

INTEGRATION OF PUBLIC ACCESS:
The Adaptive Re-Use of Alcoa's Waterworks

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Submitted in Partial Fulfillment of the requirements for the Degree
of Master of Architecture at the Massachusetts Institute of
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MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

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ABSTRACT

This thesis is about the re-use of Alcoa's Waterworks. The exciting spatial attributes of the buildings which compose the plant, along with the views they offer to Manhattan, inspired the design of a journey through the complex. To create the journey, a system of access was combined with the physical form of the existing buildings. As the diversity of the plant context lends itself to different user groups, it is the collective spaces that help organize a framework to make the journey continuous.

This project provides an opportunity to examine how some ideas about movement patterns and space perception can be incorporated through architectural interventions to take advantage of the site's unique characteristics and heighten the experience of the observer yet offer him an understanding through perceptual control.

Thesis Advisor: Renee Chow

Title: Lecturer

ACKNOWLEDGEMENTS

THIS THESIS IS DEDICATED TO MY PARENTS, FOR THEIR LOVE, ENCOURAGEMENT AND SUPPORT, and for my EDUCATION.

I wish to gratefully acknowledge the following individuals without whom this thesis would never have been completed:

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Who has been my inspiration throughout my years at MIT.

I thank her for the tremendous knowledge I have gained through her guidance in this project.

My studio-mates, Michael and Chin

Whose friendship is truly genuine.

The owner of the Alcoa Site, Mr. Oskar Brecher

Who provided me with all the plans and history of the site, and whose excitement of my interest in the project, pushed me on.

The guard, Mike

Without whom I would have never been able to get into the site.

My thesis group and all the studio people who were there for assistance in those final moments. And special thanks to Mark Three Stars, our thesis T.A. and provider of wonderful Monday night dinners. Oh, and yes, Mr. Asparagus!

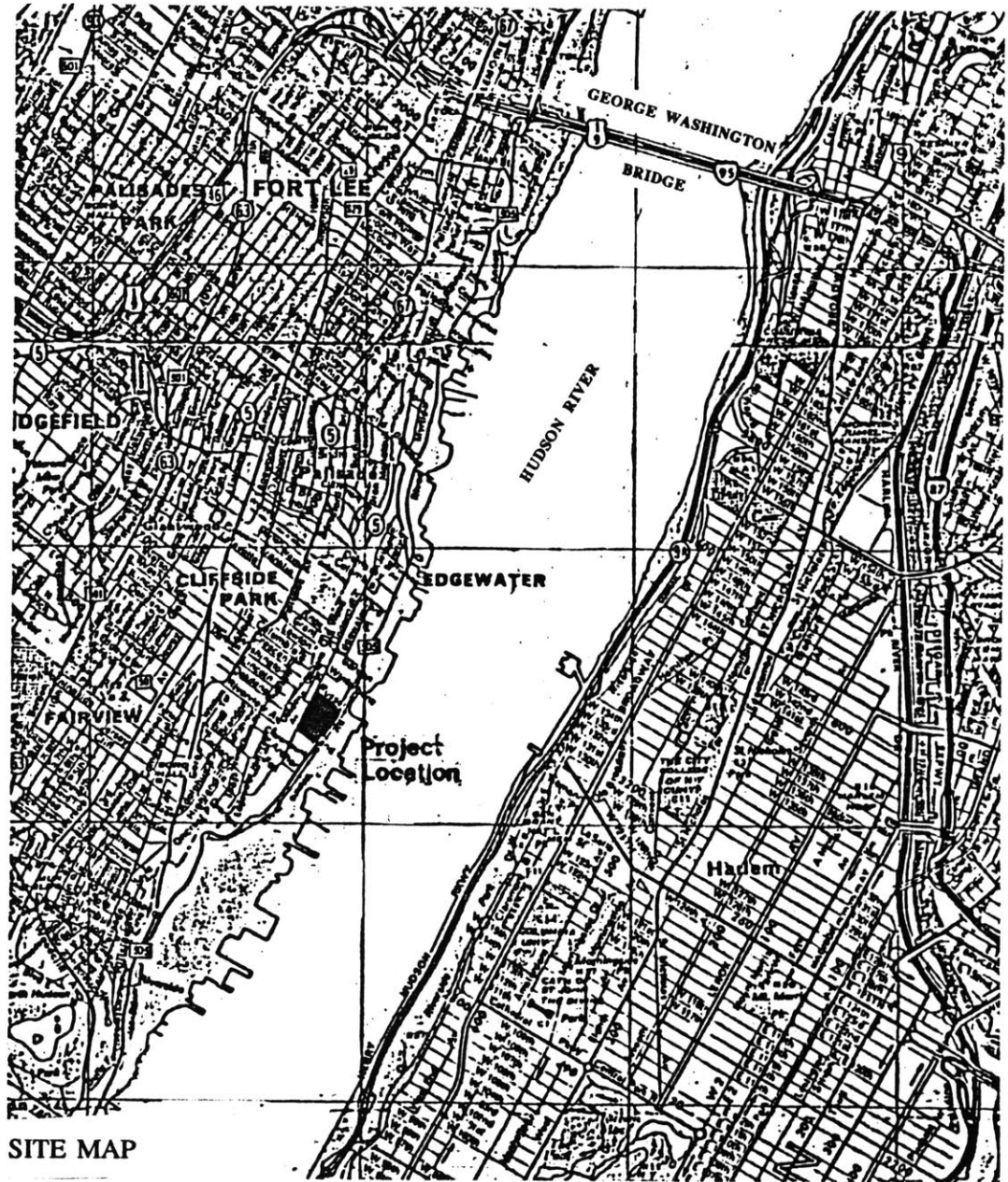
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PREFACE

The investigation presented in this paper is the result of a personal interest in the site and its context. The structures which housed Alcoa's first aluminum plant stand dormant in a town whose location on the Hudson River is becoming a magnet for private development. The adaptive re-use of Alcoa's neighboring factories which serve as relics of Edgewater's industrial roots, is causing a resurgence in this town, whose natural boundaries, sandwiched in between the high granite cliffs of the Palisades and the wide Hudson River left it secluded. The recycling of these industrial relics must now re-address the town such that their size extends beyond their site lines into their surroundings.

In the re-use of the plant, it was important not to hide the spatial characteristics that are unique to the complex. The project examines how a work environment of light manufacturing can utilize the generous bay sizes for work and large display in a sensitive re-use of the memorable landscape of the Alcoa complex.

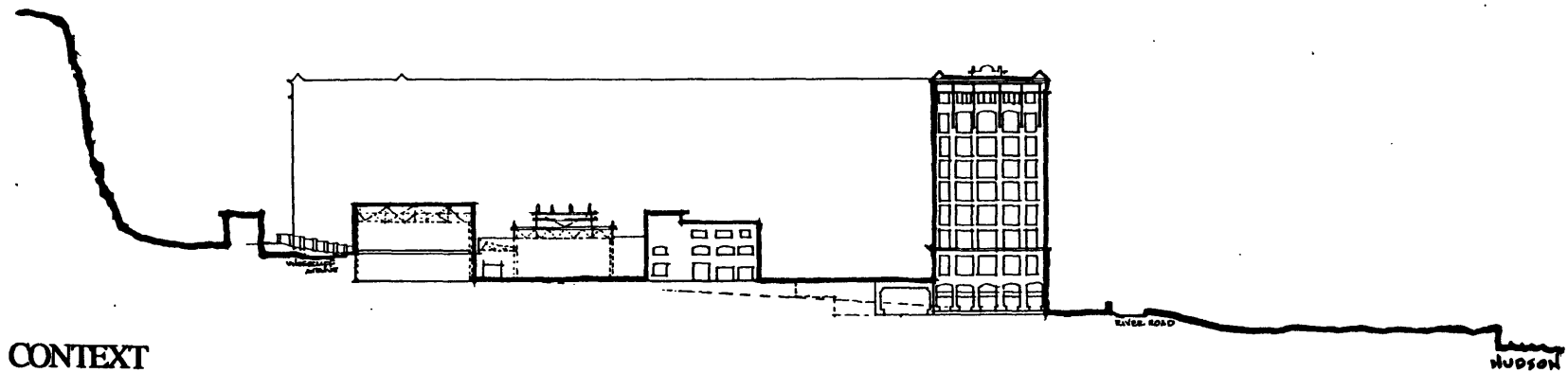
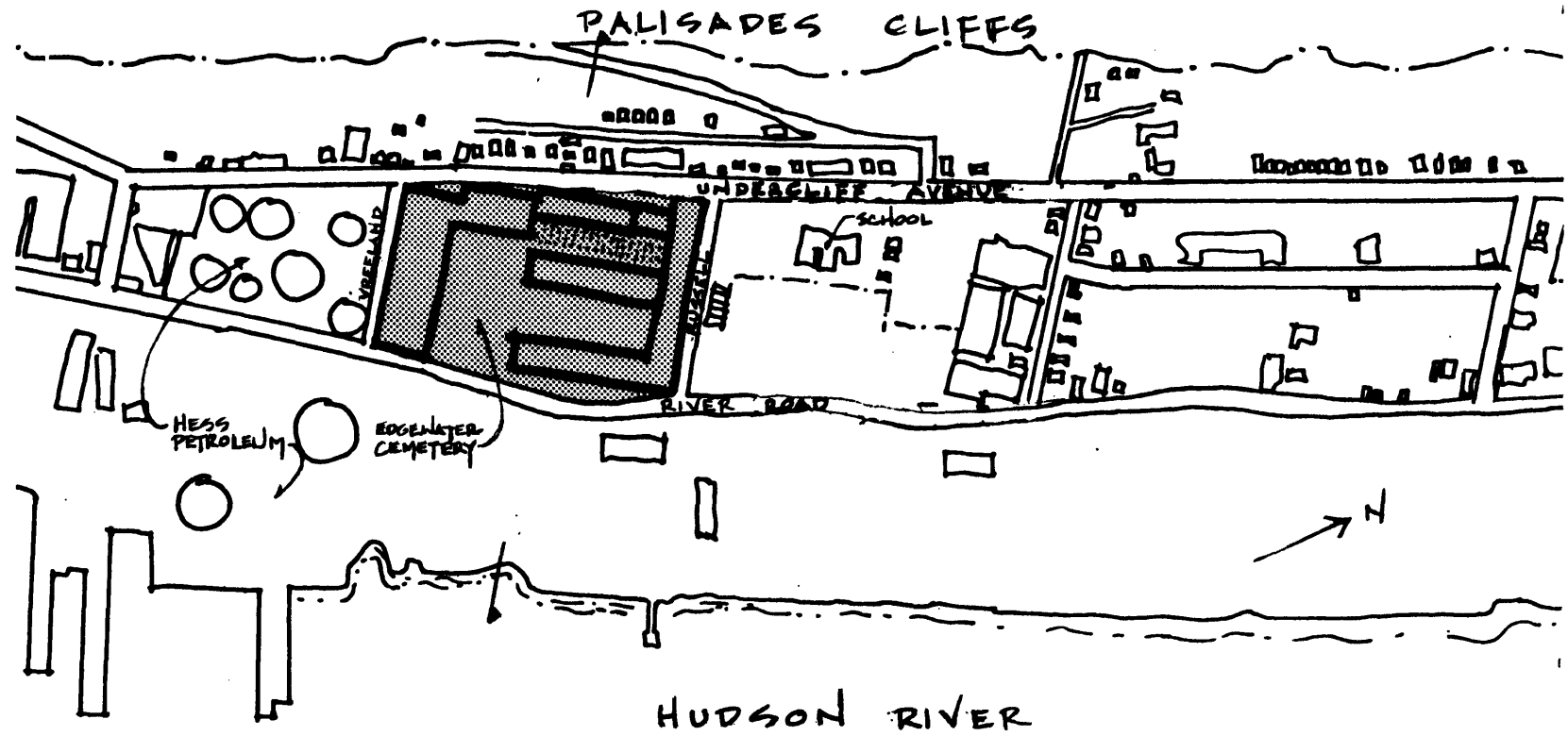


SITE MAP

1.0 THE SITE

Alcoa's Waterworks is situated in the town of Edgewater, New Jersey, ten minutes south of the George Washington Bridge. Edgewater is a borough three miles long and two blocks wide, one square mile in area and sandwiched between the Hudson River and the high granite cliffs of the Palisades. Edgewater became a magnet for industry and commerce due to its potential for deep water ports and delivery of parts by rail and by water during the 1920's.¹

This map shows the relation of the site to the larger directional field of north-south movement of the Hudson River and the Palisades Cliffs.



1. 1.1 ALCOA WATERWORKS HISTORY

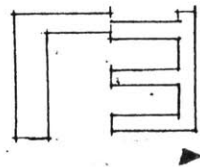
Between the years 1914 and 1925 the United States Aluminum Company acquired the land on which the Plant now stands. The Site is bounded on the North by Russell Avenue, on the South by Vreeland Terrace, on the East by River Road, and on the West by Undercliff Avenue. The Edgewater Cemetery, a 1.34 acre interior property, is impacted in the super-block Site.

In the year 1914, the United States Aluminum Company drafted a Master Plan and Design for a "heavy manufacturing skyscraper" complex containing heavy manufacturing and storage space, which was to be constructed in Edgewater, New Jersey. It was to be the largest of its kind in the world. Construction began in the year 1916 and was continued in subsequent stages until 1940, when the Plant achieved its present size of 1,100,000 square feet.²

The large rolling and stamping mill which the company is erecting on the Hudson River at Edgewater, New Jersey will not only be the largest mill owned by the Aluminum Company of America, but the largest mill of its kind in the World.

During the year 1916 a large addition to the existing fabricating capacity for aluminum was made by the completion and bringing into operation of the large metal working plant at Edgewater, New Jersey, containing as a portion of it the most modern rolling mill plant in existence for rolling aluminum. The plant is now taking care of a large portion of the demand for fabricated aluminum from the middle and eastern states.

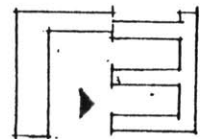
Publications from "The Metal Industry Journal", January 1916.



1. 1.2 DESCRIPTION OF THE PHYSICAL STRUCTURES

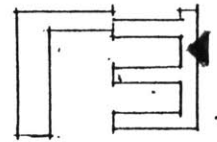
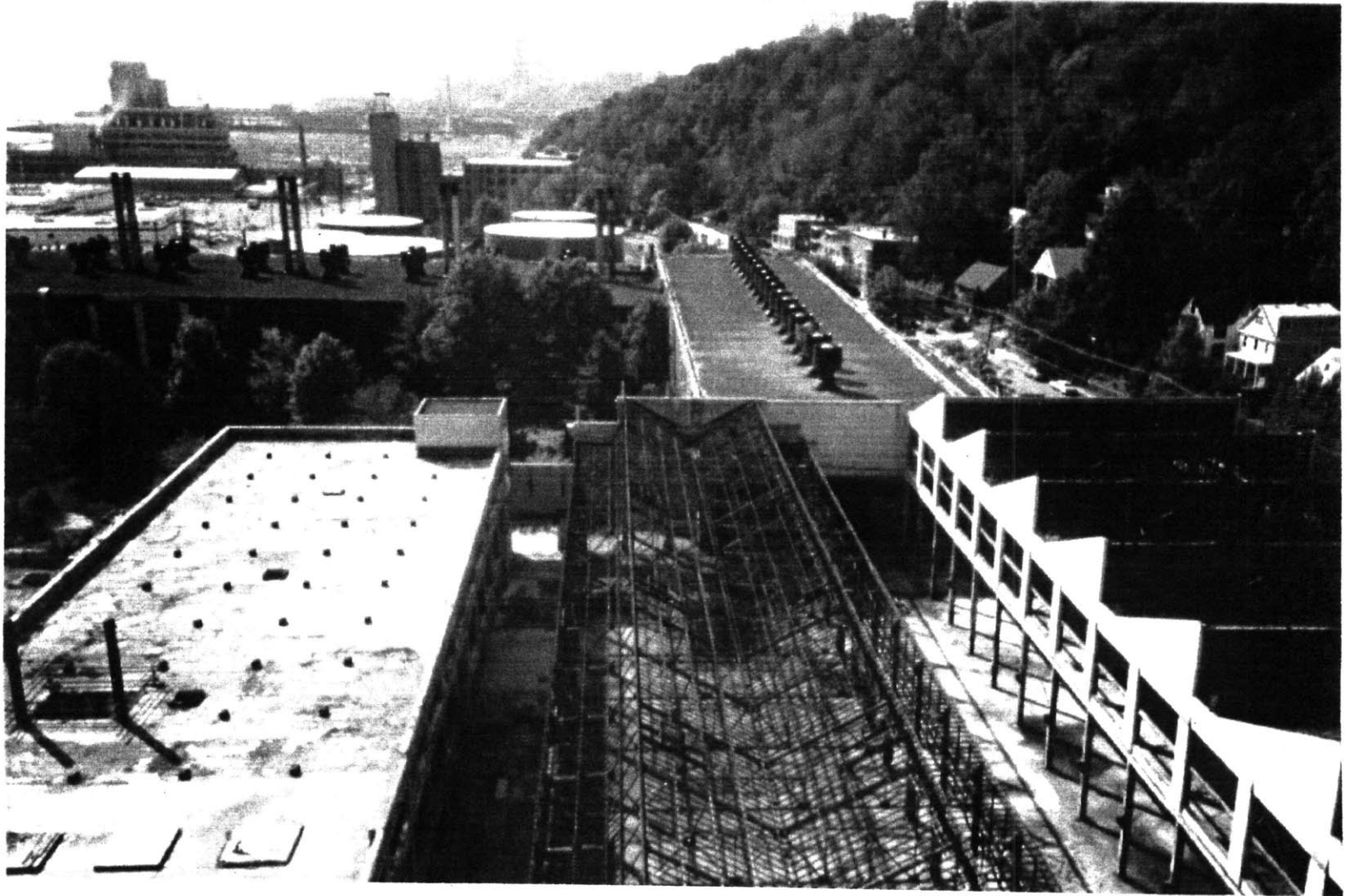
From a distance, Alcoa's Waterworks, and the town of Edgewater itself, is identified by the 160 foot high, 940 foot long reinforced concrete frontispiece which is the primary structure of the inactive Plant. It stands as a commentary to Edgewater's industrial heritage.

The 1920 vintage "L" shaped structure is reinforced concrete design. It consists of eight loft storeys 18 feet in height resting on a two storey plinth. The floor construction is of two-way flat-slab design supported by circular reinforced concrete mushroom columns forming 19'-5" x 16'-0" structural bays. The building envelope is composed of steel factory sash with wire glass fenestration and concrete surrounds. This building contained the great stamping machinery, some of which weighed two million pounds, and many ancillary manufacturing, assembly, treatment and storage operations. The top floor housed the administrative offices.



The early rolling mill is a long-span steel structure which housed giant suspended moving cranes, and are steel and glass butterfly roofed structures that bathe the 69 foot interior column free space it encloses with profuse sunlight. It was completed in 1918. The forging operation was a similarly constructed space with the exception of the roof design which reflected the roofing preference of its time, built in 1938, the saw-tooth North skylight.

The final addition to the plant, causing the plant to engulf the Edgewater Cemetery, is a structural steel skeleton with brick masonry panel walls and piers expressing the structural bay module. Its 158 foot width is spanned by long-span steel trusses forming two equal 79 foot bays.³



2.0 ON THEORY

The best built environments are unique responses to the land. Sites of strong character will dictate the basic organization of the plan and call for an organization that clarifies the terrain. Within the immediate context, however, the general organization of a site is not understandable without our association/recognition providing the continuity.⁴ This recognition or understanding of the site can be obtained through the addition of a design vocabulary which guides the observer through the site.

Viewpoints

Since the landscape is experienced by a moving observer, the eye may be directed by framing views or be drawn along a path of repeated forms.⁵ The observer must be able to orient himself in the landscape. He can be clued by the direction to some goal, the marking of some distance traversed, and the clarity of entrances and exits. The design sequence is a coherent development of a set of relationships of physical and spatial vocabularies.

Into the Site
From the outside.

The parts make the whole
And the whole is a part:
Movement relative to the larger,
Stability relative to the smaller,
Makes Form.

The boundaries enclose the form
And the form becomes boundary:
Seclusion towards the outside,
But openness towards the inside,
Makes Place.

The rules define the similarities
And the differences share the rules:
Sameness in time and space,
Without repetition
Makes Understanding

The site is space and material:
Form, Place and Understanding
Make the Site

N.J. Habraken, "Transformations of the Site", p. 5

Spatial Character

The experience of place is a spatial one. It is a perception of the volume that surrounds the observer.⁶ The appearance of a space is modified by dimensions, proportion, scale, the objects placed within it, the activity it contains, the way one moves through it, and by the way it is lighted.

Continuity of Access

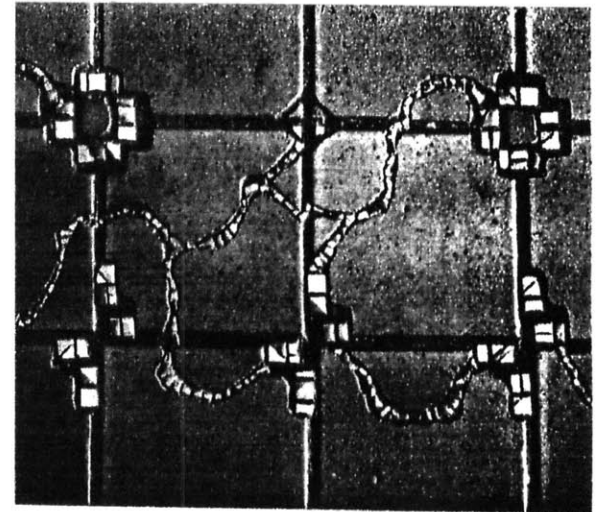
The form of motion of the observer must be ordered to enable him to understand the site. The access system is a powerful way of expressing the underlying landscape, whether it runs along contours or aggressively opposes them. Access, then, should have a clear order of its own. Access systems are the points from which the development will be seen. Therefore they have a profound effect on visual character. Along them one should experience a pleasant sequence of space and form.⁷ Access is continuous but pedestrian motion may be deflected or encouraged by visual attractions, by level changes, and openings. These interventions establish discontinuities providing varying degrees of privacy.

Territories

The access relies on variations sequentially organized by territories and direction change. Territories and direction change allow for a hierarchical organization from which a sense of association or disassociation with the path can be produced. Territories are formed along the access through the grouping of privacies. The degree of separation between access and privacy type is expressed by the entrance transition. The territories may be destination points or activity nodes which keep the flow of traffic on the access going in either direction.

Light

The one element that the designer can use to guide the movement patterns and their degrees of privacy is light.⁸ The light that bathes a space is a determinant of the space's character. Light will conceal or reveal, and contract or expand dimensions.



3.0 OBSERVING THE SITE AND ITS CONTEXT

The size of the Alcoa Complex is understandable in relation to the landscape; the huge granite cliffs of the Palisades and the wide Hudson River.

The great diversity of its immediate context in which lie single-family homes, an elementary school, the Hess petroleum plant, and River Road, however, does not influence the design of the Alcoa complex due to the strong edges that the buildings of the complex form and the retaining walls surrounding the site.

Within the site, only the structural skeletons of the original physical forms remain; all infill, access, and infrastructure systems have been stripped. Thus, in order to organize the physical form of the site we must begin by defining any of these systems. As my objective is to create a journey through the complex such that the unique spatial characteristics of the site and its views can be experienced by the observer, my working procedure began with defining the access system. The access system when combined with the original physical form produced a framework which informed the organization of the site. This access is governed by the set of principles

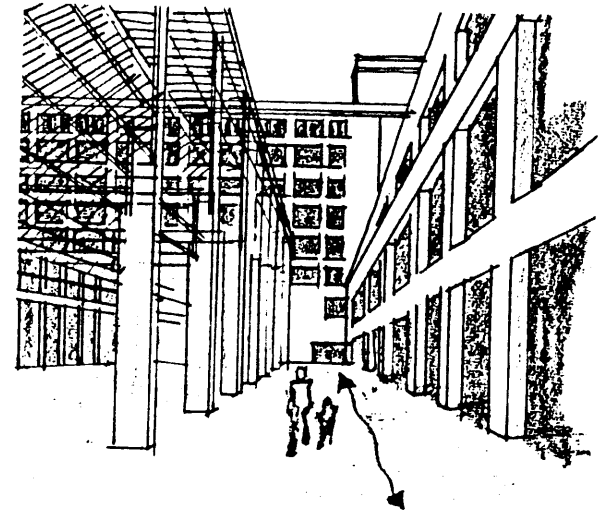


FIGURE 1:

- PATH IS THE "IN-BETWEEN" SPACE
- DIRECTION IS GUIDED BY BUILT ED

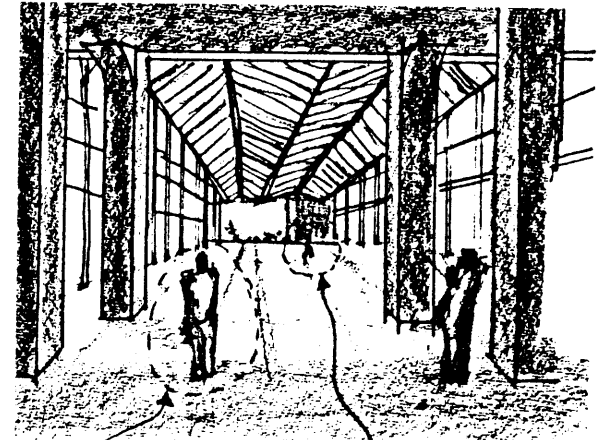
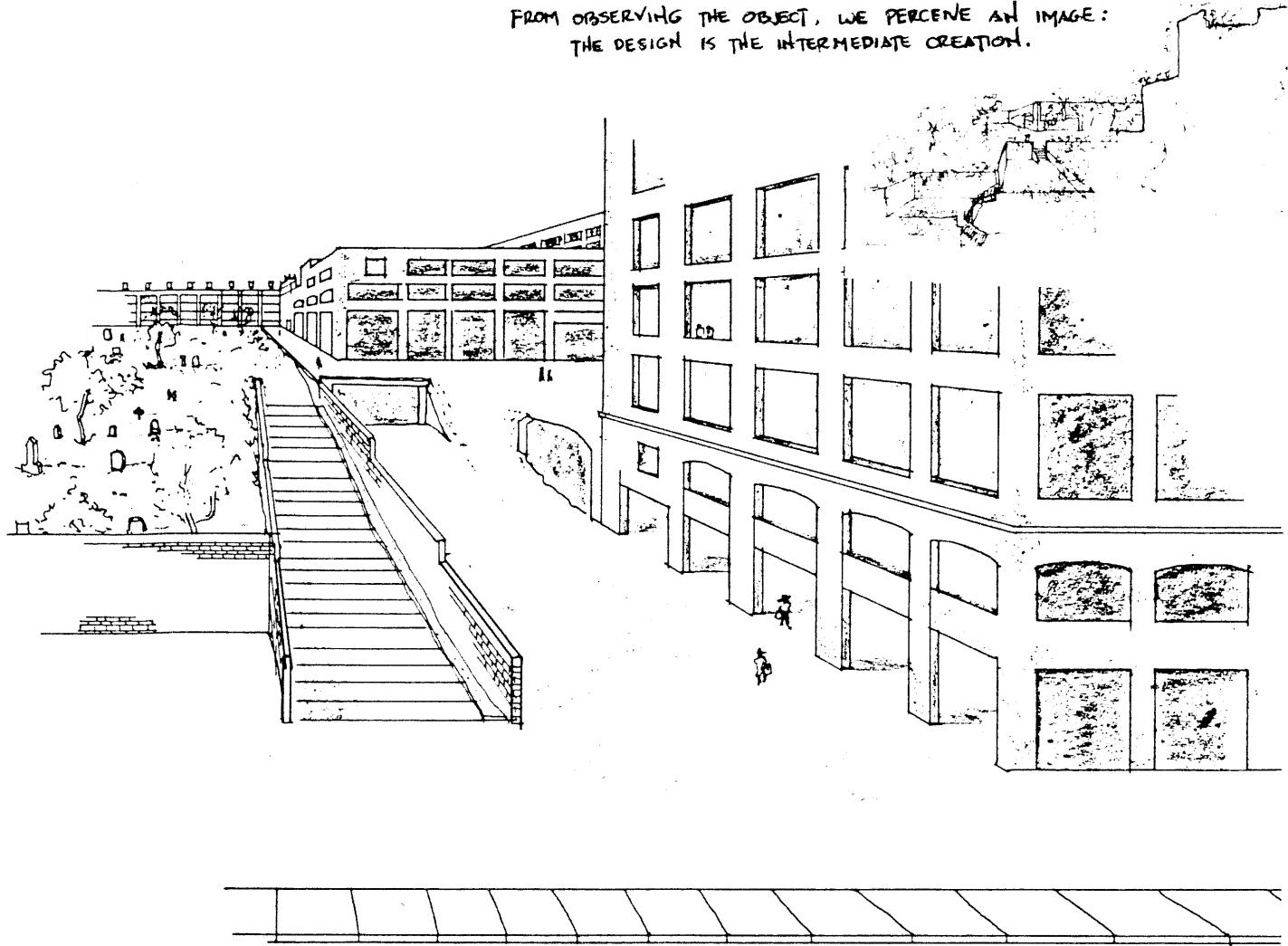


FIGURE 2:

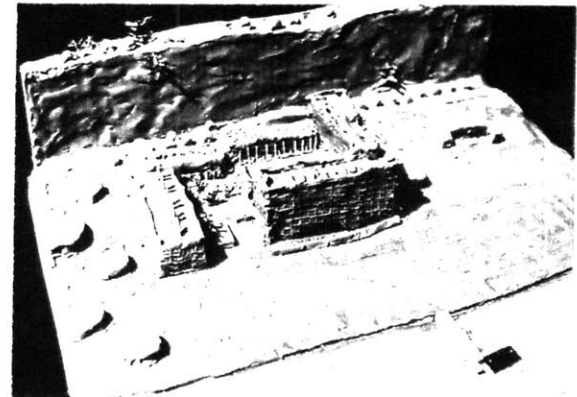
THIS PERSON EXPERIENCES A DIFFERENT FEELING THAN THIS ONE DUE TO DIFF SIZE/SCALE/LIGHT QUALITIES OF BUILDING MATERIALS.

FROM OBSERVING THE OBJECT, WE PERCEIVE AN IMAGE:
THE DESIGN IS THE INTERMEDIATE CREATION.

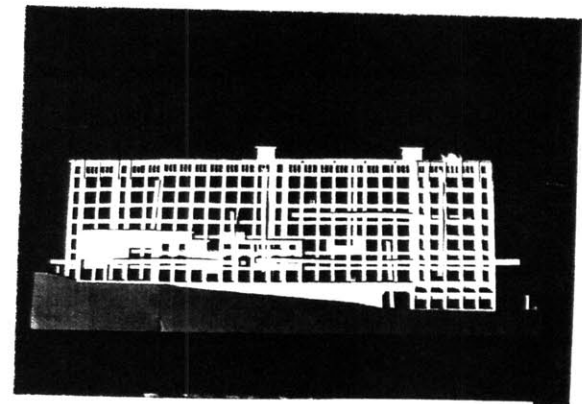


previously mentioned forwarding a proposition about space.

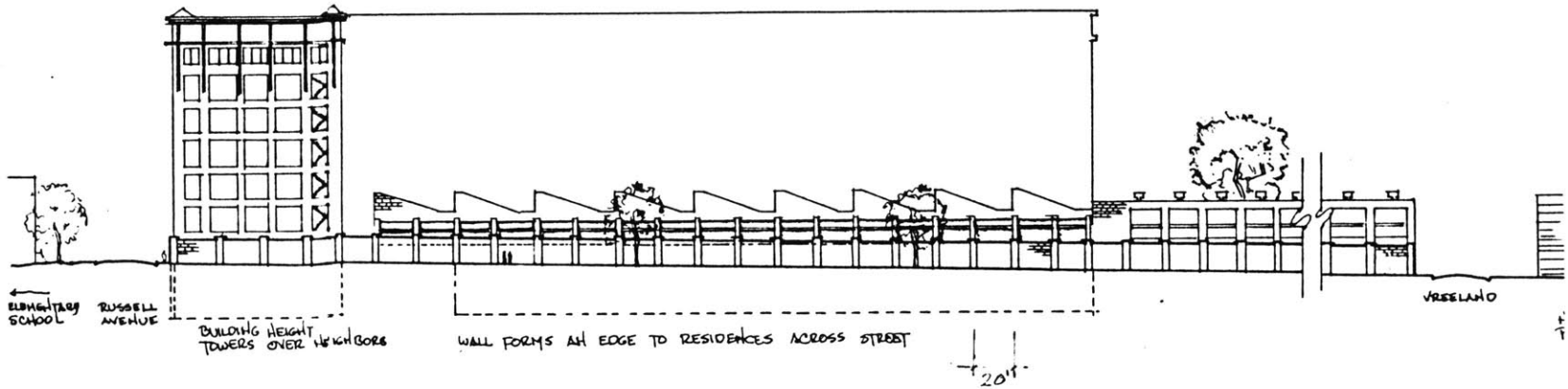
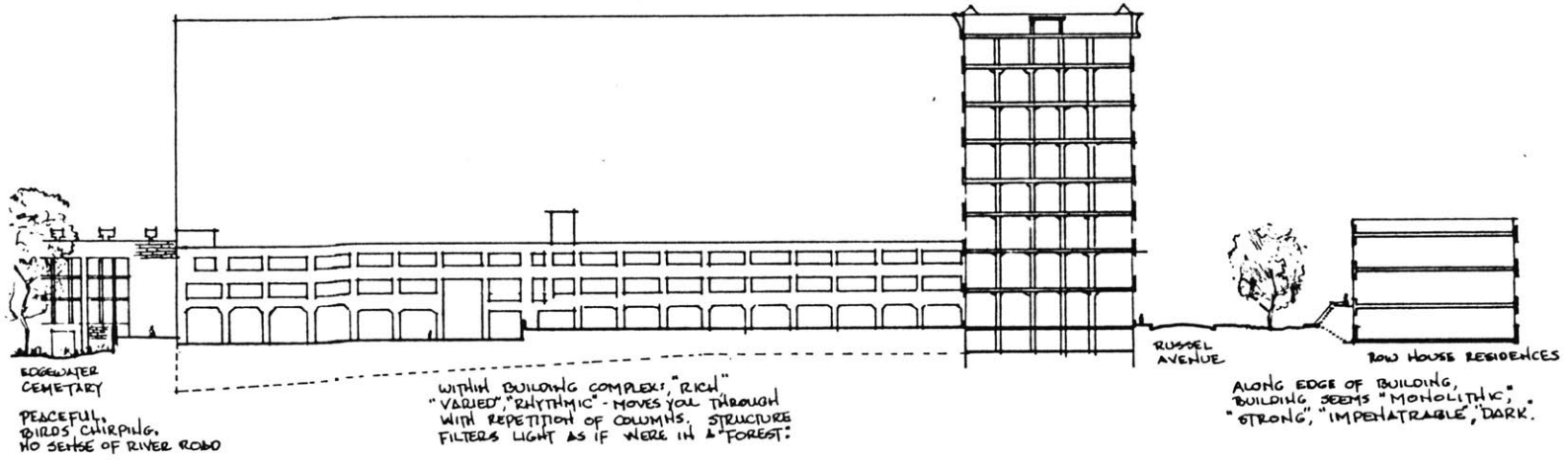
As the size of the site is too large to understand as a system, it must be broken down into parts, or subsystems that are recognizable. Each subsystem then acknowledges the overall size of the complex. Through the integration of public access in each subsystem, one journey experience is identified. The journey presents the observer with a unique spatial experience which intensifies upon the attributes of the original physical form. The journey is presented in parts as "The Terraced Slope", "The Promenade", and "The Garden Wall".



Clay model of original physical form.

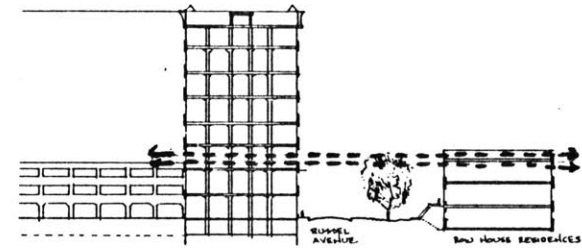


Access diagram on original facade.

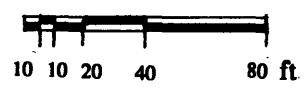
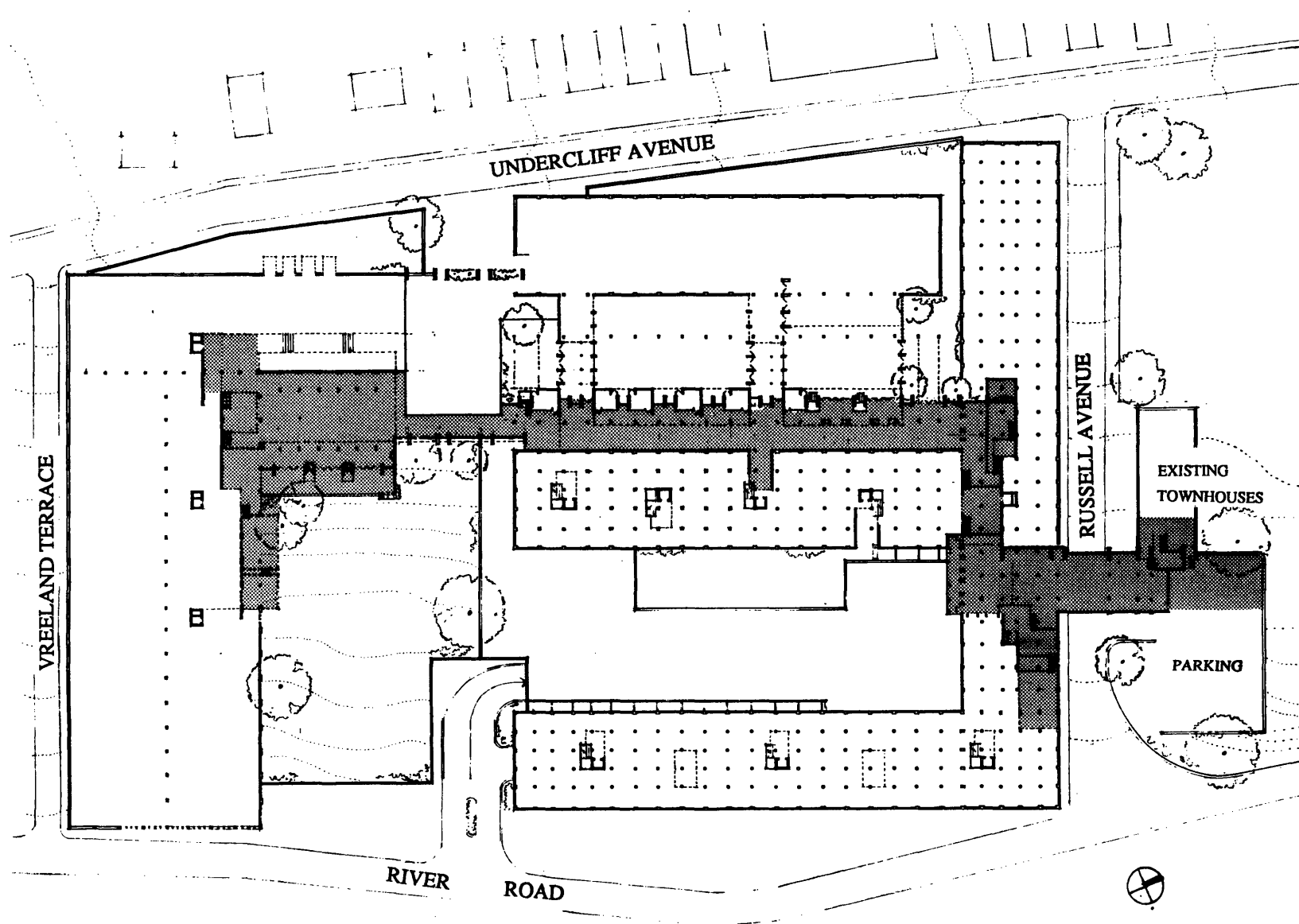


4.0 THE JOURNEY

The journey through the Terraced Slope, the Promenade, and the Garden Wall begins with another part or subsystem which penetrates the Northern edge of the eight storey concrete building, bringing the traveler into the site. This subsystem is accessed from a node outside the site. The node is shaped by a parking area and the original townhouses, now transformed to serve as the entrance piece which brings one up into the subsystem that crosses over Russell Avenue. Through penetrating the northern facade with a subsystem, the community is now linked to the whole system of the site. The journey is now accessible.



Piece linking to community.



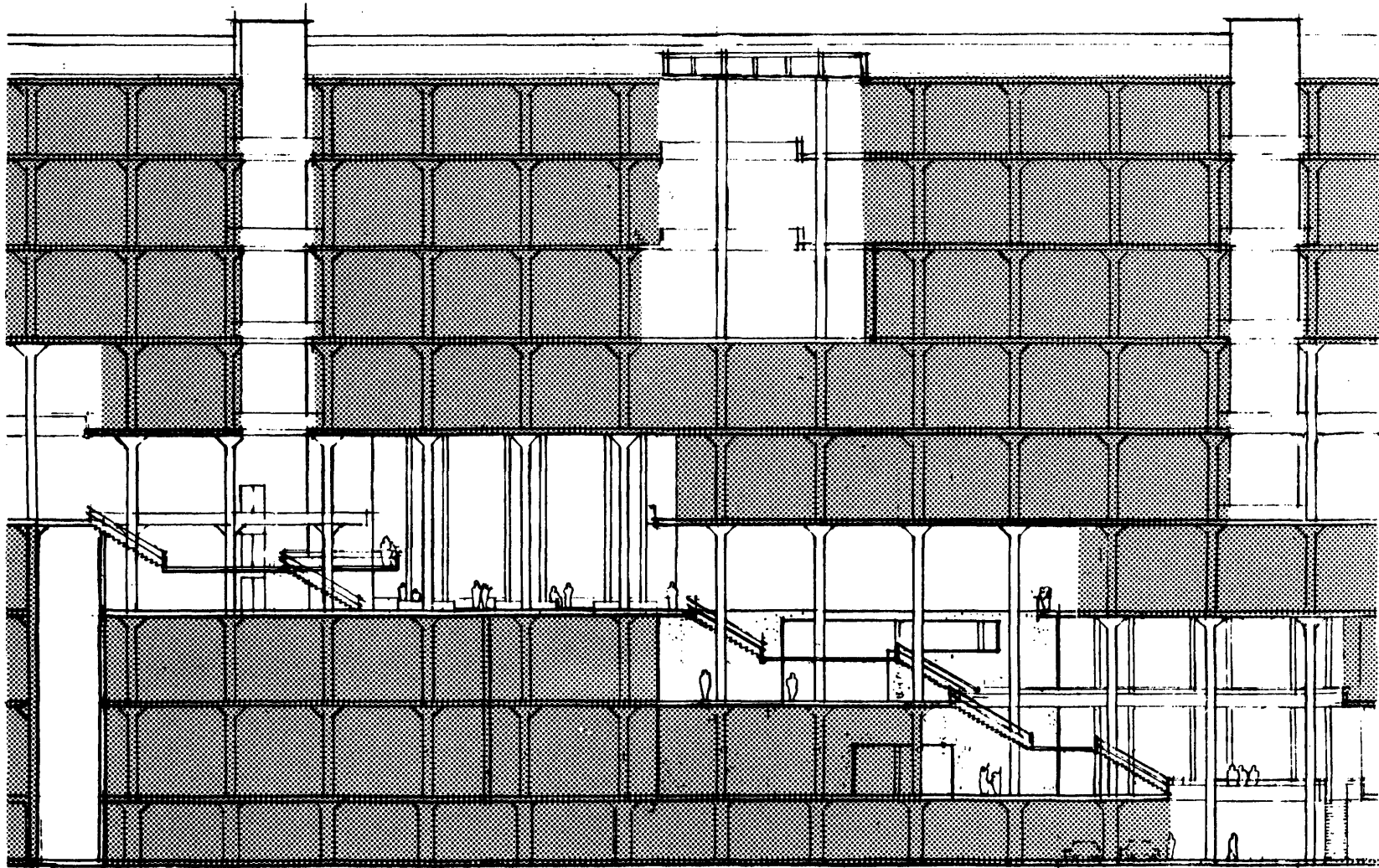
THE JOURNEY THROUGH THE SITE.

4. 4.1 THE TERRACED LANDSCAPE

The first experience of the journey occurs within the eight storey concrete structure. Using the design vocabulary of terracing, the journey is one which crystalizes the structure as landscape. It is the carving away of this landscape and the shaping of it that make the descent to the public reference level of the site not just one of movement but one of association with the total volume of the original physical form of the concrete structure.

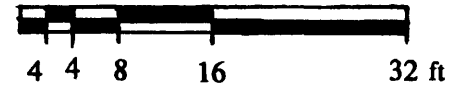
To guide the traveler, the southern facade has been pulled away from the smaller concrete structure which meets it. The traveler thus moves on the outside of this continuous wall down a series of lightweight metal terraces which link the main reference levels of the eight story structure. The now open edge of the smaller concrete structure allows the traveler to associate with it as well.

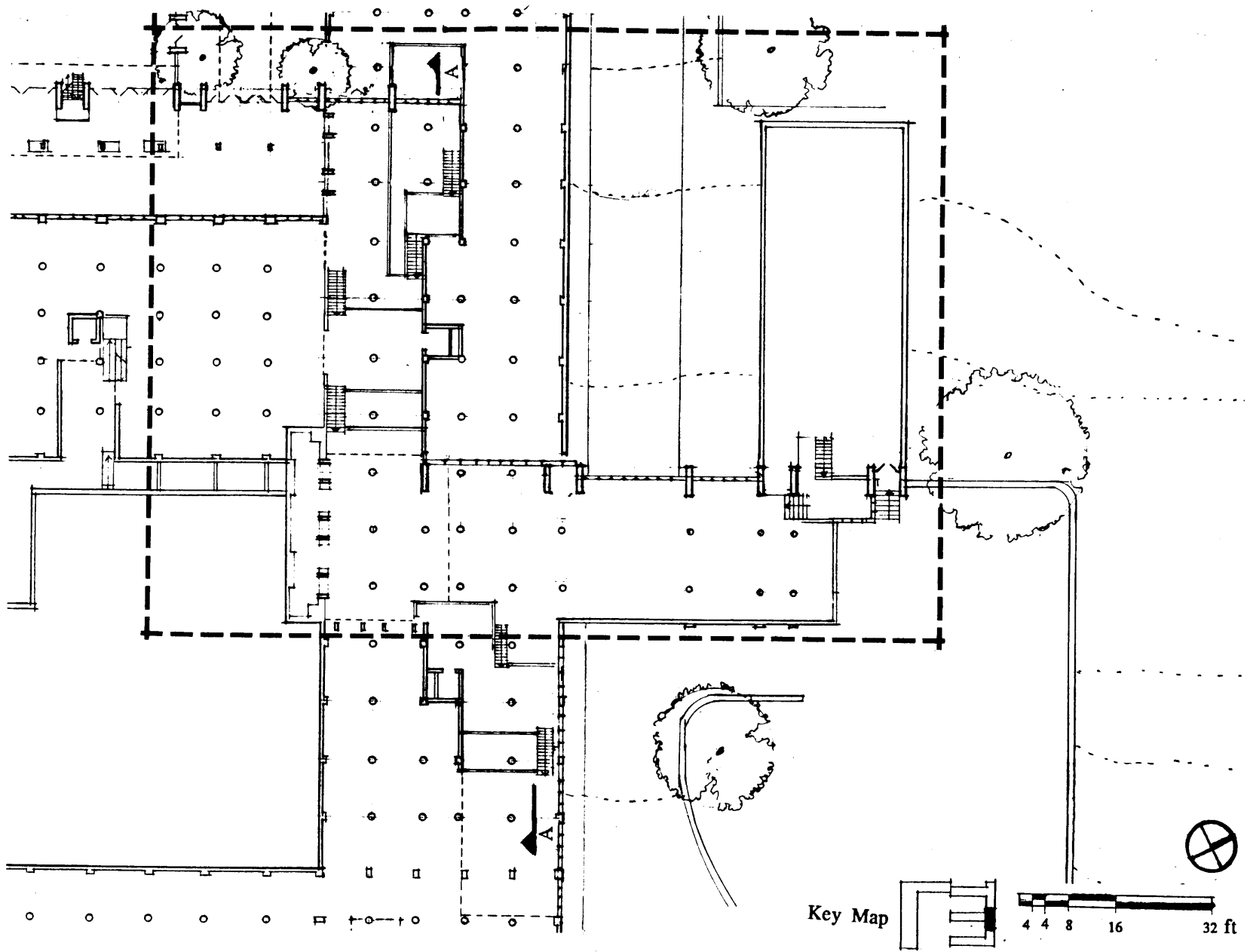
The journey through the terraced landscape is one which intensifies the original physical form of the concrete structure, guiding the traveler through an association of volumetric preceptions of space.

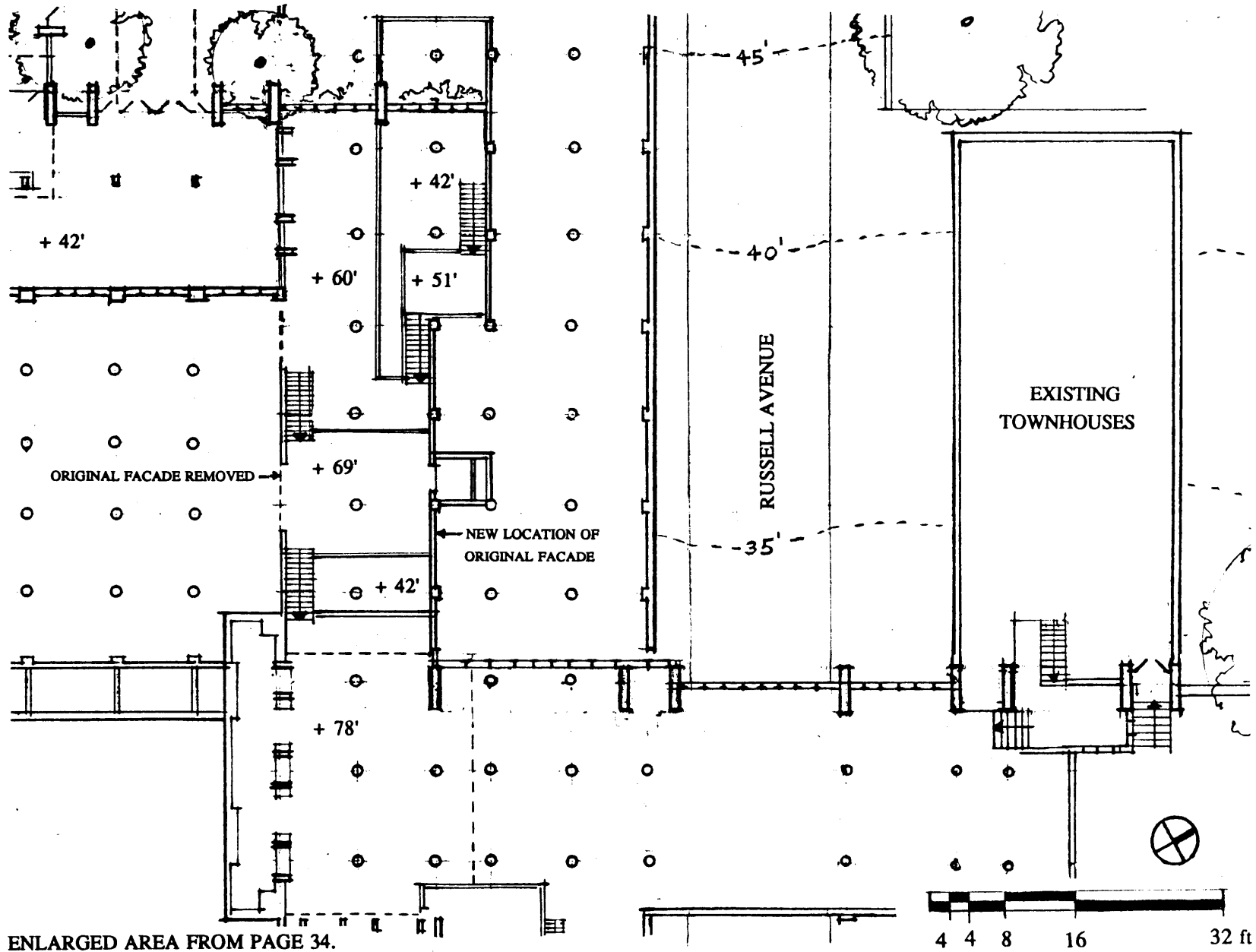


SECTION A-A: TERRACED LANDSCAPE

NOTE: MOVEMENT GUIDED BY VOLUMETRIC ASSOCIATIONS
BETWEEN REFERENCE LEVELS.





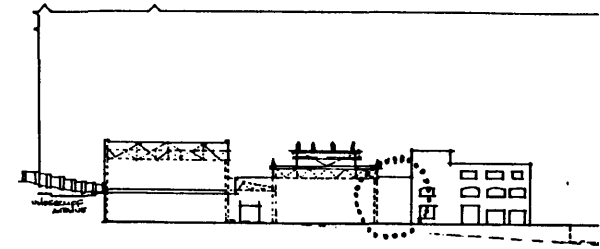


ENLARGED AREA FROM PAGE 34.

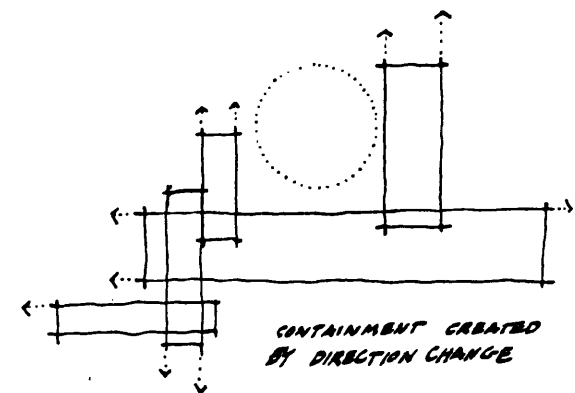
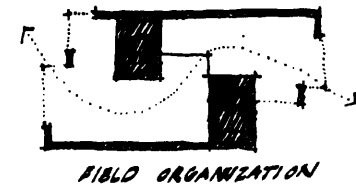
4. 4.2 THE PROMENADE

The next experience of the journey occurs in the subsystem composed of the small concrete structure, the butterfly trusses and the sawtooth structure. The promenade is a zone between the edge of the concrete structure and extends into the space of the butterfly trusses. The edge of the concrete structure is treated as a private edge lined with offices on the upper two floors and workshops on the promenade level. The glazed surface which brings the promenade into the space of the trusses is continuous, guiding the traveler in the lineal direction that the original structures dictate. A direction change generates territories within the butterfly trusses which may function as work or display areas. As these display areas are clearly visible from the street, walls are introduced to form a privacy gradient. Privacy may be intensified by the addition of containments, or rooms, which link the display area to the promenade. The traveler must then pass through these rooms, which may be smaller display fronting the promenade.

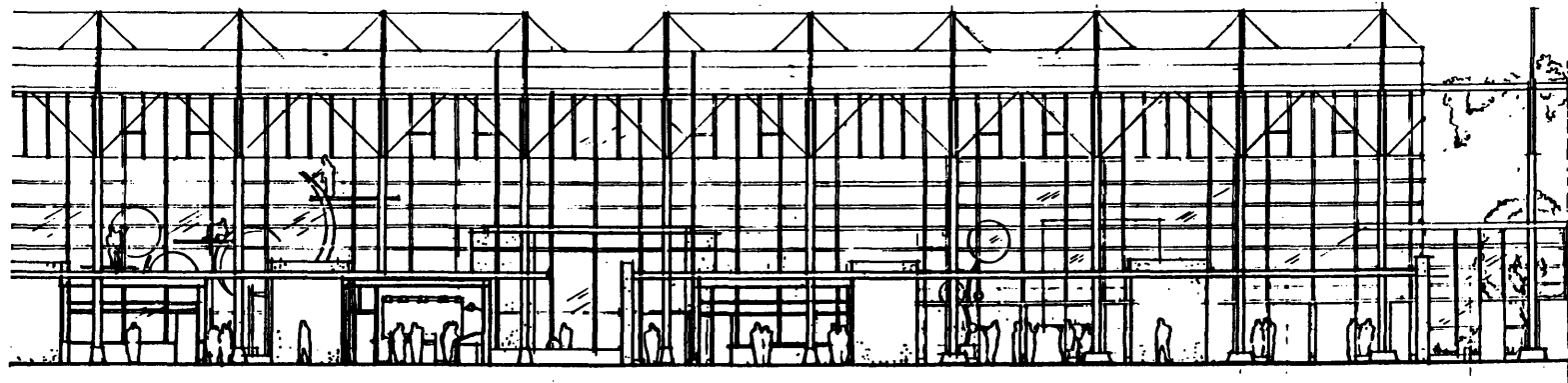
The spatial experience of the promenade is one in which light acts as a containment. Territories are linked through windows which provide a visual association of the whole length of the the promenade.



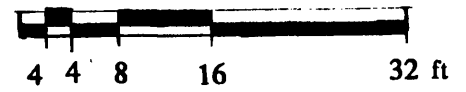
Zone of Access

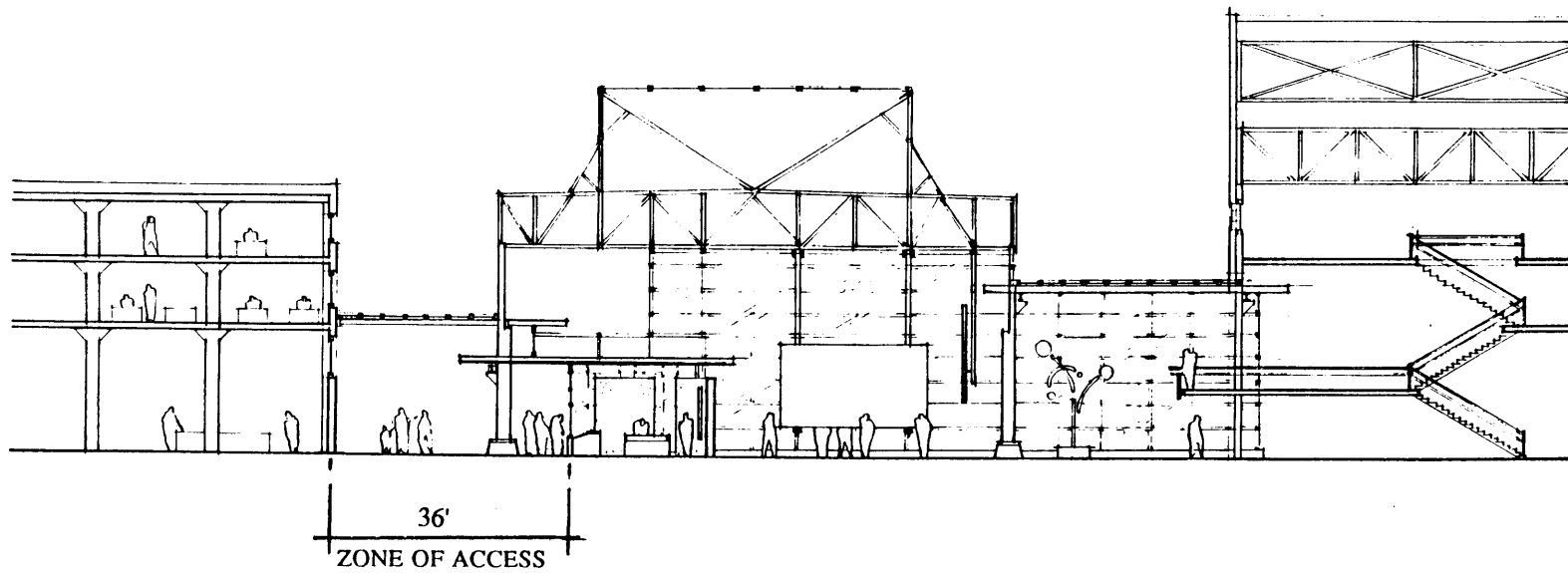


Chastain/Chow Studio

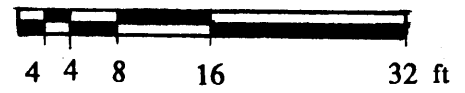


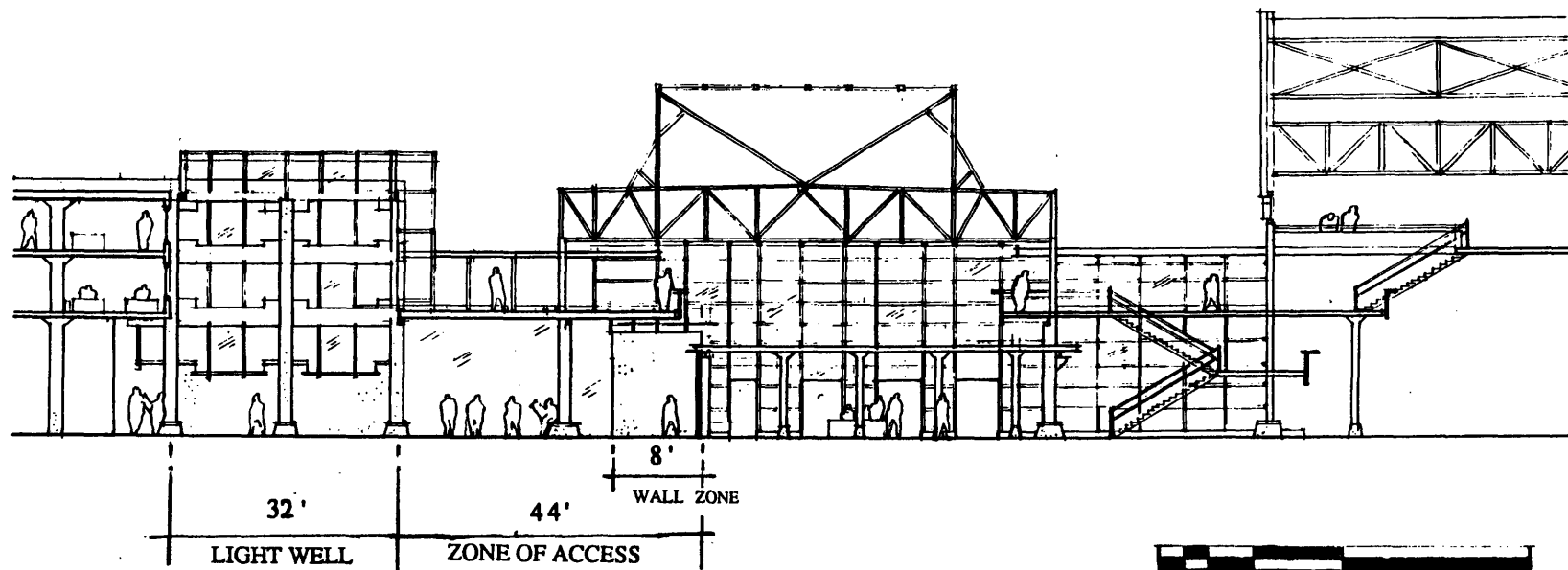
ELEVATION A-A: ACTIVITY ALONG PROMENADE.



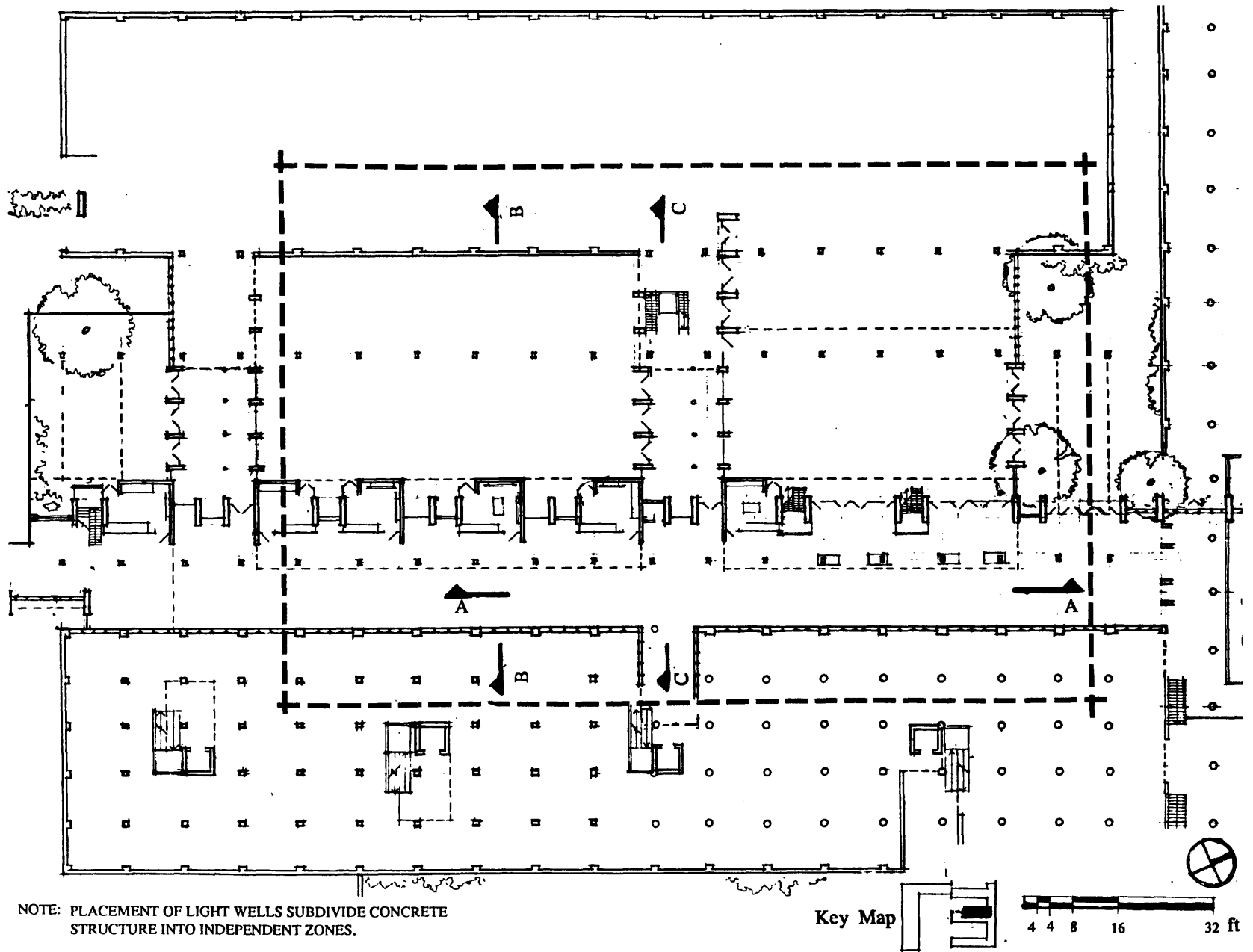


SECTION B-B: VIEWING THE DISPLAY.

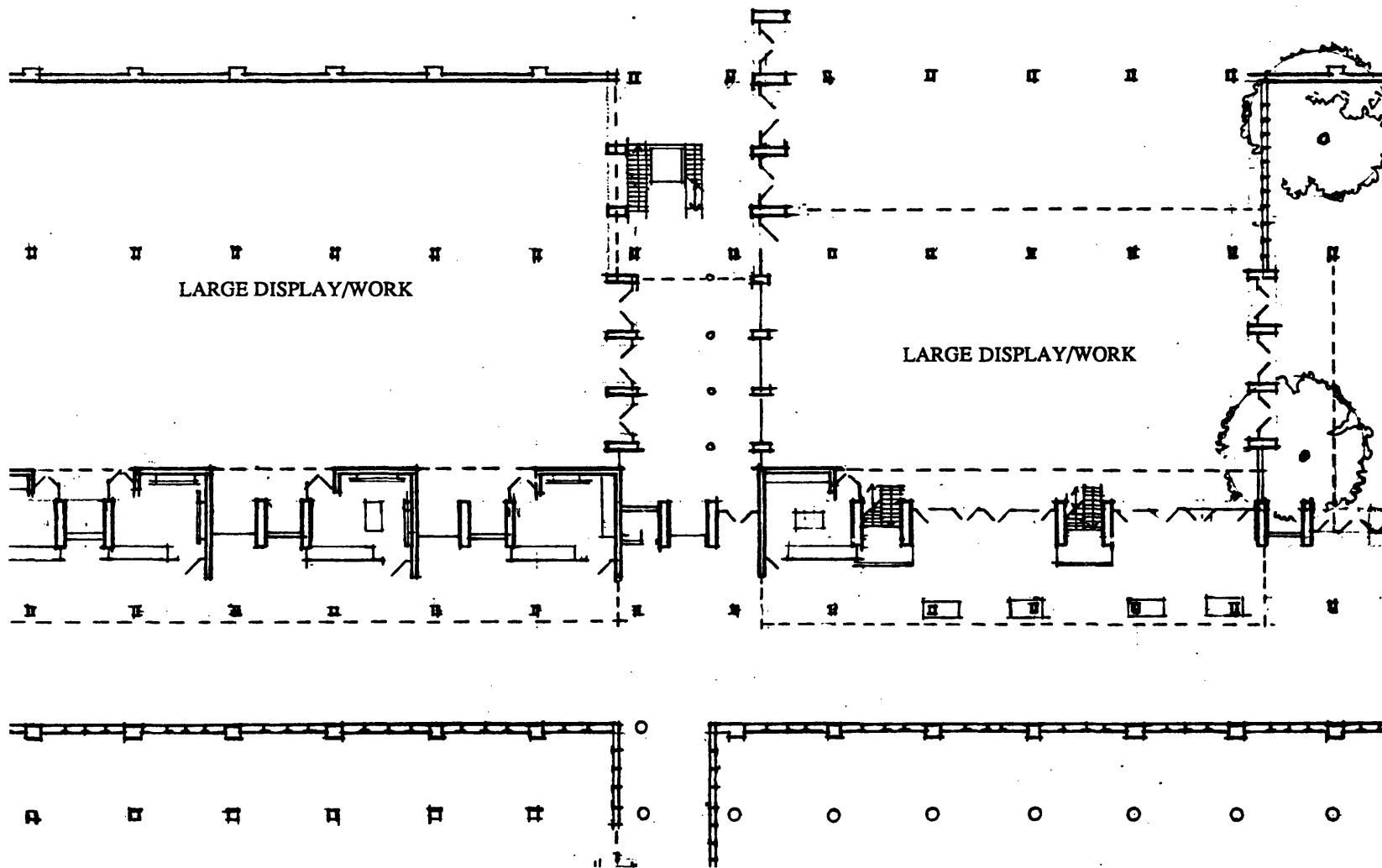




SECTION C-C: MOVING BETWEEN THE DISPLAY AREAS.



NOTE: PLACEMENT OF LIGHT WELLS SUBDIVIDE CONCRETE STRUCTURE INTO INDEPENDENT ZONES.

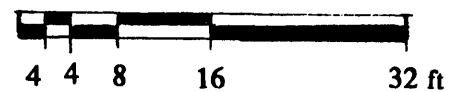


LARGE DISPLAY/WORK

LARGE DISPLAY/WORK

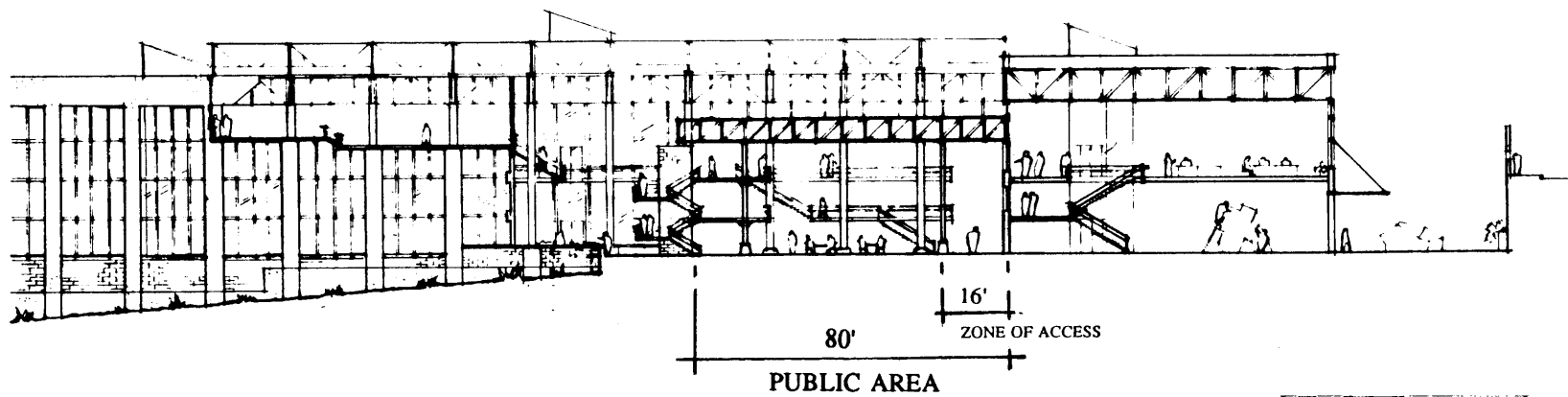
ENLARGED AREA FROM PAGE 40.

NOTE: WALLS AND L-SHAPED PIECES INCREASE PRIVACY OF LARGE DISPLAY/WORK AREAS.
L-SHAPED PIECES ACT AS SMALL DISPLAY THROUGH WHICH ONE ACCESSES LARGE DISPLAY/WORK.

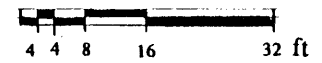


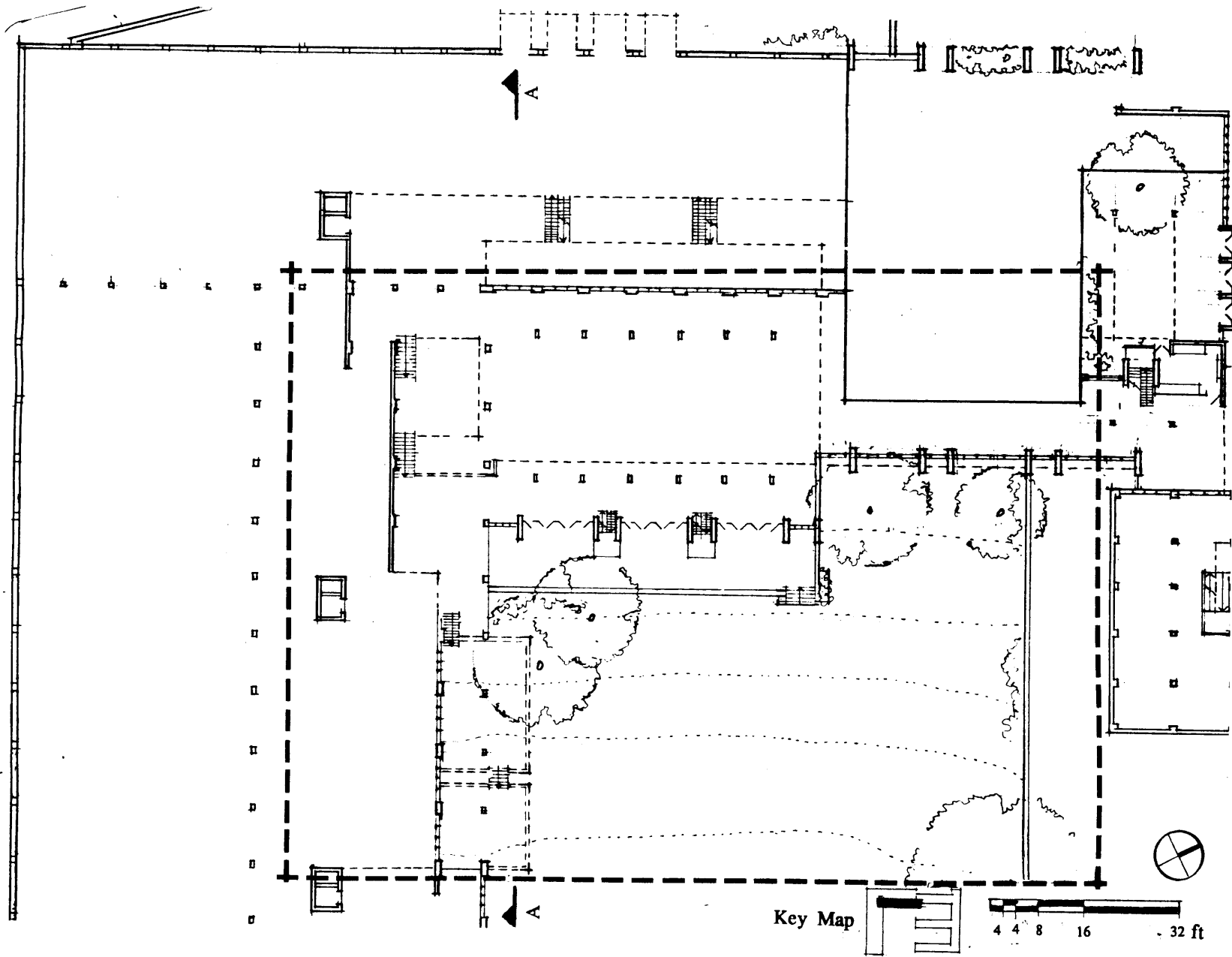
4. 4.3 THE GARDEN WALL

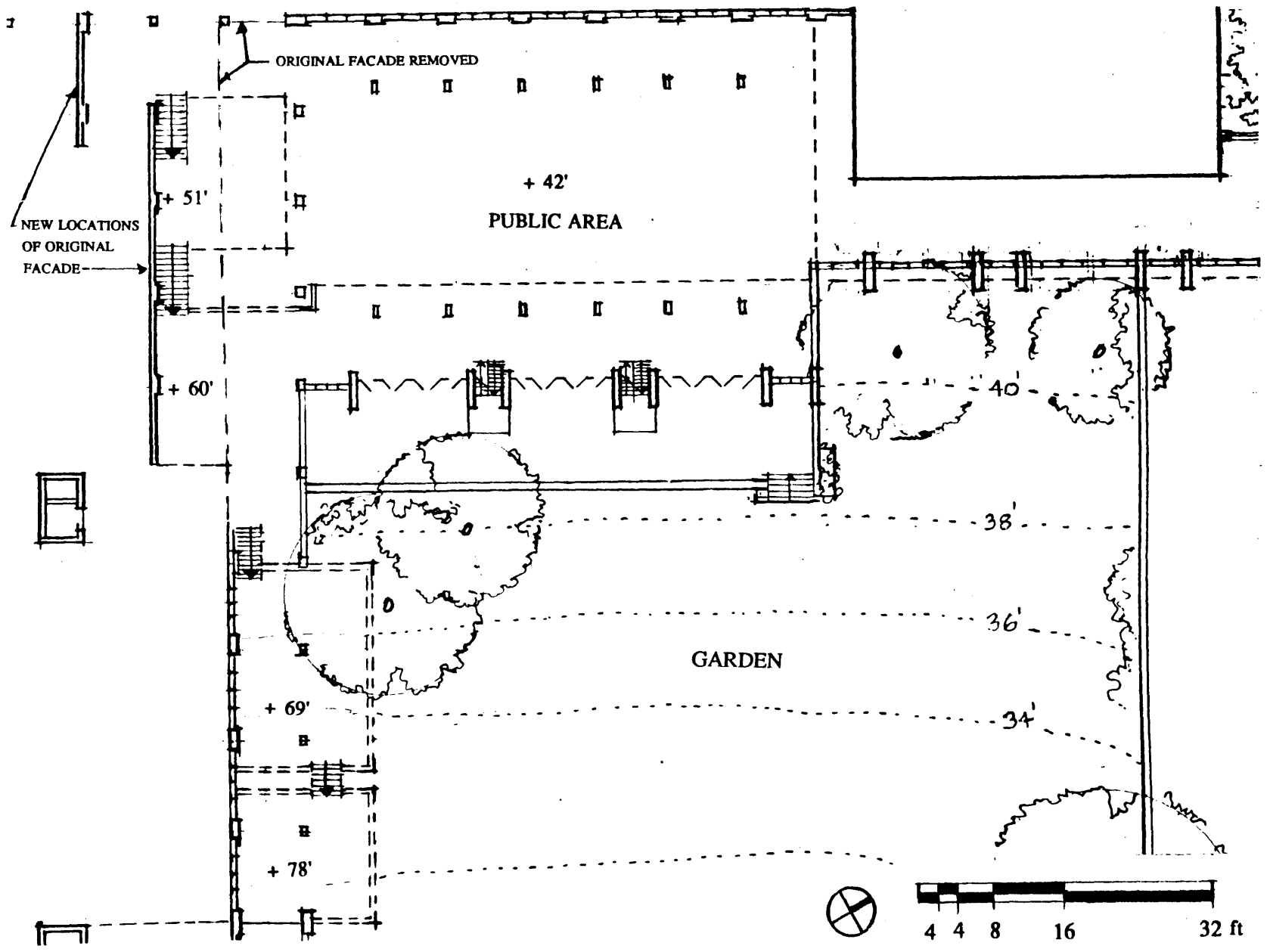
The final journey experience is one which carries the traveler across the green to the L- shaped building at the southern end of the site. The traveler is guided against a concrete retaining wall and a glazed surface which visually connects out to the open green of the original cemetery. The wall leads the traveler into a large public area whose edges are shaped by the original structures. Privacies from these structures extend out into the public space, further intensifying its edges. The traveler continues the journey around the public space walking along the edge of the original building. The set-back of the facade of the building fronting him brings the traveler into the building. Inside lies a collective territory where access systems are present which connect to privacies such as offices. A system of terraces which begins at this collective territory can guide the traveler up levels which extend out to the public space, or continue up to the final destination where the view of Manhattan awaits, and the system of the journey in its entirety can be looked upon.



SECTION A-A: TERRACING UP TO CATCH THE VIEW.







ENLARGED AREA FROM PAGE 44.

A FINAL NOTE

When faced with complexity, one reasonable response is to break the problem into parts. By solving each part separately and then combining the results, we reach a solution to the whole which responds to all its aspects.

FOOTNOTES

¹ C.L. Lycette. *Edgewater Land History-Plant Site*, Aug. 17,1938, p. 20.

² C.C. Carr. *Alcoa. An American Enterprise*, New York, N.Y., 1952, p. 12.

³*The Edgewater Alcoa*, p. 7.

⁴ C.L. Lycette. p. 25.

⁵ N.J. Habraken. *Transformations of the Site*, Awater Press, 1988, p .16.

⁶Kevin Lynch and Gary Hack, *Site Planning*, The MIT Press, Cambridge, MA, 1986, p. 161.

⁷ Ibid, p. 157.

⁸ Ibid, p. 158.

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