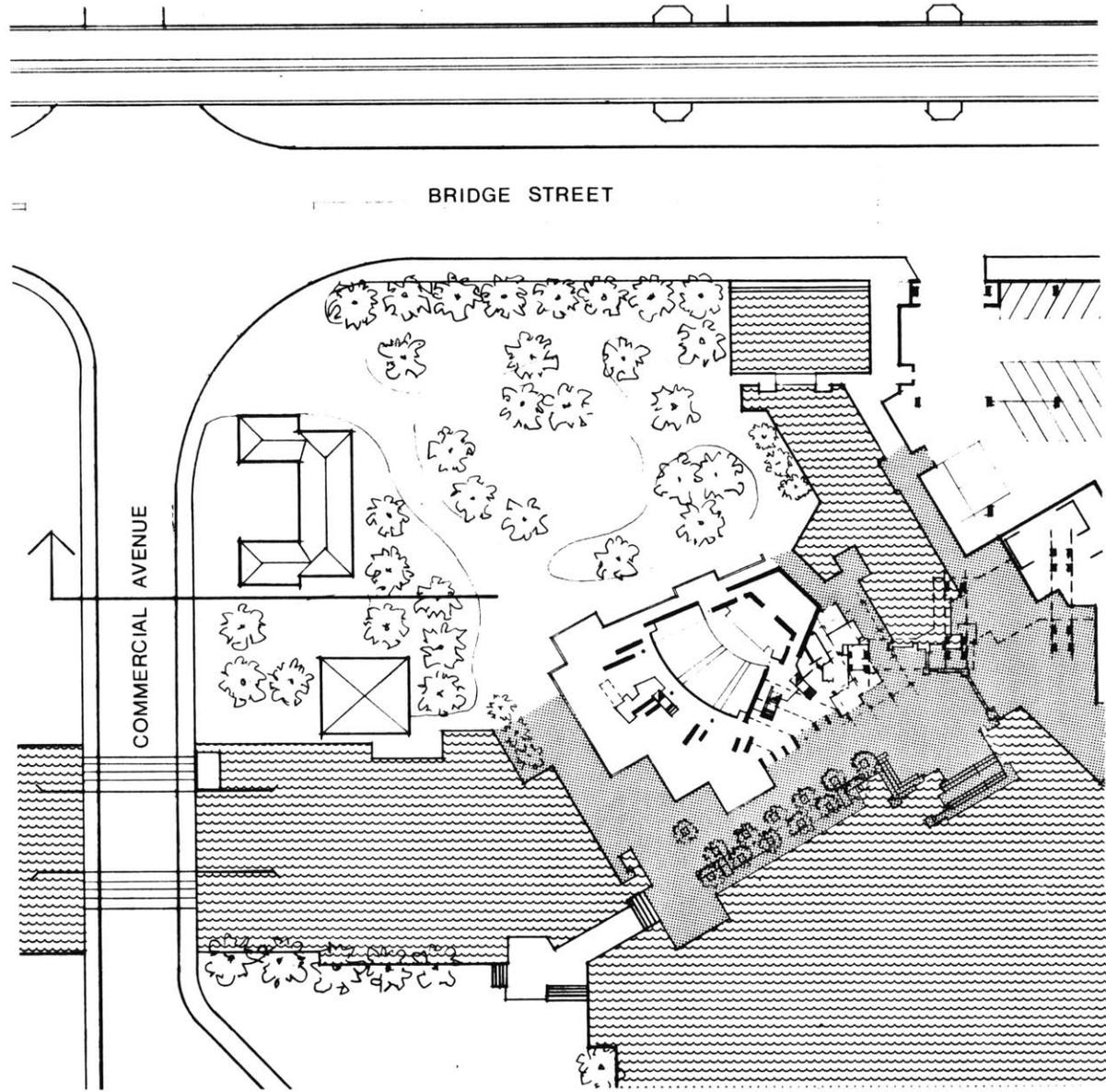


79. ENJOYING THE WATER'S EDGE

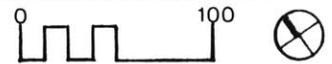


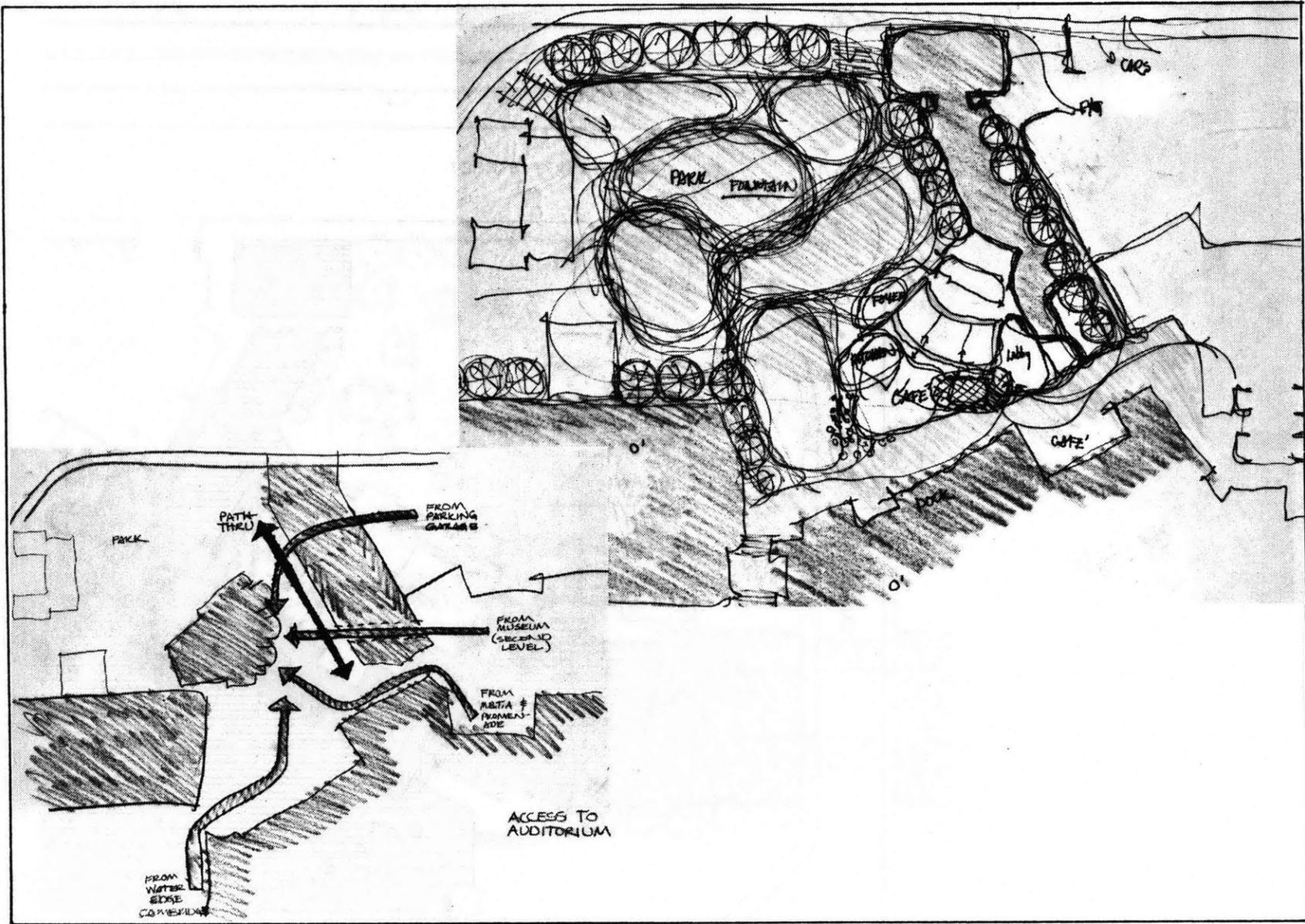
The Promenade is shown here in its regional context. Commercial Avenue in Cambridge is to the left and Bridge Street is at the top. The Lechmere canal cuts under Commercial Avenue and is bridged over to connect the Cambridge riverfront walk to the Promenade. The two existing buildings on Commercial Avenue sit in what is meant to be an urban park. A bridge crosses over the sluice between the park and the parking garage. An upper level of the museum connects to the upper lobby of the auditorium through the second level of the cafe.

80. KEY PLAN



81. THE PROMENADE IN CONTEXT

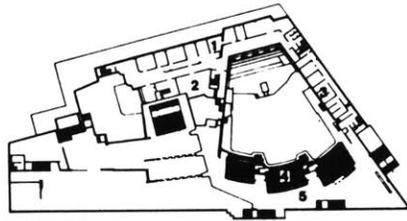




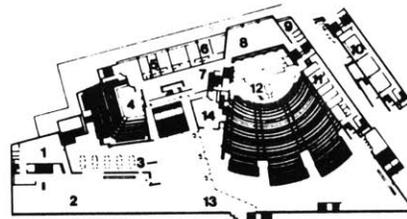
82. ORGANIZATIONAL DIAGRAMS

My primary concerns for the design of the Promenade are reflected in the following elements: the auditorium -- its form and access; a cafe -- its position and structure; the secondary structural system -- its form and materials; a trellis -- its extent and relationship to the secondary structural system; and the land-water interface -- the nature of that thickened zone.

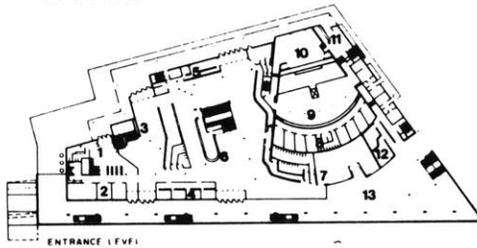
The set of qualitative information gathered on these topics includes form, use, context, dimensions, materials, use of light, color, time, etc. In the following catalogues of prototypes and precedents the most important of these qualities and the most useful of the references collected will be discussed. These "element biographies" are complemented with design sketches prepared concurrently with the research.



BALCONY LEVEL

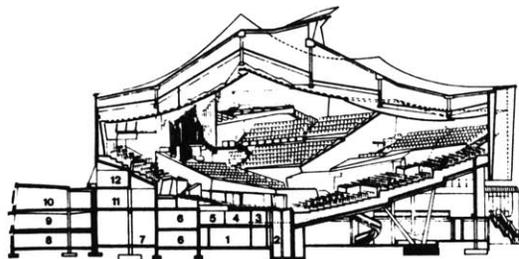


AUDITORIUM LEVEL



ENTRANCE LEVEL

83. AALTO: SEATING



84. SCHAROUN: LOBBY

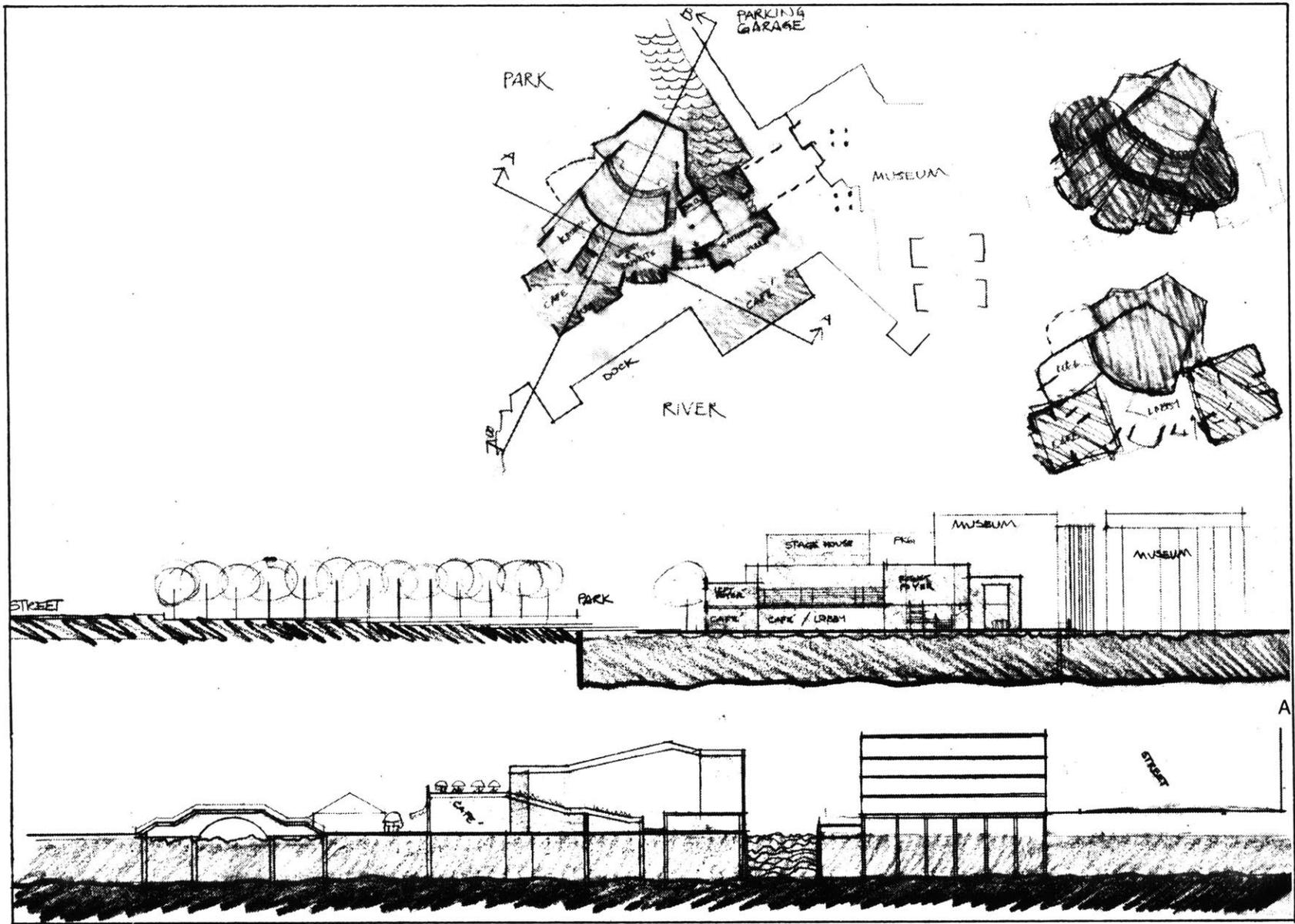
An auditorium for lectures, dramatic presentations, films and demonstrations to be shared by the greater East Cambridge community and the Museum of Science was the major programmatic use along the Promenade. Its ground floor houses a lobby, exhibit areas, a cafe and public restrooms.

At the earliest stages of design, I settled on Aalto's Finlandia Hall (fig. 83) as the primary form reference. The gradual stepping back of the fan-like seating areas seemed to be receptive to people entering. This was also expressed vertically so that the auditorium announced its use to passersby and the community. Wanting to avoid a huge lobby that would be empty most of the time, I adapted Scharoun's idea of tucking the lobby under the rising slope of the seating in his Berlin Philharmonic (fig. 84).

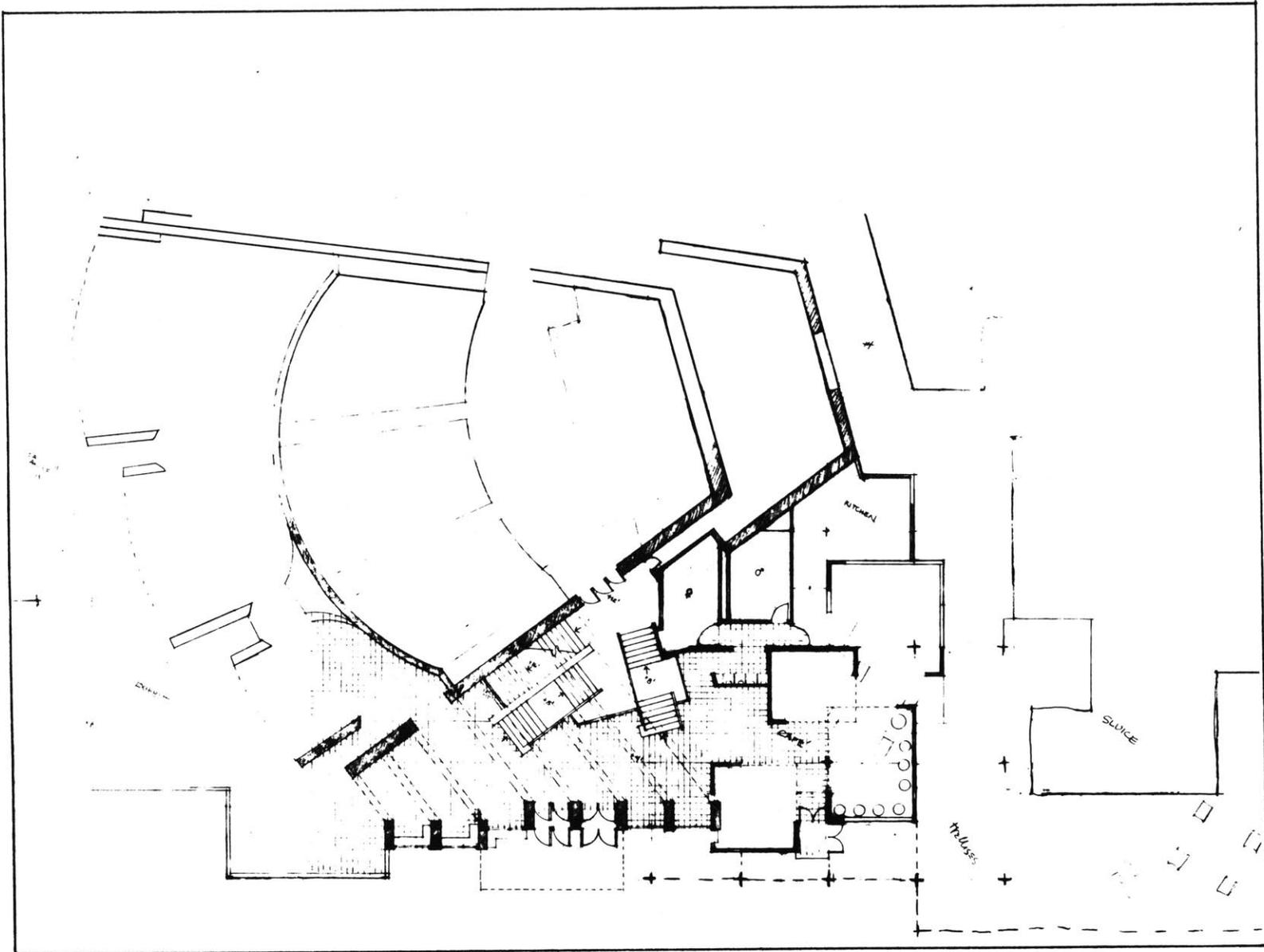
After using the fan-like seating form in a few schemes as a radar receptor seeking people, it was suggested that lateral movement into the auditorium might be more appropriate. This would allow more direct access to the auditorium as well as emphasize the difference in nature of the entry area and the auditorium.

Since access to the auditorium was lateral, it followed that the lobby spaces would also be located on both sides of the auditorium, rather than at the rear (fig. 85). This space in back of the auditorium could then be used for exhibitions and large social functions.

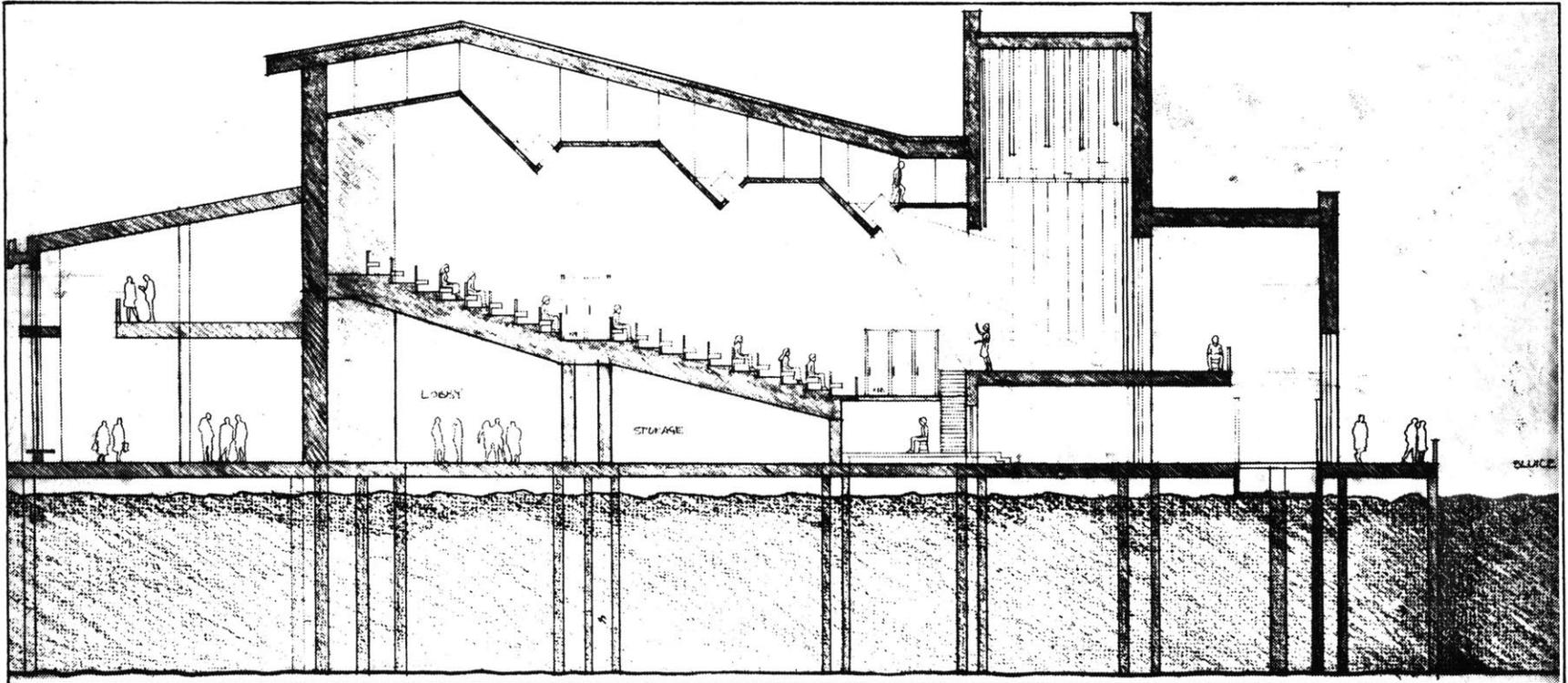
AUDITORIUM BIOGRAPHY



85. AUDITORIUM STUDIES



86. PLAN OF AUDITORIUM



87. SECTION THROUGH AUDITORIUM LOOKING NORTH

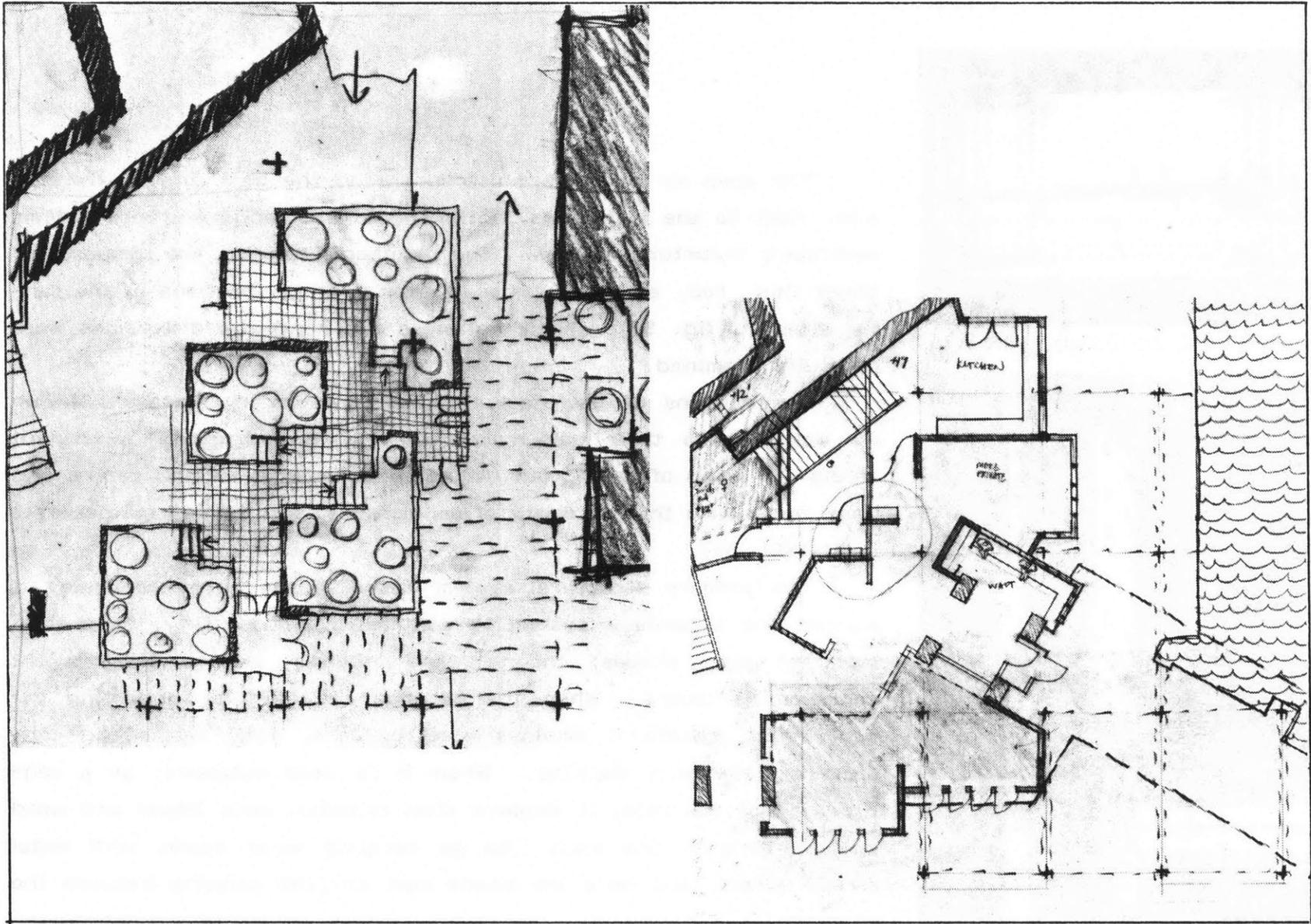


88. ACTIVITY POCKET

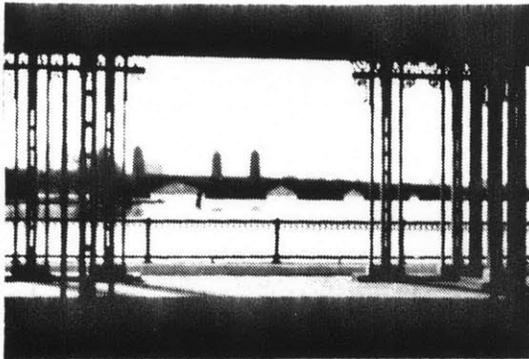
The Promenade faces due south and connects to over one-thousand feet of water-edge walkway. It seemed that a well-placed cafe could serve a lot of people on a hot day and throughout the year. From an original location on the Cambridge end of the auditorium (fig. 82), the cafe ended up at the juncture of the paths along the sluice and the Promenade. This location was favored over the other as here the cafe could better serve the people going back and forth between the museum and the auditorium, could expand to alongside the sluice and out to the plaza in front of it (off the main part of Promenade) and could further intensify the juncture of converging paths at that point. A cafe with waterside tables is just a little more special than one without (fig. 88).

The cafe operates on two levels, the upper one connecting the museum bridge with the auditorium. The graceful meshing of the museum's huge column clusters with the cafe's light steel structural system before the onset of the auditorium's different structural system was a delicate design issue. The cafe evolved from a series of rectilinear load-bearing modules (fig. 89) to eventually become a columnar system with infill walls reflecting the change in direction between the museum's structure and its own.

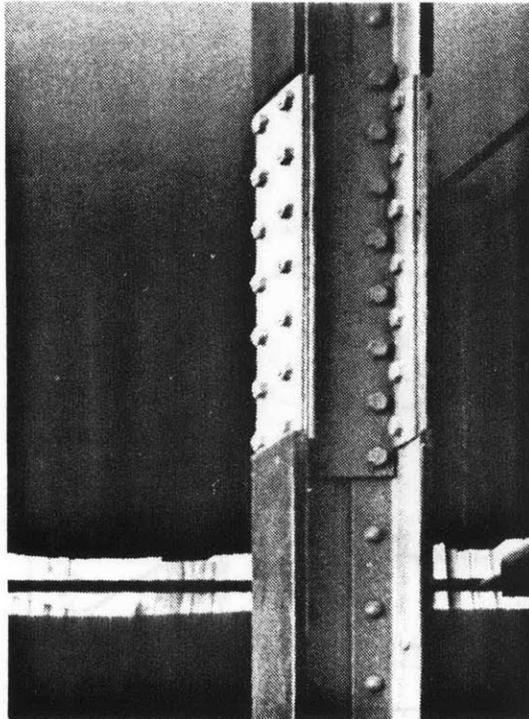
CAFE BIOGRAPHY



89. EARLY AND CURRENT CAFE DESIGN STUDIES



90. DETAIL OF PAVILLION



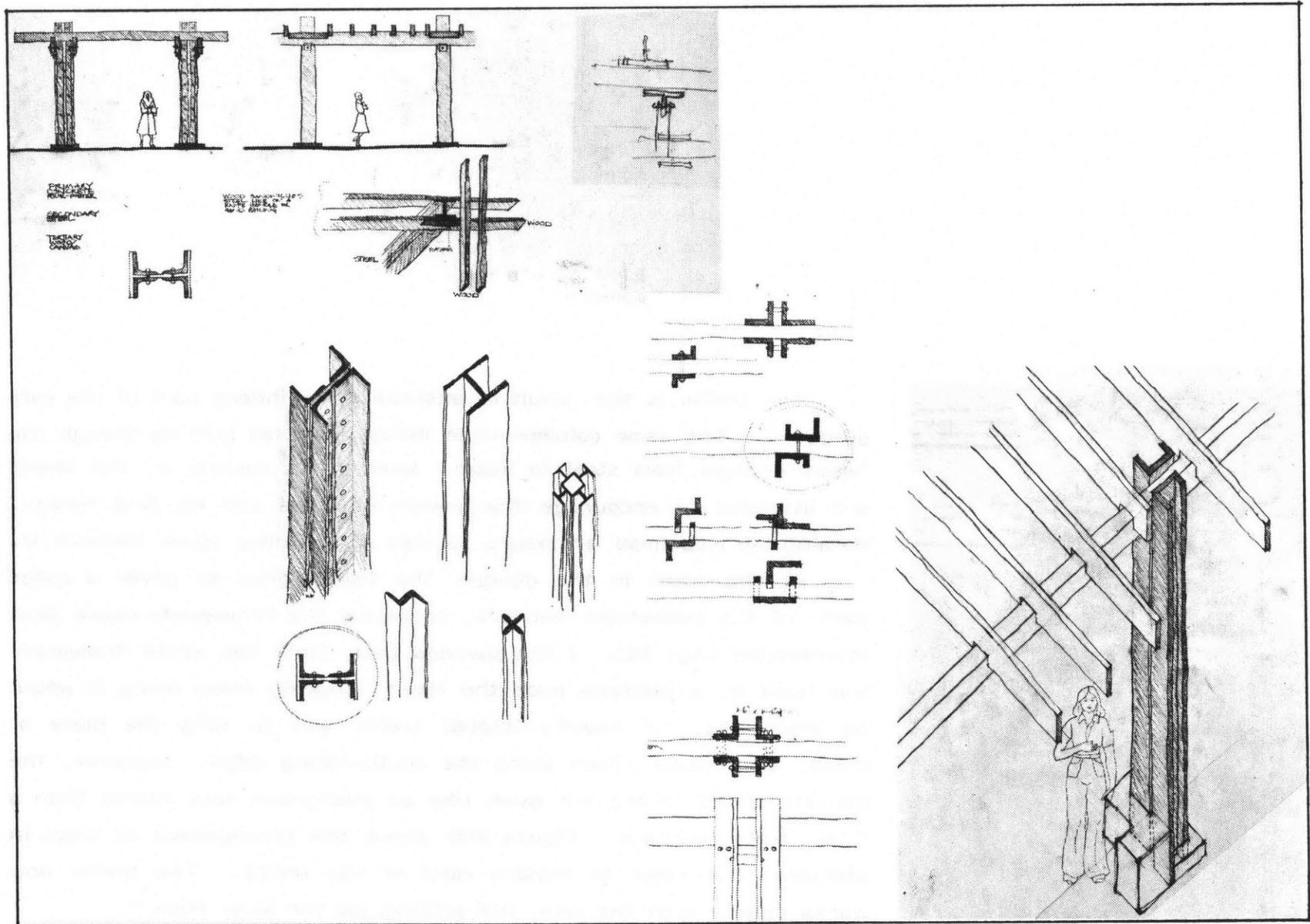
91. STEEL CONNECTION

The open-air pavillion which exists on the west end of the dam site, next to the lock (figs. 15H, I) was a strong reference for my secondary structural system. The pavillion's columns are composed of three thin, red, enameled tubes of iron with perforations in the center member (fig. 90). Their lightness and hand-size dimensions were carefully examined.

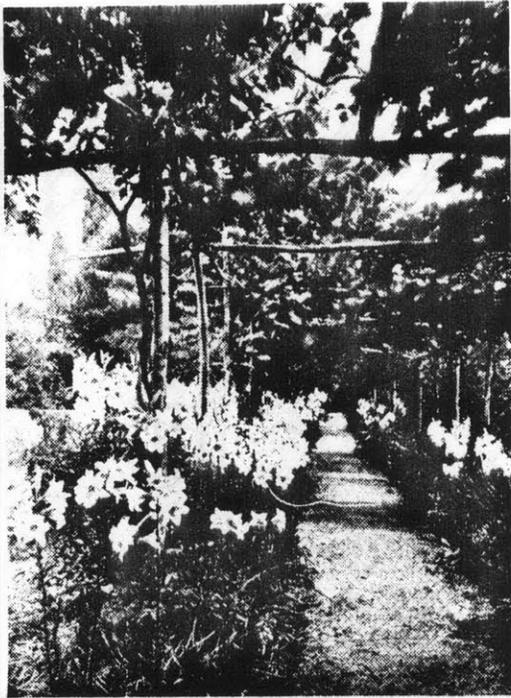
The columns of the steel secondary system in Chareau's *Maison de Verre*, with their bold colors of orange and green, prominent rivets and ways of calling out intermediate floor levels and capital and base zones with the placement of connections, also helped me generate ideas (fig. 91).

The primary structural system was of heavy, grey concrete. I wanted the secondary system to contrast. I chose tiny, hand-size, standard steel shapes; channels and I-beams, and envision bright enameled-on colors. When the secondary system is supporting the two levels of cafe it employs steel columns, steel beams and concrete-topped metal decking. When it is used outdoors, as a continuation of the cafe, it employs steel columns, wood beams and wood joists. This is the same idea as hanging wood beams with metal straps except that here the beams rest on pins running between the channels.

SECONDARY STRUCTURAL SYSTEM BIOGRAPHY



92. STUDIES FOR STEEL STRUCTURAL SYSTEM

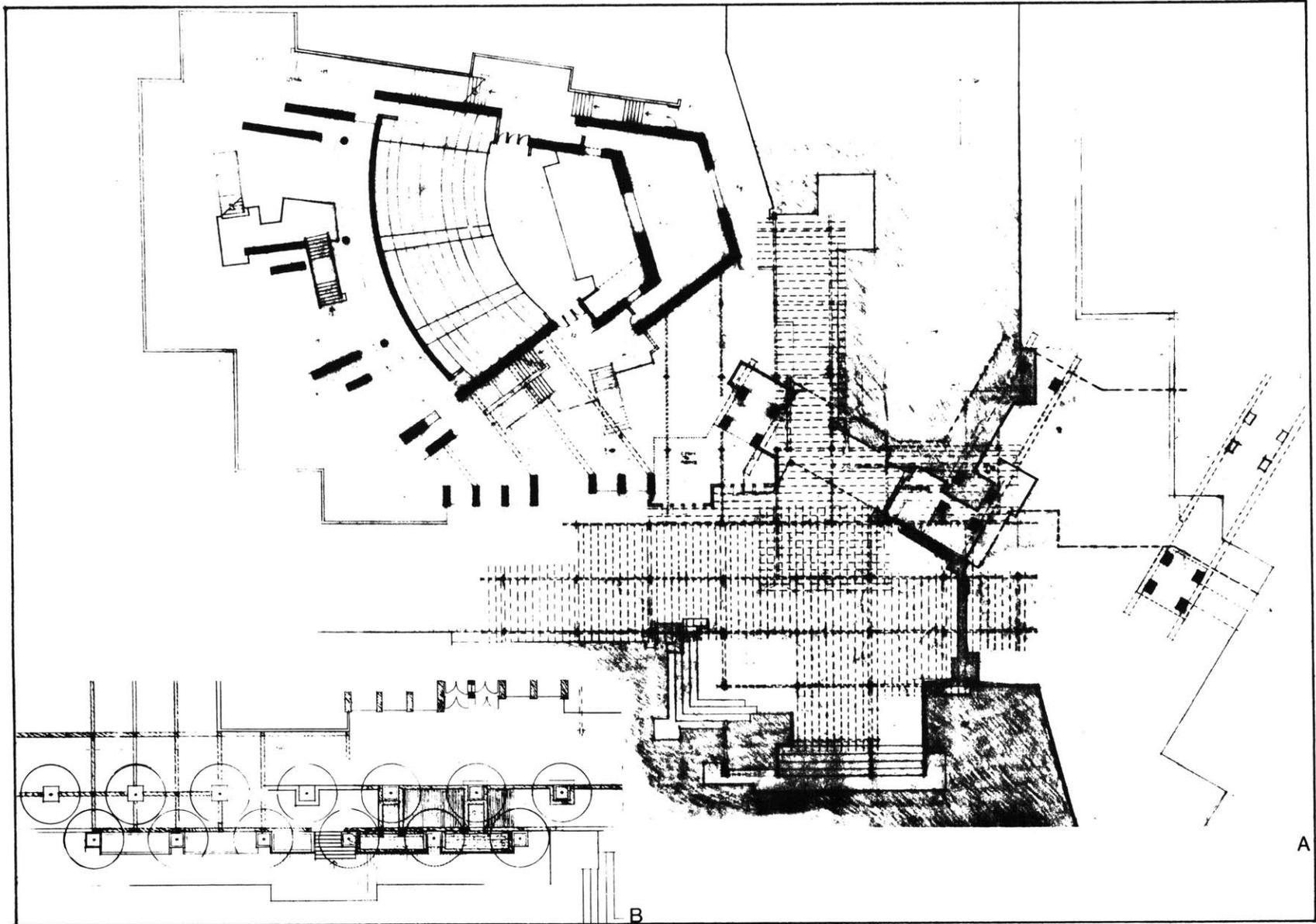


93. TRELLISED PATH

The trellis is the result of extending the indoor part of the cafe outdoors. The same columns used inside are used outside though the beams change from steel to wood. Wood joists resting on the beams are intended to encourage the growth of vines and hanging foliage, forming an overhead enclosure capable of defining space beneath it.

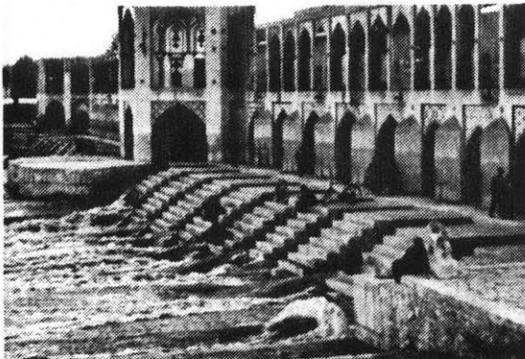
At one point in the design, the trellis grew to cover a major part of the pedestrian network, especially the Promenade-sluice path intersection (fig. 94). I had decided that, since the whole Promenade was built on a platform over the river, growing trees along it would be impossible. A heavily-foliated trellis was to take the place of trees, to provide shade along the south-facing edge. However, the delicate trellis looked too much like an overgrown tent rather than a light, leafy umbrella. Figure 94B shows the arrangement of trees in planters that came to replace most of the trellis. The trellis now works closely with the cafe, not getting too far away from it.

TRELLIS BIOGRAPHY

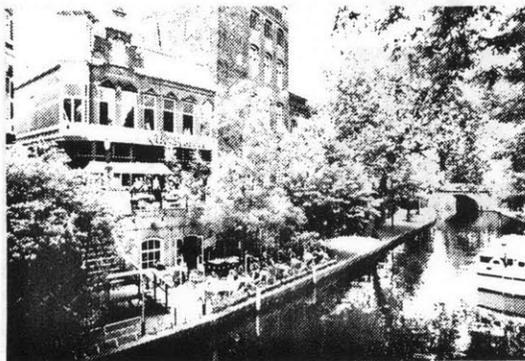


94. MAXIMUM EXTENT OF TRELLIS OVER PROMENADE (A) AND STUDY FOR TREES IN PLANTERS (B)

The land-water interface is analogous to the description of closure in the Passage section; the actual land surface that gets splashed by the water is not critical. What is important is the zone where land and water interlock. Bays are formed when water pushes into the land and peninsulas are formed when land pushes out into water. I've tried to include this reciprocal condition at various scales in the design of the Promenade. As getting one's extremities into water is so refreshing on a hot day, I have provided steps leading all the way down to the water's surface. The projecting plaza with steps descends to that part of the river where the sluice's salt water meets the fresh water. Figure 95 reminds me of how the water might look if the sluice were still being used.



95 STEPS TO THE WATER'S EDGE

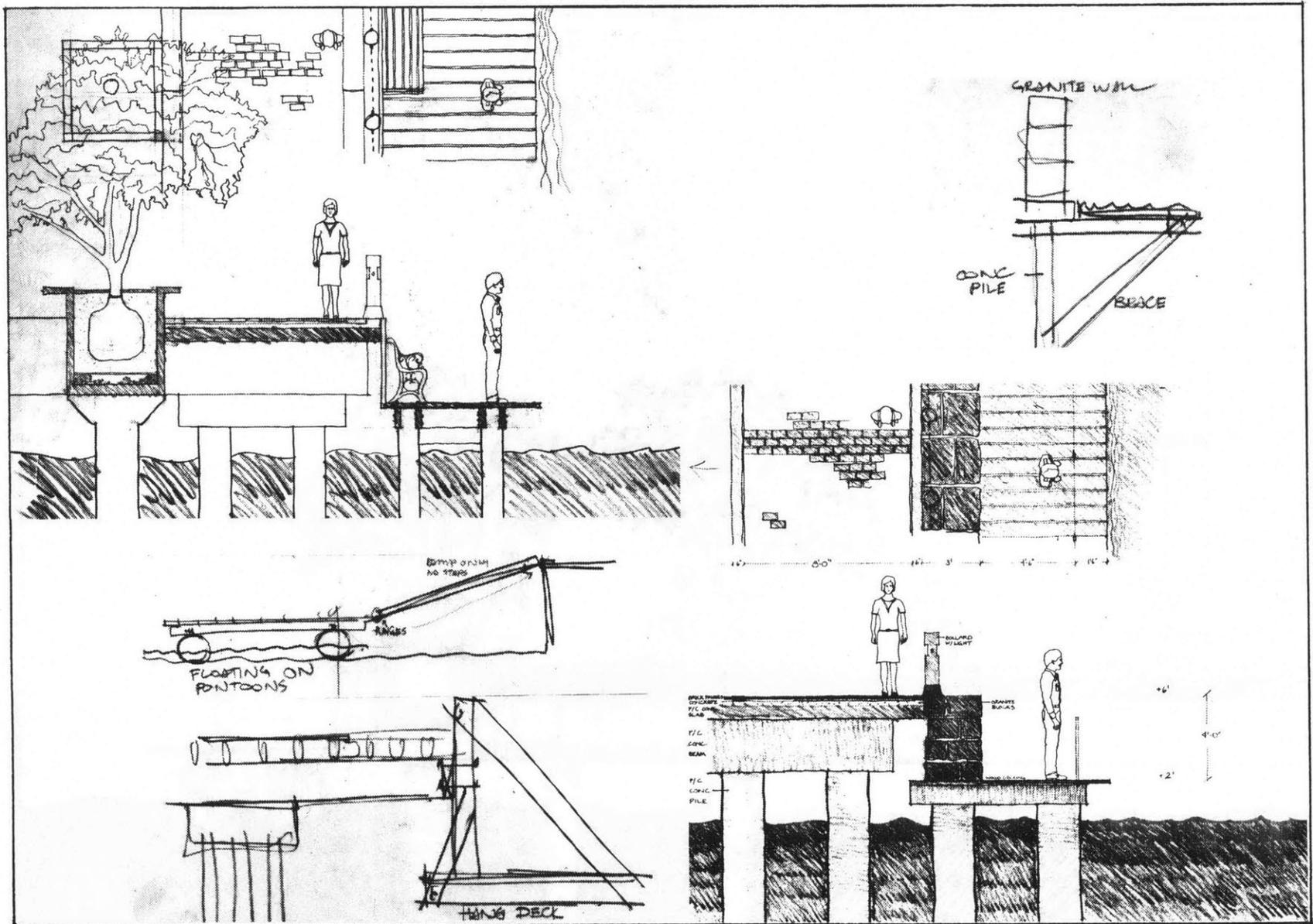


96. HIGH/LOW ROAD CHOICE

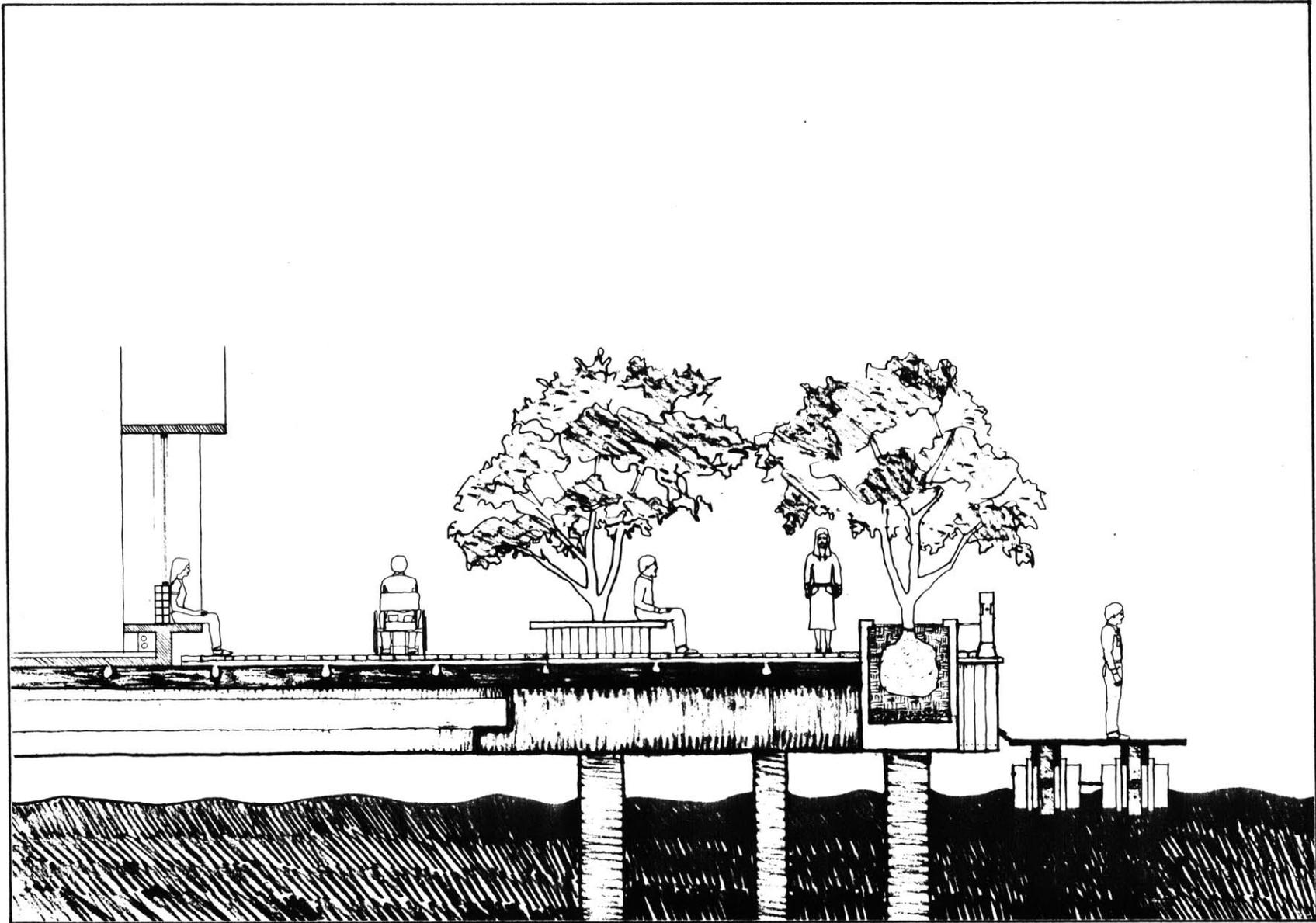
A narrow, partial path two-feet above the water parallels the tree-lined part of the Promenade as in figure 96. Figure 97 shows attempts to design this lower walkway. Figure 98 is the result of the investigation; it's floating on pontoons and is merely hinged to the Promenade structure by its ramps. This tenuous connection is meant to emphasize the differences in sensation between strolling on the solid pavement of the higher Promenade and swaying loosely up and down on the damp boards of the floating path.

Another aspect of the land-water interface is the notion of what I call "interior water." The area under the museum bridge at the end of the sluice is one such example of covered water (fig. 99). This protected shady place should be a welcome change from a sun or rain drenched Promenade.

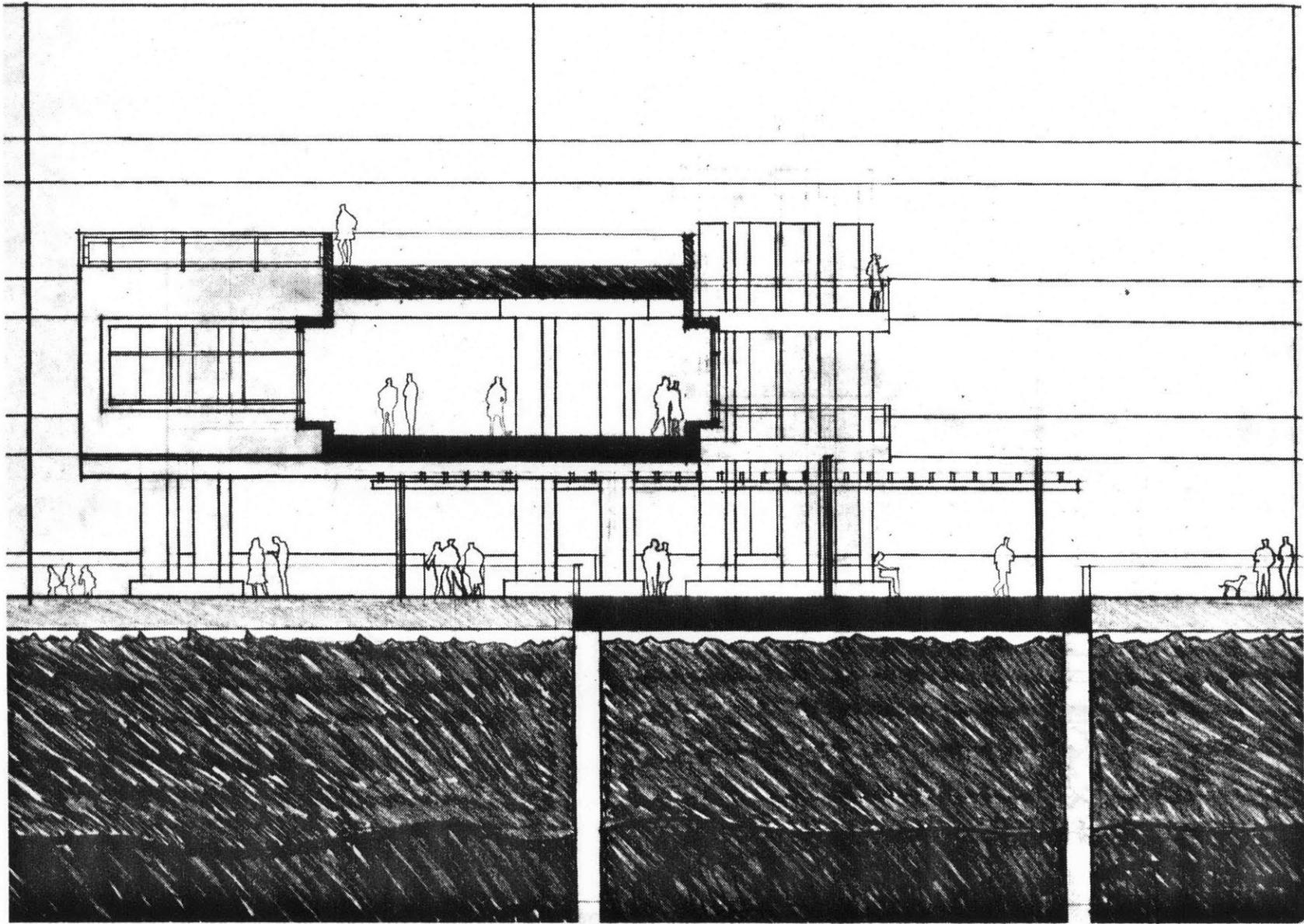
LAND-WATER INTERFACE BIOGRAPHY



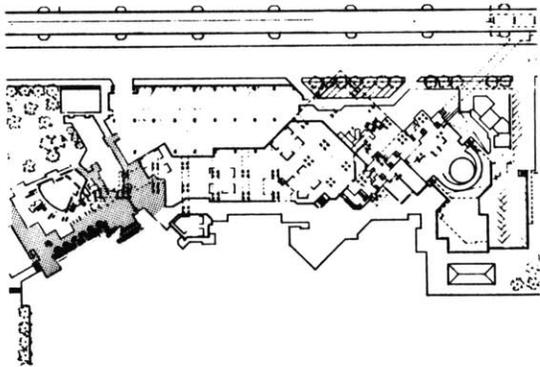
97. STUDIES FOR THE WATER'S EDGE ZONE



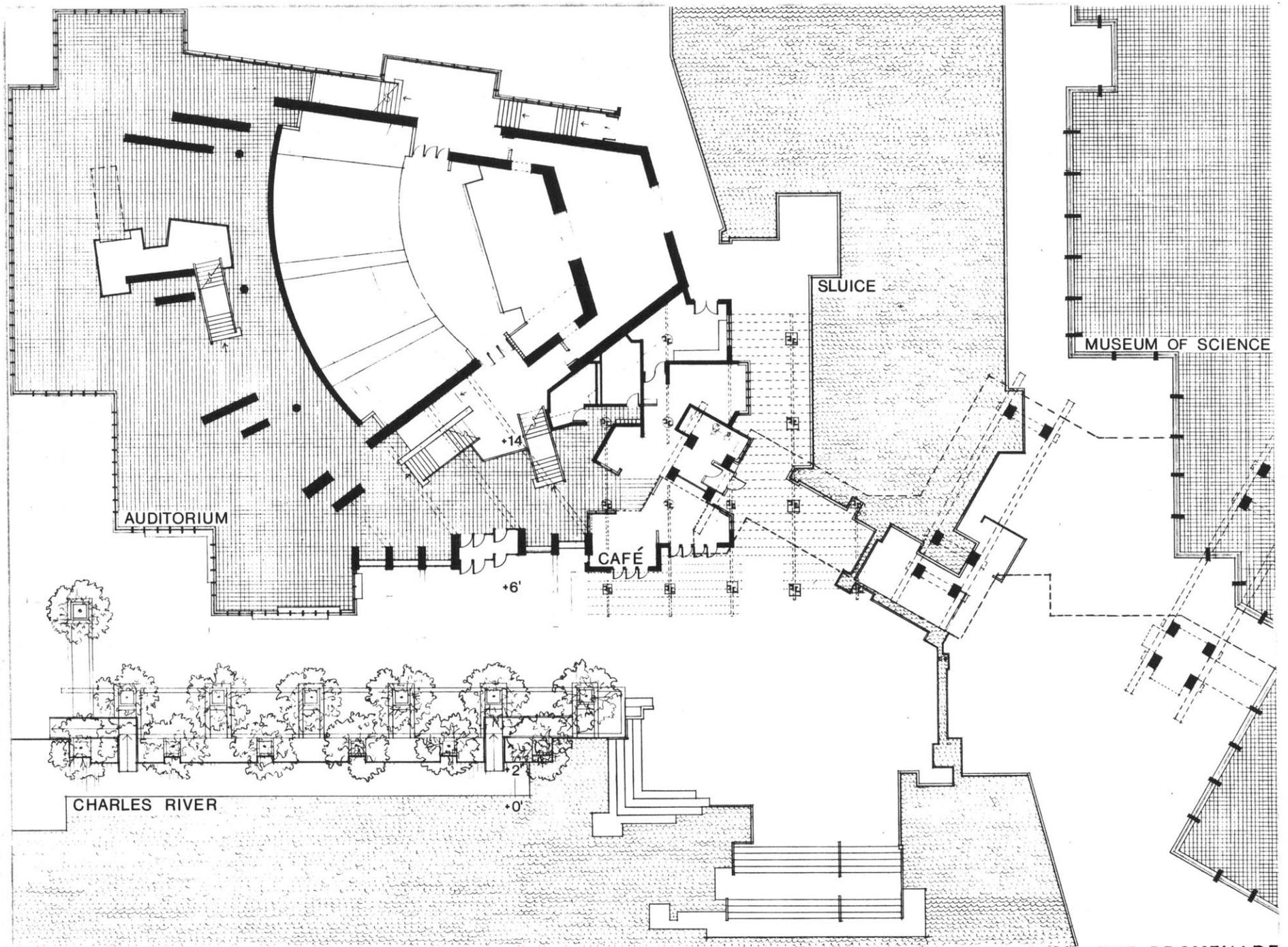
98. CROSS-SECTION THROUGH PROMENADE WITH FLOATING WALKWAY



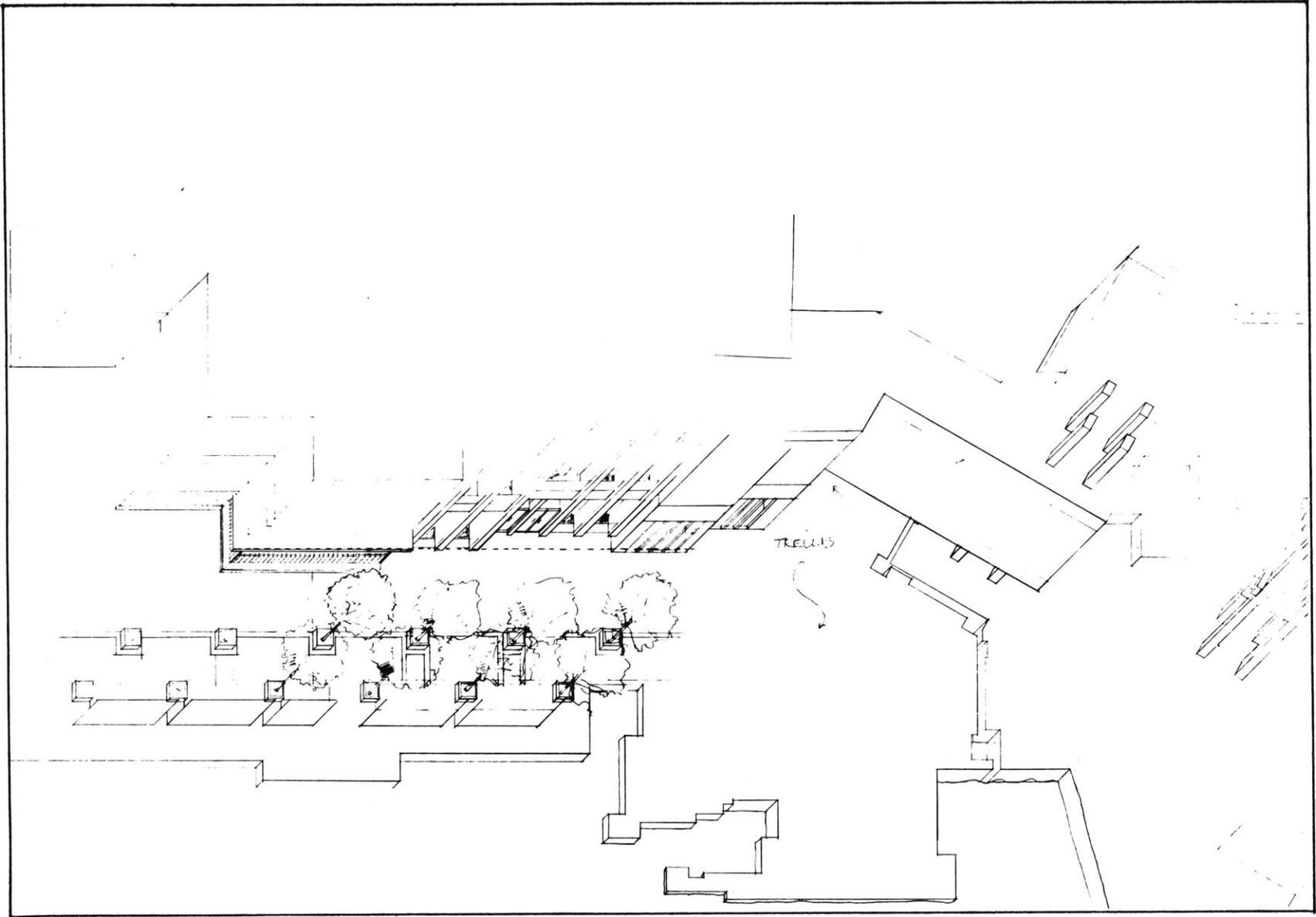
99. SECTION THROUGH MUSEUM BRIDGE: "INTERIOR WATER"



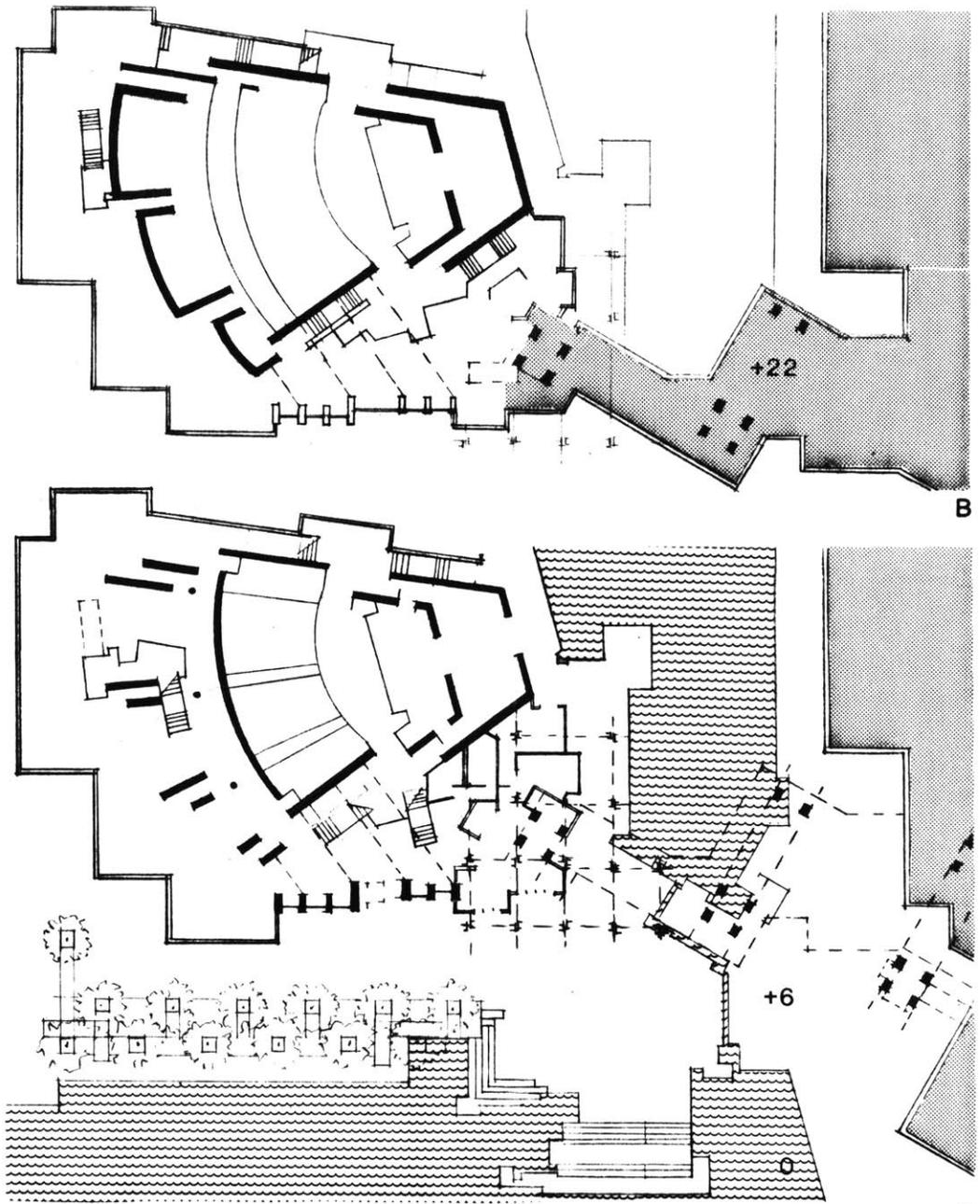
Here is the final Promenade plan!



100. THE PROMENADE



101. AXONOMETRIC SKETCH OF PROMENADE LOOKING NORTH

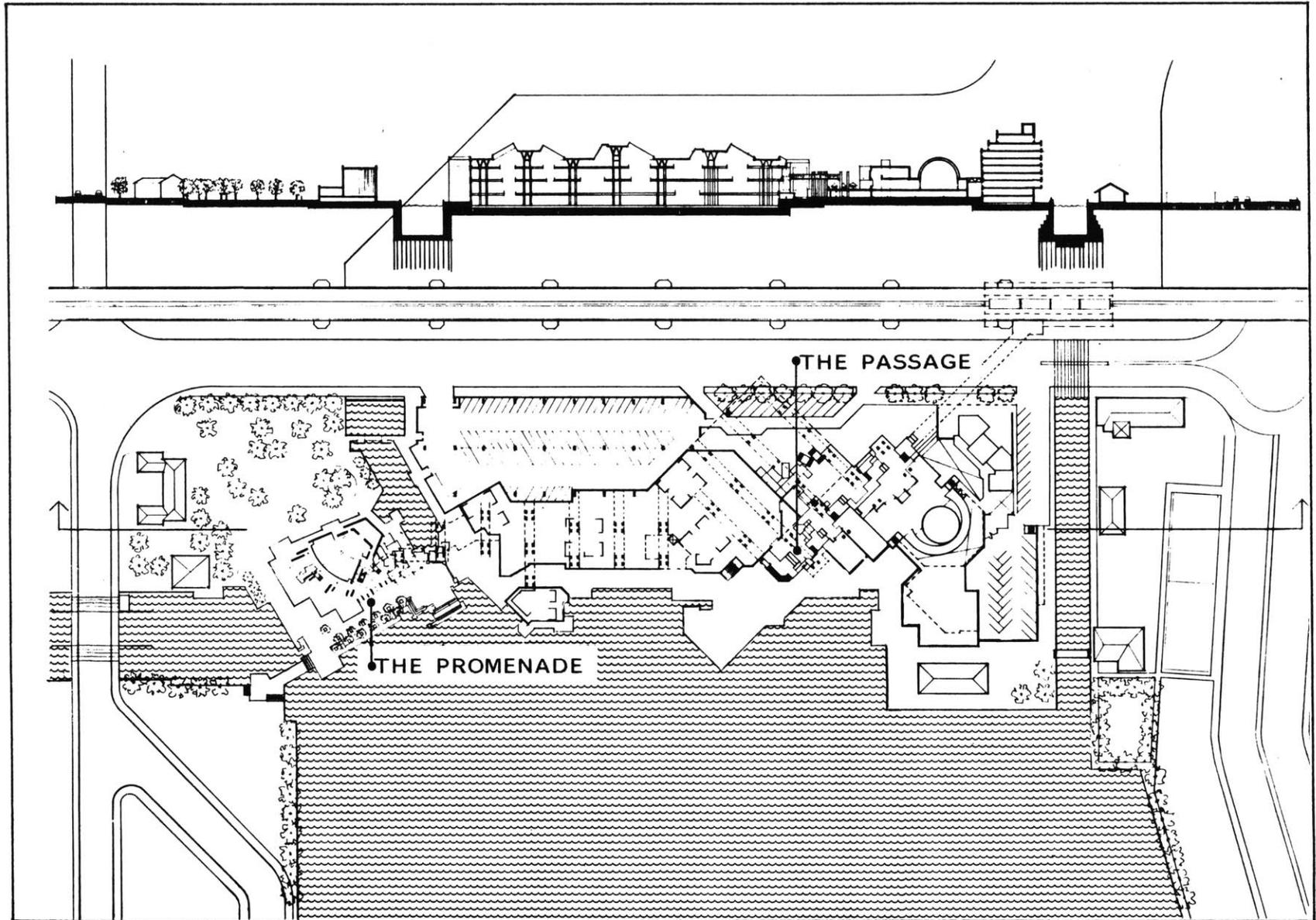


102. PLANS (A) GROUND LEVEL, (B) UPPER LEVEL

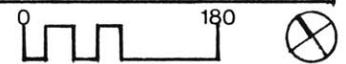
How do all the preceding elements tie together this edgeway? The fundamental intent was to design a zone between the architecture and the water that would support social interaction and give the Promenade a sense of place. The elements of the edgeway are a means for shaping, in form, this zone.

While we can only speculate on how the Promenade would function in built reality, I feel that it provides a good variety of spatial conditions in terms of type and character: size, degree of vertical and overhead enclosure, horizontal stability, etc. which would encourage group interaction and personal claim. The strong directionality of the Promenade serves to unify the many and diverse conditions occurring along it.

CONCLUSION



103. DESIGN PROPOSAL: SITE PLAN AND SECTION



1. East Cambridge Riverfront Plan, p. 2.
2. East Cambridge Riverfront Plan, p. 2.
3. Boston Redevelopment Authority photo
4. Survey of Architectural History in Cambridge: East Cambridge by Cambridge Historical Commission, p. 4.
5. Schumacher und Hamburg, by W. Kallmorgen, p. 155.
6. Massachusetts by Whitehill and Kotker, p. 292.
7. East Cambridge Riverfront Plan, p. 5.
8. Postcard by M. Roberts
9. - 11. East Cambridge Riverfront Plan, pp. 4, 5.
16. East Cambridge Riverfront Plan, p. 12
- 18., 19. Metropolitan District Commission document.
21. Architectural Record, May 1978, p. 139
22. - 24. Postcards by H. K. Barnett
28. East Cambridge Riverfront Plan, p. 9
35. Urban Spaces by D.K. Specter, no. 148
- 36., 37. Passagen, Ein Bautyp des 19. Jahrhunderts by J.F. Geist, 169, 232.
38. Setenil, Villages and Towns #8, by Y. Futagawa, p. 70.
39. Architectural Record, February 1972, p. 130.
40. The Architectural Review, vol. XC, Nov. 1971, p. 131.
41. Hotels, Feriendorfer by D.W. Callwey, p. 52.
46. Hydra: A Greek Island Town by C.E. Michaelides, p. 73.
47. Passagen, ein Bautyp des 19. Jahrhunderts by J.F. Geist, p. 8.
49. Elderly housing design by Jan Wampler, 1976.
50. Deutsche Bauzeitung, vol. 69, April 1964, p. 245.
52. The Katsura Imperial Villa by T. Sato, p. 52.

ILLUSTRATION SOURCES by figure number

53. Le Grand Palais de Knossos by J. Raison, planche CCII.
58. Scalinate di Roma by C. D'Onofrio, p. 136.
59. Passagen, ein Bautyp des 19. Jahrhunderts by J.F. Geist, p. 236.
60. Progressive Architecture, December 1978, p. 67.
64. Music Center by Hertzberger, slide by F. Miller.
65. Schindler by D. Gebhard, pp 84-85.
66. Deere Headquarters in Global Architecture #6, p. 45.
67. Sert by K. Bastlund, p. 102.
68. Gaudi by C. Martinell, pl. 238.
- 69., 70. Maison de Verre in Global Architecture #46, pp. 12, 13, 40.
71. Cisterino, Villages and Towns #5 by Y. Futagawa, p. 77.
79. Zurich, Rivers in the City by Roy Mann, p. 101.
83. Finlandia Hall, Progressive Architecture, August 1972, p. 54.
84. Deutsche Bauzeitung, Vol. 69, April 1964, p. 253.
88. A Pattern Language by C. Alexander, p. 599.
91. Maison de Verre in Global Architecture #46, p. 31.
93. A Pattern Language by C. Alexander, p. 809.
95. Cities by L. Halprin, p. 139.
96. Utrecht slide by Shun Kanda.
- p. 16. Image for Part Two: Bold Strokes; dredging and filling from Cambridge Reconsidered by S.B. Sutton, p. 88.
- p. 24. Image for Part Three: The Passage; Passage du Grand Cerf, Paris from Passagen, ein Bautyp des 19 Jahrhunderts by J. F. Geist, p. 220.
- p. 62. Image for Part Four: The Promenade; Charles Davenport's vision of the Charles River basin, 1874 from Cambridge, Massachusetts: The Changing of a Landscape by A. Emmet, p. 44.

drawings and photographs by the author are not listed

- Alexander, Christopher, et al. A Pattern Language. New York: Oxford University Press, 1977.
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