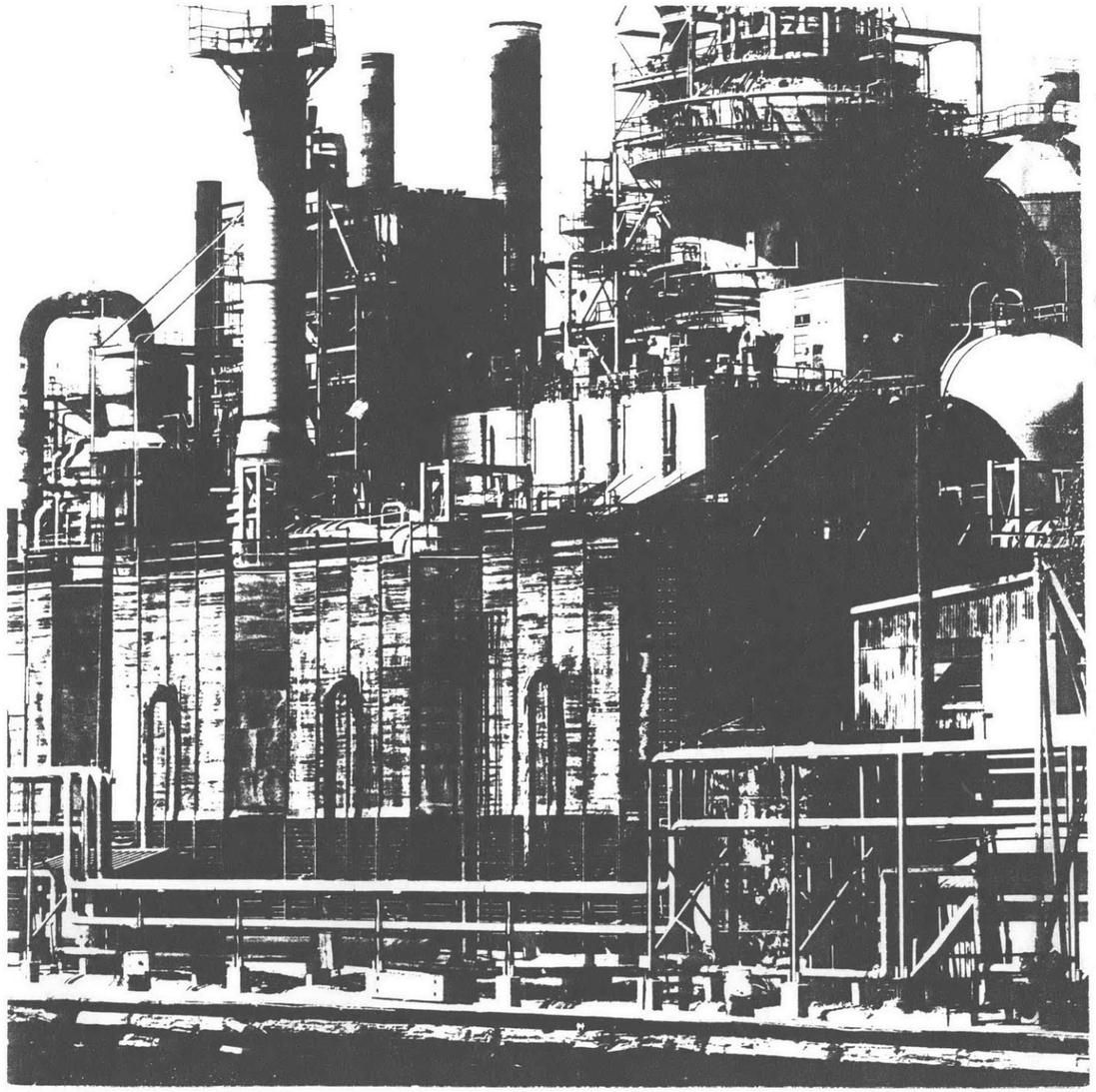
INDUSTRIAL STRUCTURES:
AN ANALYSIS AND TRANSFORMATION OF THEIR FORMAL CHARACTERISTICS



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SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL
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MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

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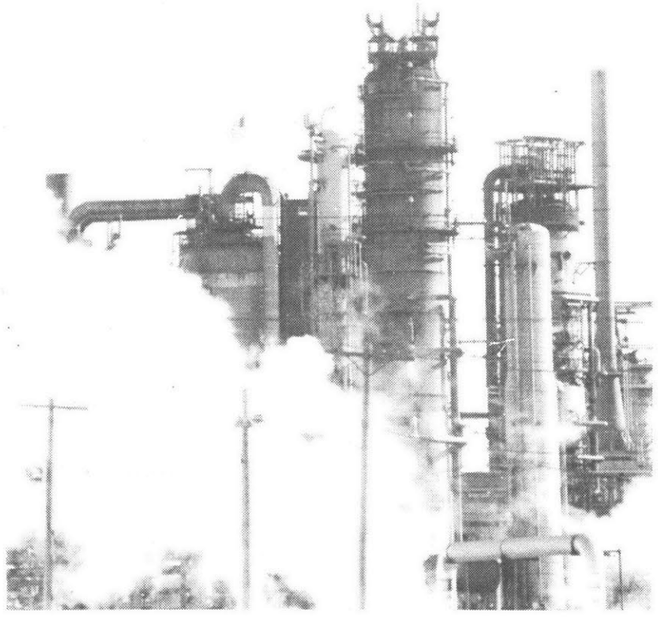

INDUSTRIAL STRUCTURES :

AN ANALYSIS AND TRANSFORMATION OF THEIR FORMAL CHARACTERISTICS.

By

Damon Strub

Submitted to the department of architecture on May 6, 1988

in partial fulfillment of the requirements for the degree of

Master of Architecture

ABSTRACT

Industrial structures such as blast furnaces, oil refineries, gravel crushers etc. are often beautiful and fascinating. Furthermore, they exemplify certain formal and organizational characteristics which could be incorporated into architectural design.

In the 1920's Le Corbusier and his contemporaries refered to industrial structures, American grain silos in particular as a symbol of their Positivist faith in rationalism and anticipation of a Techno - Utopia. However, the world has changed in the last 60 years. Contemporary architecture is struggling to move beyond this Positivistic utopian vision and create a built environment which is more humane, user freindly and accomodating of idiosyncrasy and diversity.

This thesis will examine four characteristics exemplified by industrial structures which could inform such an architecture. Industrial structures are heterotopically ordered complex assemblages of autonomous components. Discrete, clearly defined spaces within them are displaced so as to allow residual or slack space in between. The exposed steel framework creates a sense of transparency and blurs the edge between inside and out. The purely utilitarian lack of artifice creates an honest and legible tectonic expression.

These four characteristics cannot be applied superficially as an end in themselves. They should evolve out of the design process. Industrial stuctures are organized according to strict functional, utilitarian and economic criteria. It might be possible to acheive these characteristics in architecture by following the same functional methodology. However, this is difficult in architecture because not only are the functional requirements obscure and complex but there is often little correlation between form and function. In architecture, the experiential as well as the technical qualities of a building must be considered. Helmut Schulitz's three C's context, construction method and content, defines a broad categorization of functional criteria which can influence the form of a building. However, no matter how broadly defined, a purely rational, functional design approach is insufficient to create architecture. Some degree of formal compositional order is unavoidable.

To illustrate the incorporation of these characteristics into architecture, I have designed a community center to be located on the Boston State Hospital site at Franklin park. This design attempts to follow a heterotopic functional methodology. The various activities of the center are organized around a plaza. The plaza is open to the southwest and comands a view of the field below and the blue hills in the distance.

In sumation, this thesis proposes four characteristics discernable in industrial structures which could inform a more diverse and humane architecture. It then proposes how these characteristics can be achieved by following a functional design methodology. This approach is illustrated with the design of a community center located on the Boston State Hospital Site.

Thesis Supervisor - Fernando Domeyko
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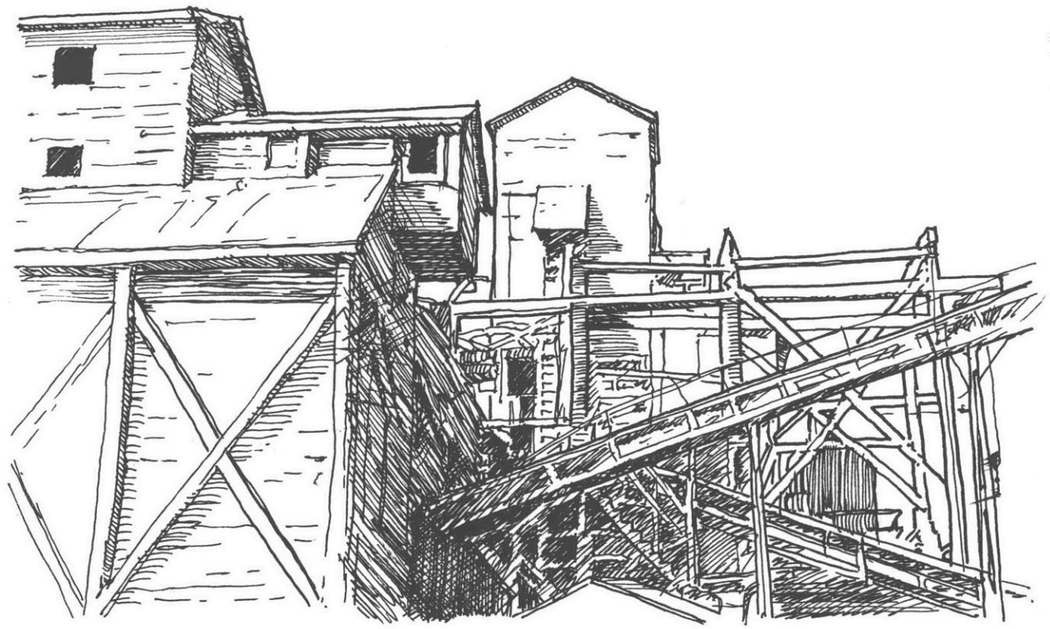

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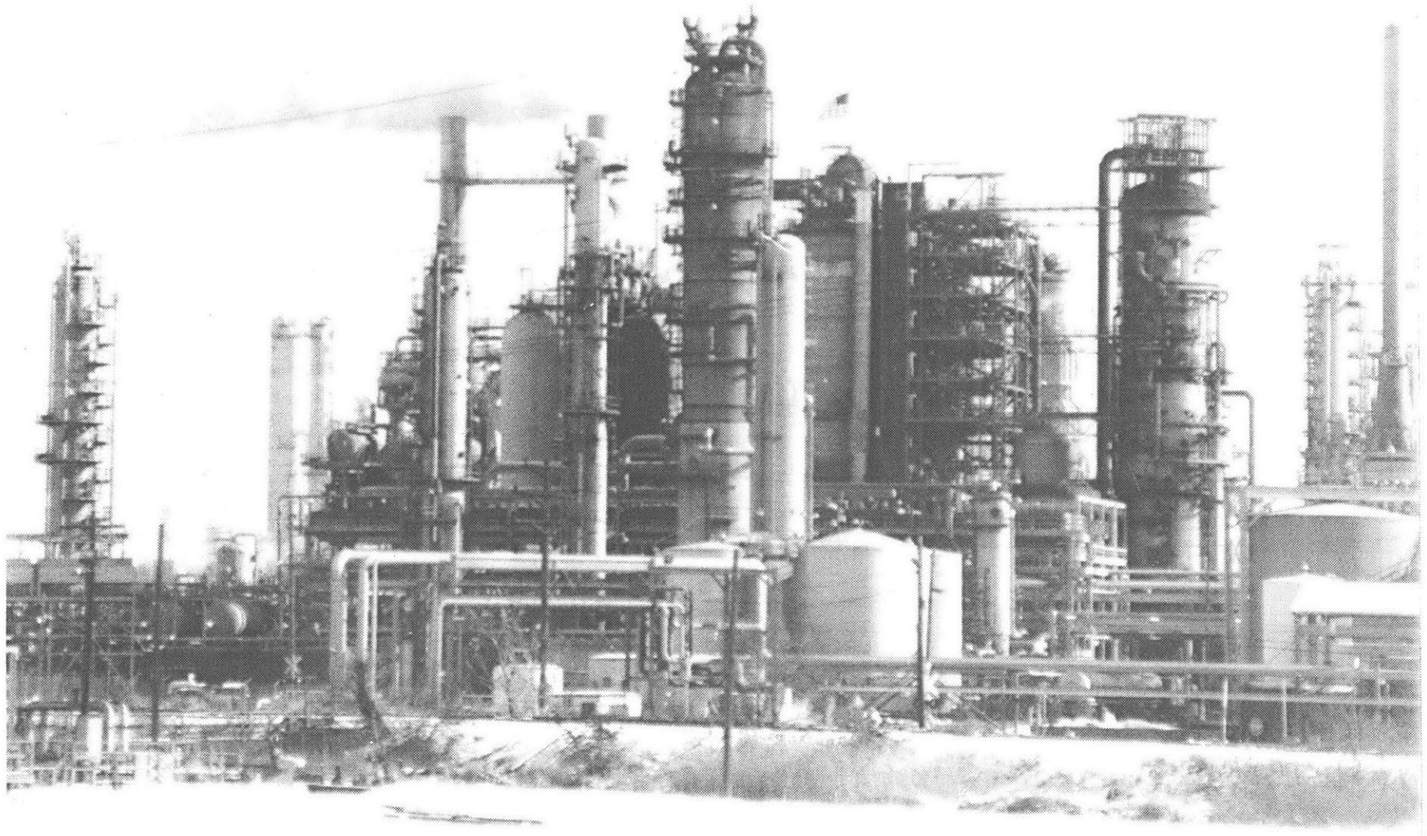


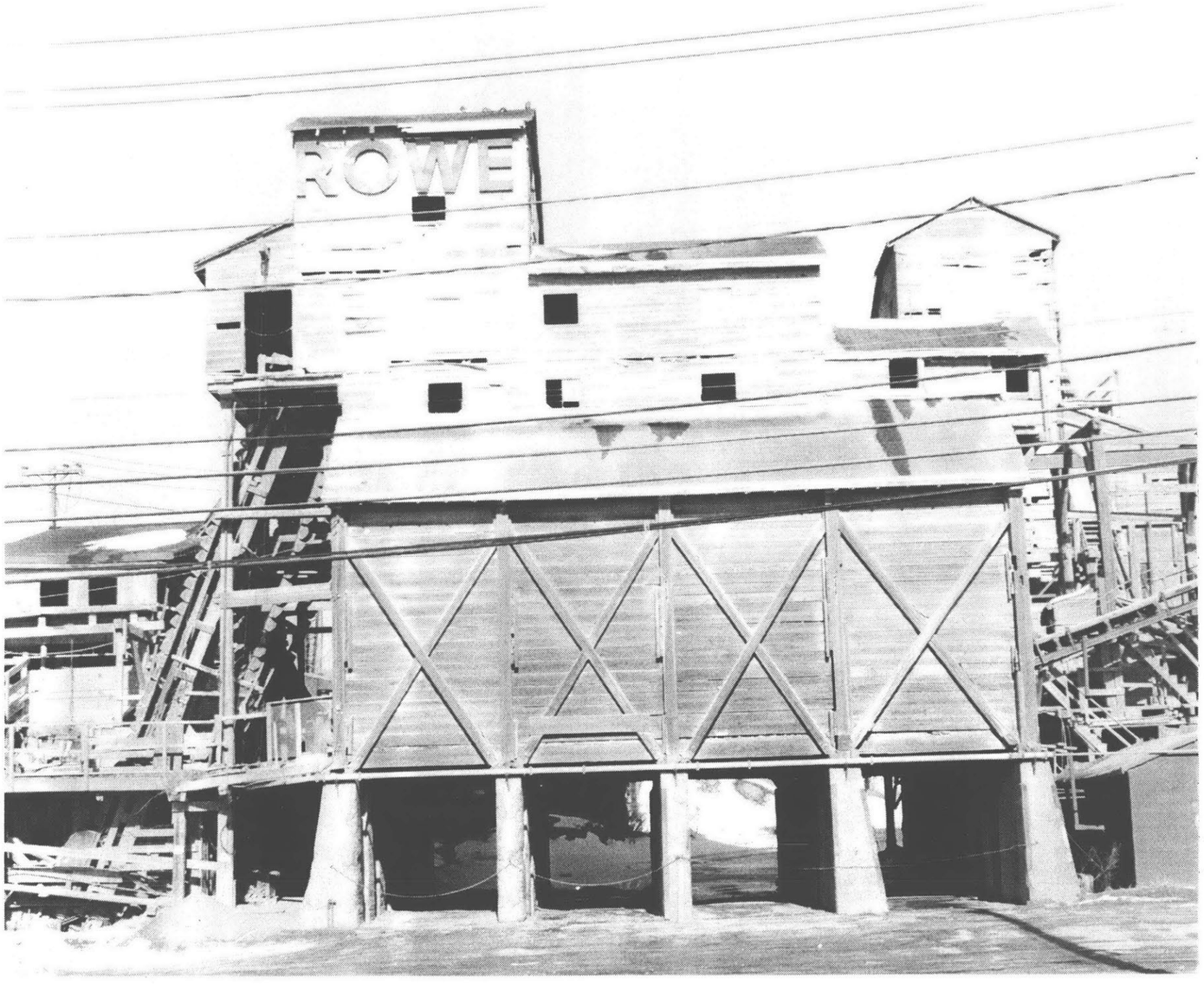
The Exxon refinery at Linden

PREFACE:

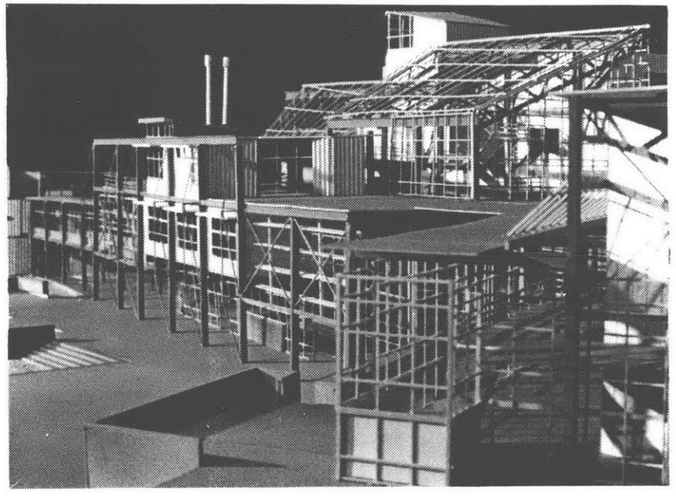
As you drive down the Garden State Parkway in New Jersey on your way to the Newark Airport, The Exxon oil refinery at Linden appears on the horizon, rising out of a cloud of white smoke. Pipes, ducts, tanks, X bracing, frames, stair towers, gantries, refractories spiraling into the sky and unrecognizable components of every description fly about in apparent chaos. Since childhood I have been awed and fascinated by this structure and the thousands of others like it, the blast furnaces, oil refineries, gravel crushers, cement plants, etc., which pervade the American landscape. In this thesis, I will explore what it is that I find so fascinating about these industrial structures and how this could influence my own architectural design.

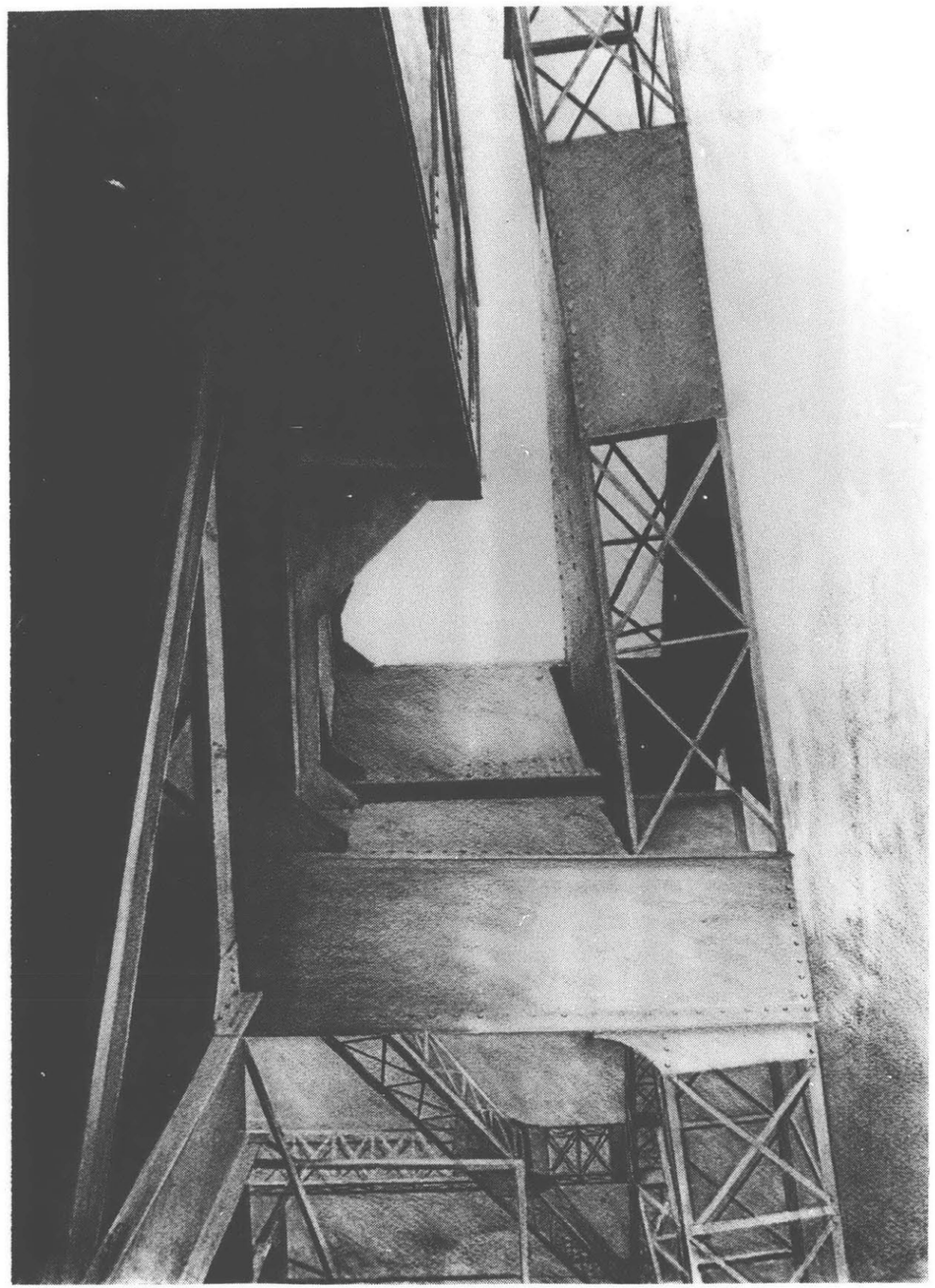
Industrial structures are not architecture. They do not accommodate human habitation. Nor do they intentionally communicate anything about shared cultural aspirations and values. They are architectural scale machines designed solely to perform a particular manufacturing process. It would be inappropriate if not impossible to employ their forms literally in architecture.

This thesis will explore the intrinsic qualities of these structures without concern for any associative meaning relating to a machine aesthetic or heroic industrial period. Here my fascination with these structures is not so much what they are but more how they appear. They exemplify certain formal and organizational characteristics which could be transformed and applied to architecture free of literal association. These characteristics could be incorporated without creating a building which is reminiscent of a blast furnace.



There will be three parts to this thesis. The first will describe four characteristics of industrial structures which might be beneficial to architecture. These are a complex assemblage of autonomous components, a combination of discrete and slack spaces, transparency and spatial overlap, and tectonic clarity. The second part will discuss how these characteristics might be incorporated into architecture by following a functional design methodology. The third part will present an illustrative design. This will be for a Community Center on the West campus of the abandoned Boston State Hospital site in Jamaica Plain, a suburb of Boston.





I: THE MAGNIFICENT FIRST FRUITS OF THE NEW AGE

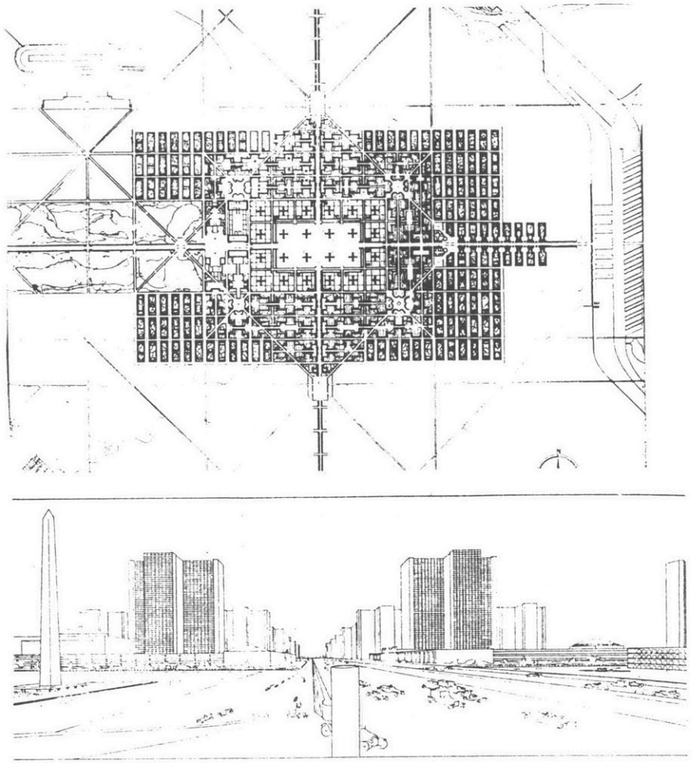
Our eyes are constructed to enable us to see forms in light.

Primary forms are beautiful forms because they can be clearly appreciated.

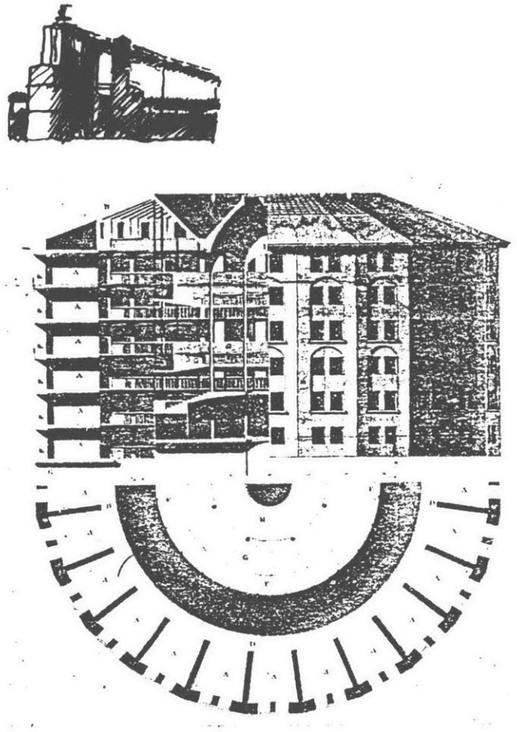
Architects to-day no longer achieve these simple forms.

Working by calculation, engineers employ geometrical forms, satisfying our eyes by their geometry and our understanding by their mathematics; their work is on the direct line of good art.

Le Corbusier



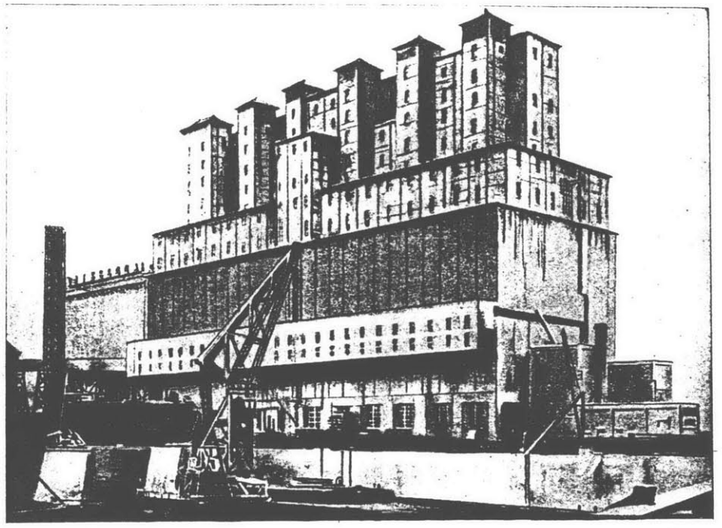
A City for three million inhabitants
a built utopia proposed by Le Corbusier

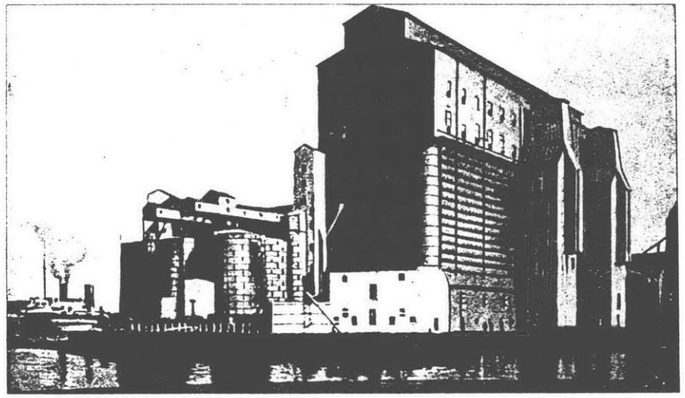


Bentham's Penopticon - a prison configured so that every inmate is under the observation of the guard in the central tower.
"A way of obtaining power, power of mind over mind in a quantity hithero without example."
Jeramy Bentham

In the 1920's, Le Corbusier and some of his contemporaries referred to industrial structures, American grain silos in particular, as a symbol of their Positivist influenced world view. Demetri Porphyrios states "Positivism was thus instrumental in shaping the ideological problematic of Modernism through two equally influential platforms: The scientism of the design process and the socio-economic messianism it promised.[1] They viewed architecture as a science moreso than as an art. As such, architecture would be concerned with rationally technical and functional criteria rather then aesthetic or stylistic considerations. Positivism also asserted that through rational application of scientific principles, both nature and human behavior could ultimately be understood and controlled. This led to fascination with technology and a belief that scientific and industrial progress would eventually lead to a techno-utopia, a totally good society free of all inequality, injustice, social ills, etc..

In the 1850's Jeramy Bentham developed his Penopticon prison plan. This plan was significant in that it viewed architecture as a tool one could use to control human behavior (for their own good or otherwise). Many of the early modern architects, following Jeramy Bentham's lead, assumed that the creation of a rational and rigidly ordered built environment could control people and induce them to lead rational, ordered lives . Everyone would eventually lead a perfect life, in a perfect world - thanks to science and technology.





AMERICAN GRAIN STORES AND ELEVATORS

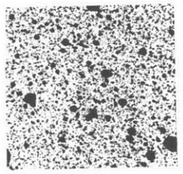
An illustration from Towards A New Architecture

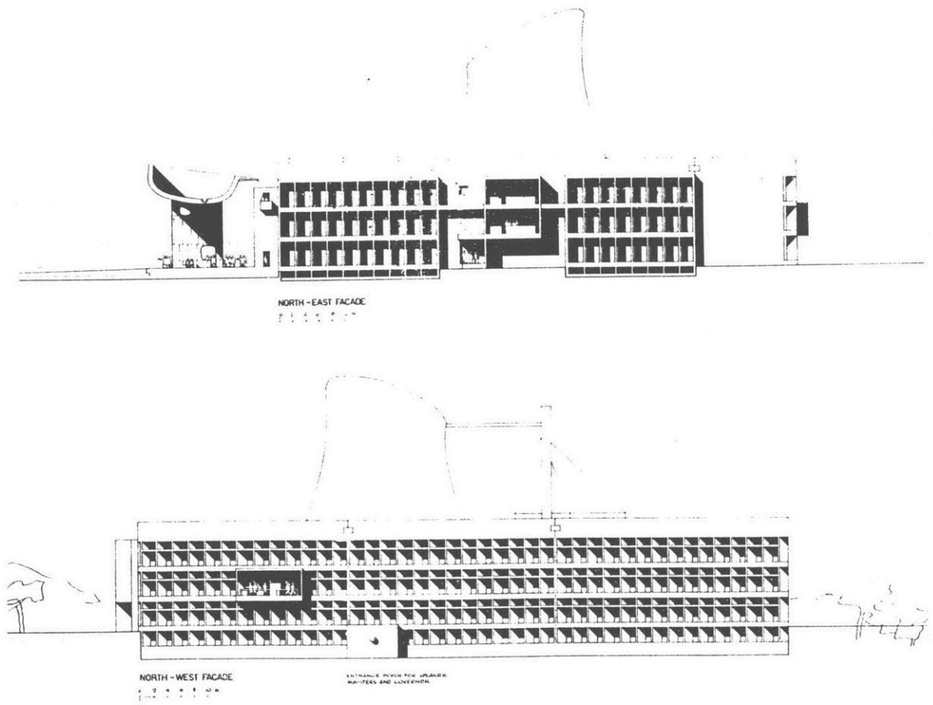
However, this envisioned Utopia was to be a closed and rigid society. "Utopia," claims Colin Rowe, "because it implies a planned and hermetically sealed society, leads to suppression of diversity, intolerance, often to stasis presenting itself as change and ultimately to violence."[2] In such a world someone would have to determine just exactly what was good then impose this goodness on others. Positivism assumed that science would eventually uncover the ultimate goodness of the universe and everyone would accept it as unequivocally true.

Le Corbusier and his contemporaries strove to express this faith in rationalism and anticipation of a future techno-utopia in their architecture. In his seminal book Towards A New Architecture. Le Corbusier claimed that in American grain silos, functional criteria lead to the use of pure Phileban geometric forms, in this case cylinders. To him, these rationally derived forms were superior to composite or complex forms. He states:

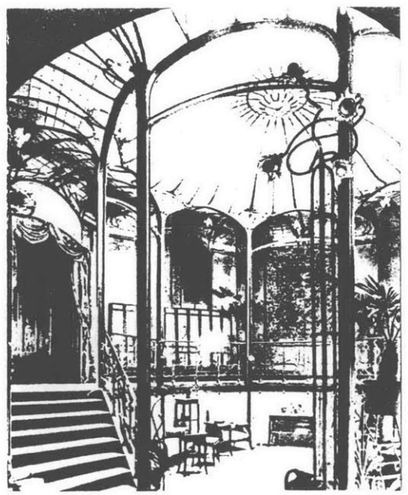
> "Not in pursuit of an architectural idea, but simply guided by the results of calculation (derived from the principles which govern our universe) and the conception of a LIVING ORGANISM, the ENGINEERS of today make use of the primary elements and, by co-ordinating them in accordance with the rules, provoke in us architectural emotions and thus make the work of man ring in unison with universal order.
>
> "Thus we have the American grain elevators and factories, the magnificent FIRST FRUITS of the new age."[3]

For Le Corbusier, it was these pure, simple geometric forms "brought together in the light" which he abstracted and incorporated into his own work in order to express his positivist faith in rationalism. Of course, he transformed these forms into his own work as an "architectural idea." He did not





The Palace of Assembly, Chandigarh, India
by Le Corbusier

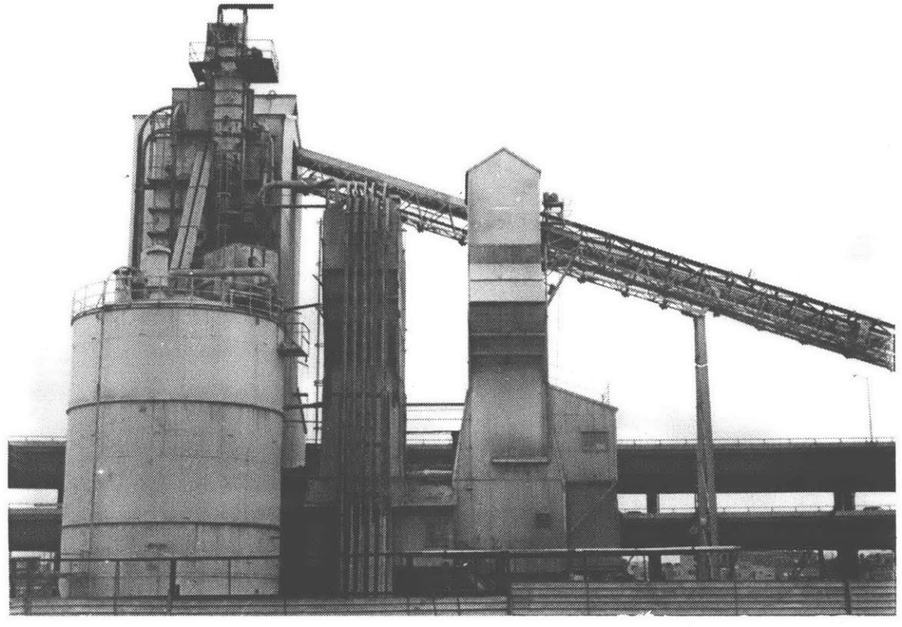


Hotel Van Eetvelde by Victor Horta 1895

employ the "calculations derived from principles which govern our universe" which he claimed were so important. He derived his architectural vocabulary in part from observing these forms. Yet one would not look at one of his buildings and say " ah, a grain silo".

The world has changed considerably in the sixty years since Towards a New Architecture. The heroic machine age of Le Corbusier and his contemporaries has given way to what has been labeled the Post Industrial or Information age. Today, Positivism is rather out of vogue. The once aspired for Techno - utopia has lost a lot of its appeal.

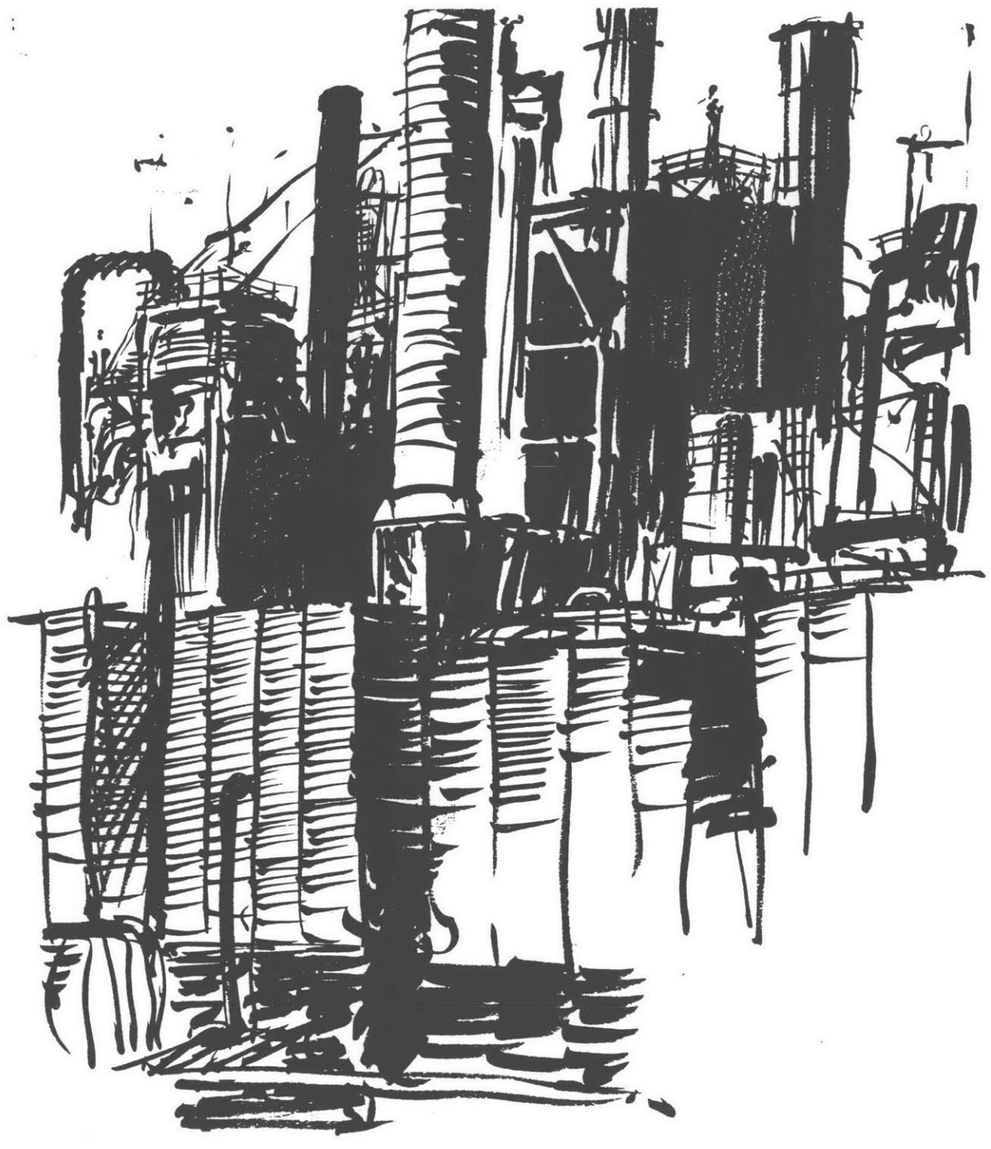
Colin Rowe defines two conflicting world views: the authoritarian and idealistic search for perfection of Utopianism (the sacrifice of the individual for the benefit of all) versus romantic individualism's laissez faire acceptance of imperfection and idiosyncrasy for the sake of freedom (the sacrifice of all for the benefit of the individual).[4] Each view derives its meaning in relation to the other. Both are necessary to some degree. Yet society oscillates back and forth in its appreciation of and desire for the two extremes. The arts of early modern era including architecture were reacting against the perceived licentious excesses of the Nineteenth century romantics such as Art Nouveau artists like Hector Guimard.



For at least the past twenty years, western society in general and architecture in particular have been reacting against the overly authoritarian, alienating and dehumanizing aspects of modern "post-industrial" life. I believe contemporary architecture is struggling to move beyond this Positivistic utopian vision and create an environment more user-friendly and accommodating of idiosyncrasy and diversity. I aspire to create buildings which are more environmentally sensitive and humane, buildings which would promote an open society based on individual freedom and self-determinacy rather than the rigid, homogeneous social order envisioned by Le Corbusier and his contemporaries.

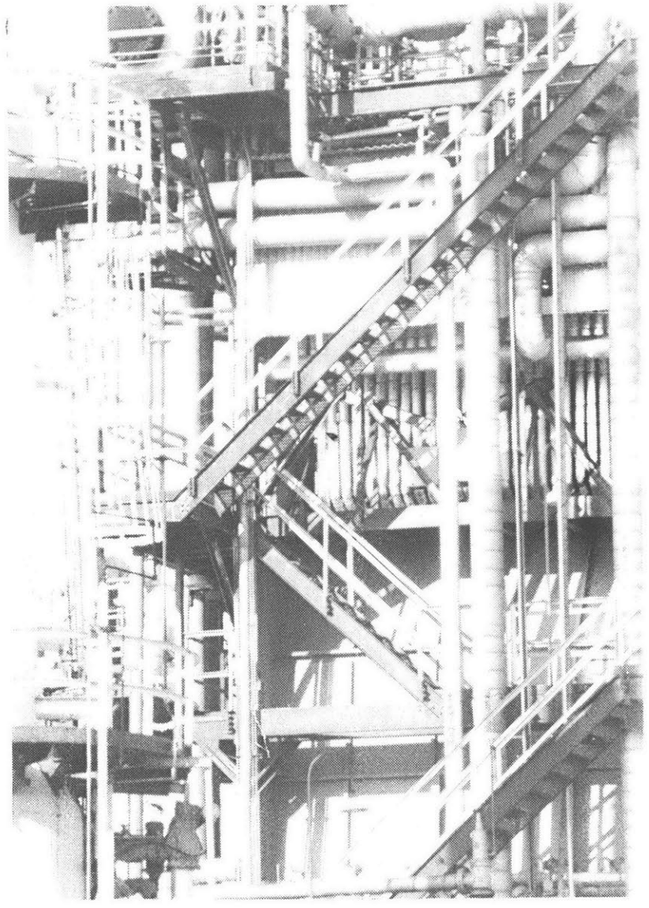
So times change. Like Le Corbusier before me, I am fascinated by industrial structures, but from a quite different perspective and with different objectives. Where he admired them for their purity of form and rational simplicity, I am fascinated by their diversity, open informality and articulation.

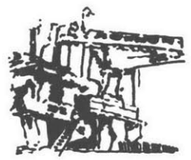
Part of my fascination with these structures is due to their ability to suggest a possible diverse, open and informal architecture. They aren't architecture. But they could be. One can imagine inhabiting them. Ever since childhood, I've fantasized about climbing around on them, exploring, even camping out on the platforms. Why is this? How could the same qualities be achieved in architecture? What specifically is so fascinating about these structures?



II: FOUR OBSERVED CHARACTERISTICS

"Technology is far more then a method,
it is a world in itself.
as a method it is superior in almost every respect.
But only where it is left to itself as in
gigantic structures of engineering, there
technology reveals its true nature.
There it is evident that it is not only a useful
means, that it is something, something in itself,
something that has a meaning and a powerful form
so powerful in fact, that it is not easy to name it."
Mies Van Der Rohe





The serial repetition of identical elements

This thesis began with the assumption that an exploration into what specific characteristics I find so fascinating about these structures could help me develop my own architectural vocabulary. I had a relativly concise understanding of the type of architecture I aspired to achieve and a vague notion that the formal realization of this architecture was somehow suggested by industrial structures. In the course of this thesis, I have done a good deal of research into modern architectural theory. I have also observed and documented several industrial structures both in New England and New Jersey. This research has pinpointed several characteristics which are desirable in architecture and which are readily discernable in many industrial structures. This chapter will introduce four such characteristics and explain why they are deemed applicable to architecture.

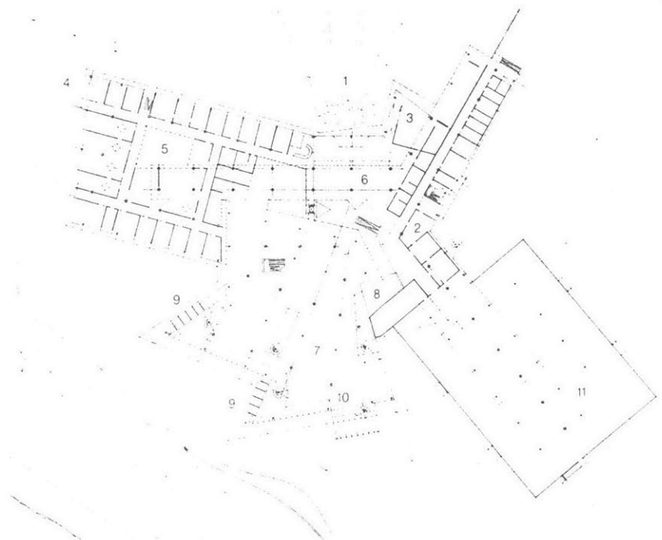
I. A COMPLEX ASSEMBLAGE OF AUTONOMOUS COMPONENTS

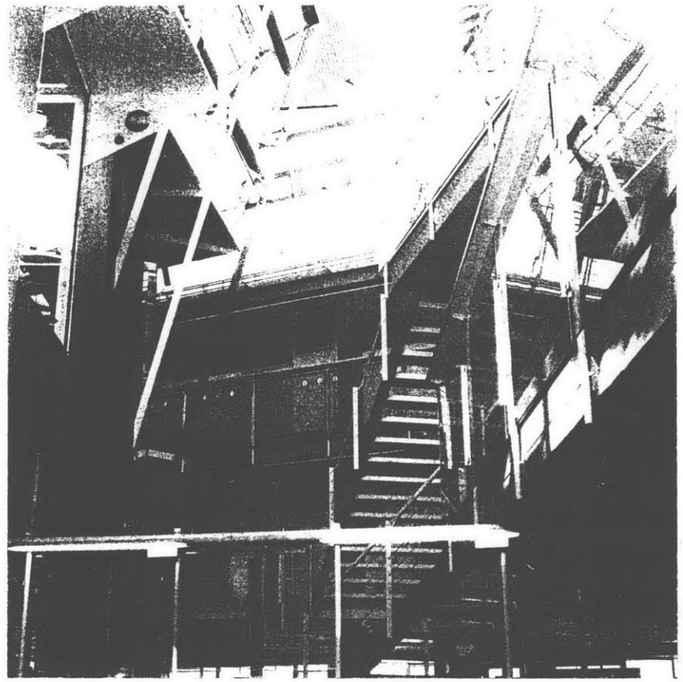
The diverse pipes, open steel frameworks, stair towers, platforms, gantries, etc of a typical industrial structure give it a sense of frenetic complexity. The individual components move about freely without any apparent overall order.

Demetri Porphyrios defines two ways of ordering the world, Homotopia and its antithesis, Heterotopia.[5] Homotopia, what Porphyrios labels "the kingdom of sameness" strives for homogeneity. It favors continuity, familiarity and recurrence. The International style architects aspired to this homotopic approach. They used this homogeneous design aesthetic metaphorically to connote and promote the social homogeneity prerequisite of their utopian vision. Thus the banal, serial

"Architecture should not represent solely the views of the powerful. On the contrary, we we must stand up to the powerful and thus secure spaces for the weaker forces. If we succeed in this we can be free and we can liberate others, Then we can observe, and give a more architectural form to free development. But the expression of hegemony in architectural form, the domination of people over people, and - what is actually even more humiliating - the expression of domination, of the power of the apparatusses over us - that is an insult."

Gunter Behnisch





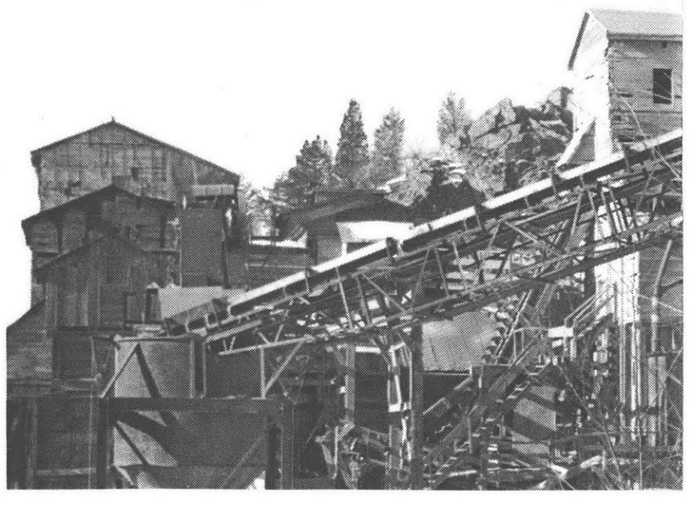
Library of the Catholic University, Eichstatt.
by Gunter Behnisch, 1987.

repetition of identical elements on a typical international style high-rise building, for example, is generated as a symbol of this social agenda as much as it is a necessary outcome of an industrialized production process.

The opposite approach, heterotopia, Porphyrios defines as "that particular sense of order in which fragments of a number of possible coherences glitter separately without a unifying common law. That order which western rationalism distrusts and has derogatorily labelled disorder."[6] This heterotopic view can accommodate idiosyncrasy and complexity. It does not try to impose an overall order. Individual elements can maintain their autonomy.

I believe that complex, heterotopic architecture is desirable for two reasons. First, it allows a perceptually rich experience of the environment. One observes the disparate components and naturally tries to discern some order to them. The observer becomes engaged in the process of discovery, at each step uncovering some new component or association. This process allows him or her to interact with the environment rather than remaining a passive observer.

An intentionally diverse architecture can have metaphorical implications as well. It is possible to use formal diversity to both connote and facilitate a more open social structure. Gunter Behnisch, for example, creates incredibly rich and diverse buildings as a social metaphor. To him, the autonomy of individual architectural elements symbolizes an open society based on self fulfillment and individual freedom.

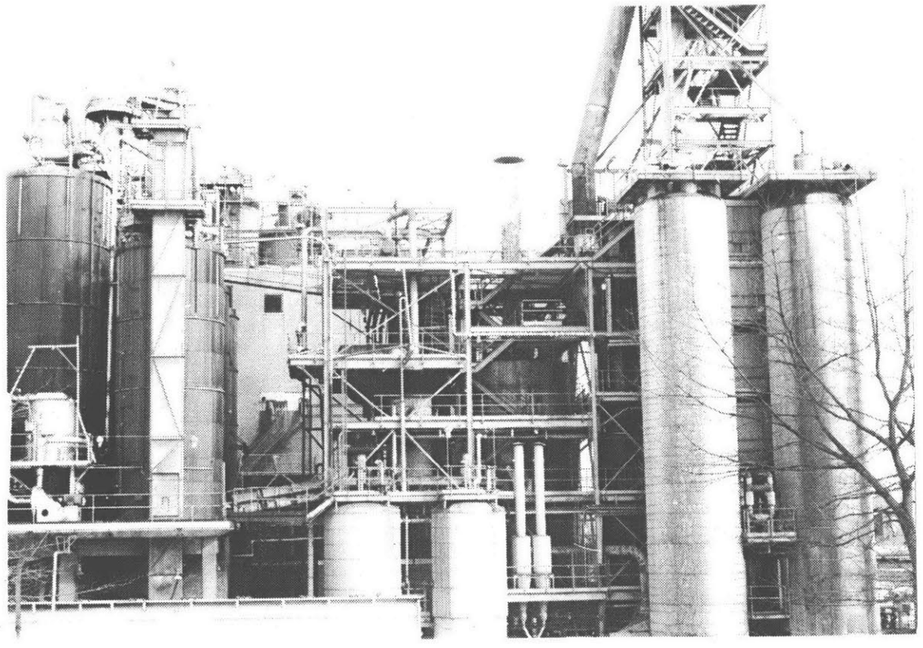


He states:

"Everyone is made aware from both inside and outside of the building of the diversity of individuals, groups, situations and relationships. Everyone can find himself and his fellows in what is indeed a very large complex. The building provides an image of society in which the individual is respected and able to assume personal responsibility, a society that forms a community by means of thoughtfulness and high standards,...without resorting to constrictions. ... It was thus that a freeform architecture was created, in which each thing stands for itself and for its place within the whole."[7]

Behnisch discusses how diversity implies unity. He aspires to a democratic free society but not total anarchy. His buildings are not at all chaotic. There is a clear overall order. Yet the individual components maintain their autonomy within this order.

Many industrial structures exemplify a heterotopic organization. They achieve such diversity because they are organized hierarchically from small scale to large rather then vice versa. Every component is configured and placed more or less independently according to its own functional criteria. Then the diverse components are assembled and supported within a loose overall organization or framework. The autonomy and efficiency of the individual components take precedence. They are not forced within a rigid overall organization. Thus, a typical industrial structure is a complex and informal assemblage of relatively autonomous components.



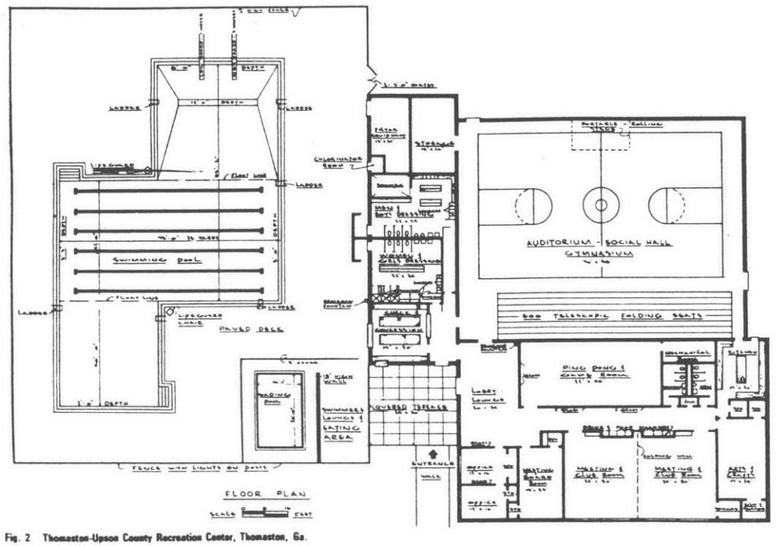


Fig. 2 Thomaston-Upson County Recreation Center, Thomaston, Ga.

Community center plan from
Time Saving Standards for Architects

II. A COMBINATION OF DISCRETE AND RESIDUAL SPACES

A typical industrial structure contains a number of discrete, clearly defined component volumes and spaces contained within an open framework. Each of these components is configured and placed according to its own functional criteria. Yet their displacement also defines spaces between them. These between spaces are residual, loosely defined and often without any specific purpose.

I feel this assemblage of discrete autonomous spaces with loosely defined slack space in between them is applicable to the design of buildings for two reasons. First, at a technical level, the displacement of the discrete spaces allows for their freedom of configuration and adaptability. The shape of one discrete and functionally specific space is not influenced by the requirements of the adjoining space. This allows each to be configured according to its own functional criteria. It also allows for future adaptability. If ten years after construction one component space becomes obsolete it can simply be unbolted and replaced without disrupting the adjoining components.

Also, on a more experiential level, the slack spaces between descrete components can promote self-determinacy by allowing for use options and freedom of choice. Many conventional buildings consist entirely of discrete and use-specific spaces. There is rarely any residual or slack space. For example, In the guidelines for a community center from Time Saving Standards for Architects, the various rooms are tightly packed together. Each room is intended to accommodate a specific activity. The various rooms are connected by a hallway just wide enough to allow circulation. Nothing is left over or slack. There is no place

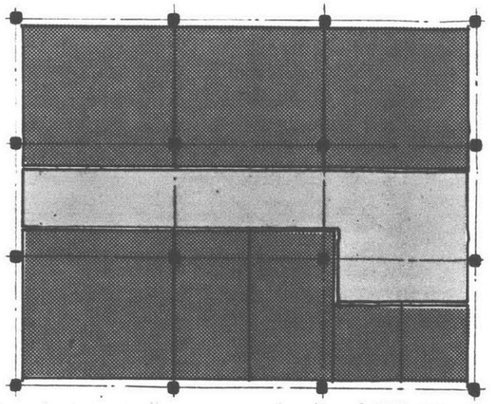


Diagram - spaces tightly packed into structural grid

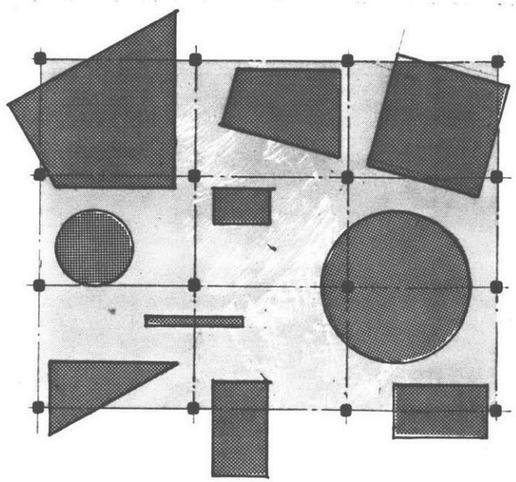
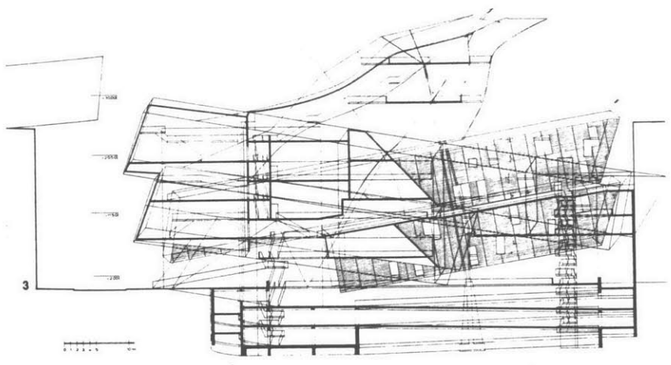
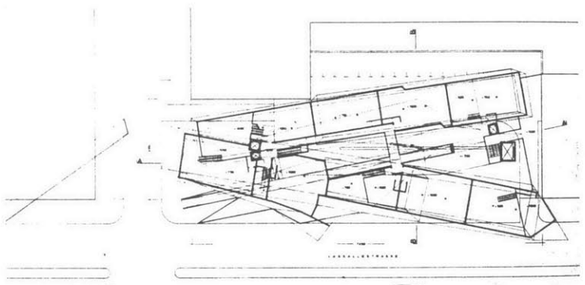


Diagram - desc?ete autonomous spaces loosly contained within a structural grid - defining slack space inbetween.





House for habitation, Vienna by Coop Himmelblau

"All architecture is political. all action, everything, unless you are blind. Even the pretence that architecture is not political, is itself a political act. spaces are complex, undefined, ambiguoys, because life is complex ambiguous. There are no sure rules, and no knowable truths. Everybody is right but everything is wrong."

Co-op Himmelblau

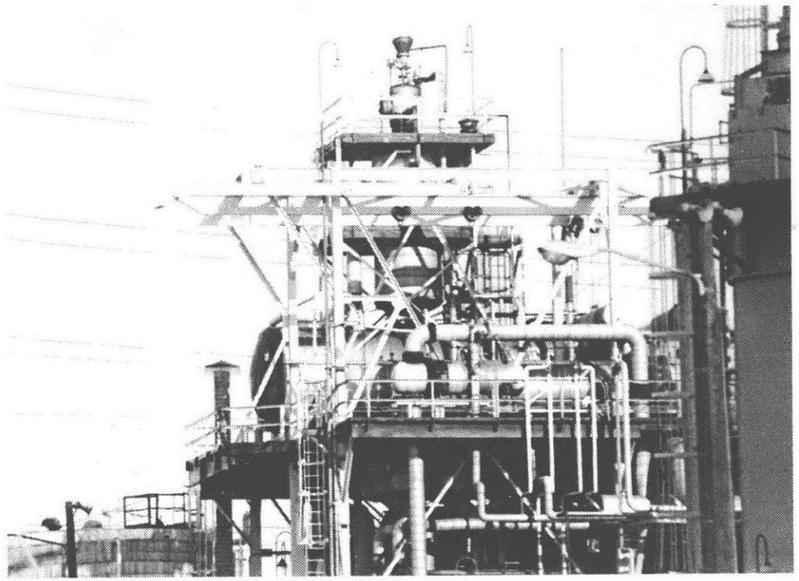
where someone would feel comfortable just hanging around, mingling or reading a newspaper.

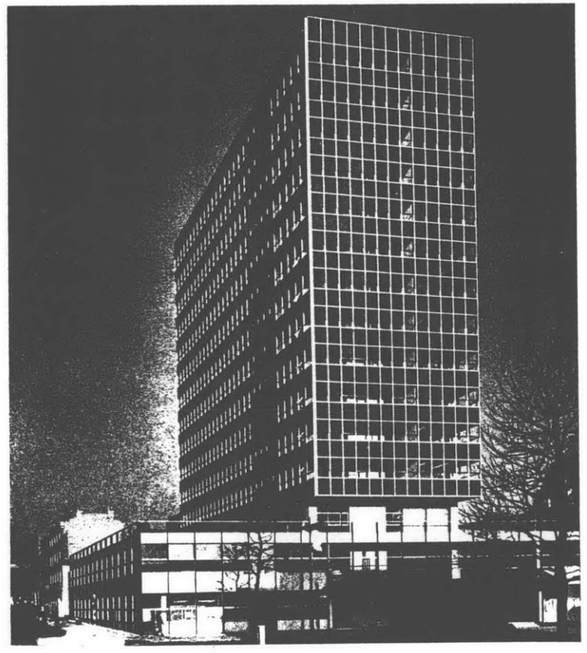
Such a building represents a literal and economically minimal interpretation of the program. The absence of free space, by restricting user freedom and use options, has the perhaps unintentional effect of controlling people, dictating the way they should behave by not allowing them a choice.

Some contemporary European architects, Coop Himmelblau for example, go to the opposite extreme. They intentionally try to avoid any discrete, specific spaces. They try to leave every thing open, obscure and fluid. Frank Werner in the forward to the book of Coop Himmelblau's collected works states:

> "It would be Ideal to build architecture without objectives and then release it for free use. There are no longer any enclosed spaces in these buildings. They interlace and open up. ... Division and expansion depend on the choice of the occupant."[8]

I feel this approach goes a bit too far. A totally open building such as a community center, without any use specific spaces would be disorienting and not particularly useful. Such activities as theater and basketball do require certain spatial configurations. In architecture as in social structure, either extreme, total control or total chaos would be inappropriate. Industrial structures exemplify the ideal where discrete, functionally specific spaces are displaced in such a way as to allow slack space in between. Applied to architecture, the discrete spaces would accommodate those activities which have specific spatial requirements. The slack space would accommodate circulation and more casual activities.





Building as a solid box

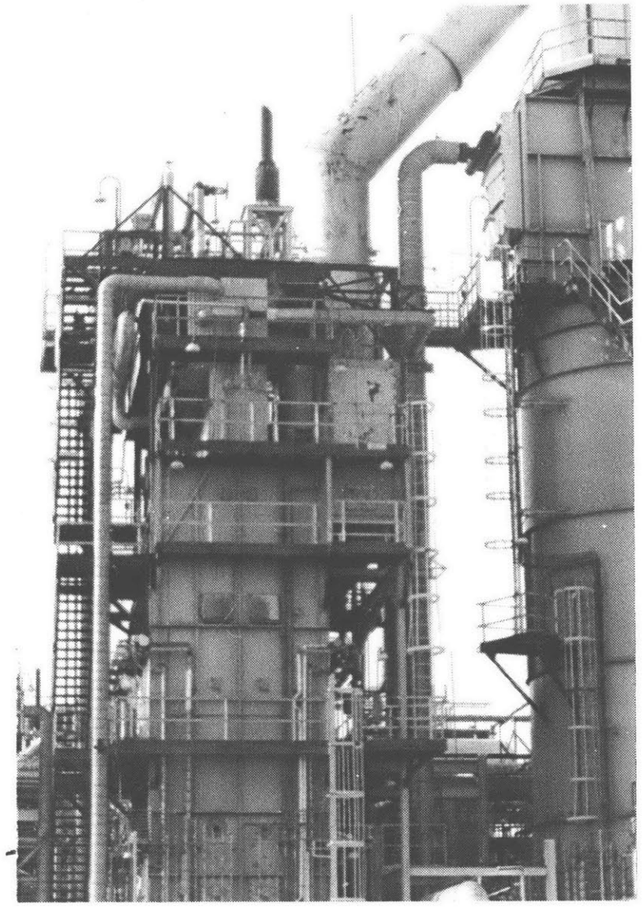
III. TRANSPARENCY AND PENETRABILITY.

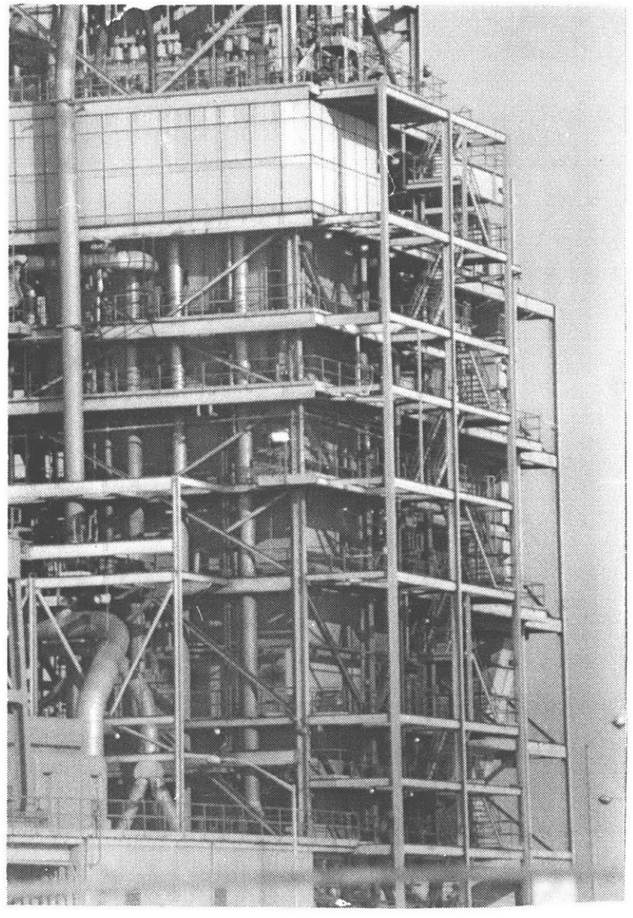
Industrial structures such as oil refineries are seldom enclosed in an exterior skin. Their frames and components are left exposed to the weather and our observation. We can see into and even through such structures. The open framework acts as a screen, articulating and defining space yet remaining transparent. This transparency gives the structure a sense of depth and blurs the edge between inside and outside, between one space and the next. It allows for interaction and reciprocity between the two.

Many buildings, on the other hand, are enclosed by solid two- dimensional walls, occasionally punched through for fenestration. These buildings present clear-cut, hard barriers between inside and outside. The two realms are mutually exclusive. There is no reciprocity. As such they seem to say "private property, keep out".

I believe the blurring of edges and a gradual transition between inside and out as exemplified by industrial structures can be desirable in architecture, particularly for a public institution such as a community center. This gradual transition allows the building to be perceptually more accessible, hence more public. There is an uninterrupted spatial continuity between inside and out. The building can be understood as a series of spaces one can move through rather than a isolated and solid sculptural object. Henry Plummer in his article Realm of the Landing states;

> "For Architecture to become a dwelling place in the world, rather than an alienated object... its configurations must become engaged in two sided dialogues rather than one sided containments. Instead of merely enclosing and shaping the shape within, as an outer shell or envelope, walls and roof





must be formed to exploit their capacity as interfaces shared by and therefore defining the interaction between adjoining spaces. "[9]

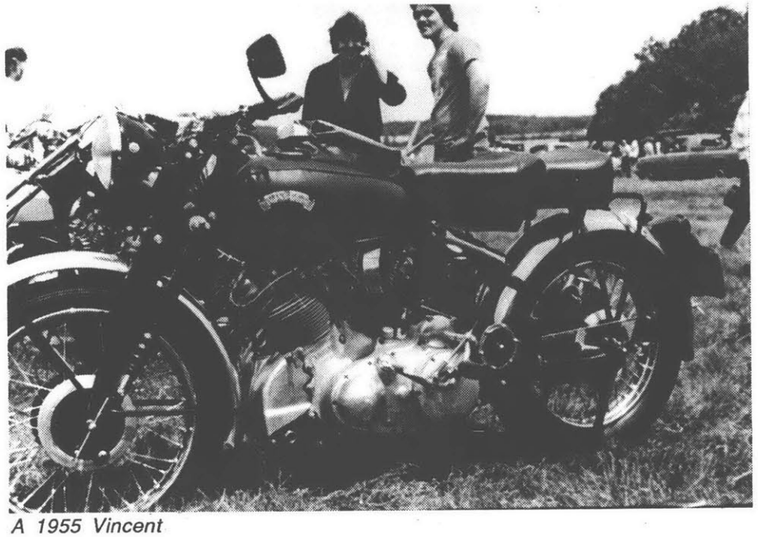
Thus the transparency achieved by the open framework of an industrial structure can be applied to architecture to create buildings which are more open and accessible.

IV. TECTONIC CLARITY OF CONSTRUCTION

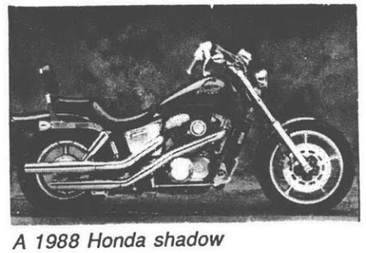
Every component of an industrial structure is designed to perform a particular task as efficiently and economically as possible. Nothing is applied gratuitously or arbitrarily. Due to this straight-forward utilitarian design, the structure tells the story of what it does and how it was built. There is no pretense, no misrepresentation. Observing the cross-bracing on a steel frame for example, one can understand what that bracing does. One can sense the weight, the tension in the frame.

Architecture is unavoidably narrative. Buildings can communicate on several different levels. In describing this narrative capacity, Robert Venturi makes the analogy of buildings being either a "Duck" or a "Decorated shed".[10] A duck says what it is. its inner-essence is an integral part of its meaning. The meaning does not rely on reference to outside sources or historical precedents. Decorated sheds on the other hand are billboards. The essence of the billboard is inconsequential to the meaning it conveys.

These two approaches can be illustrated by referring to another product, motorcycles. The 1955 Vincent Black Shadow is a duck. It stands on its own. Phil Vincent strove to create the ultimate,no expense spared gentleman's machine. Its forms speak of craftsmanship, of speed and machine power. The huge cylinder fins were designed to dissipate heat under racing



A 1955 Vincent



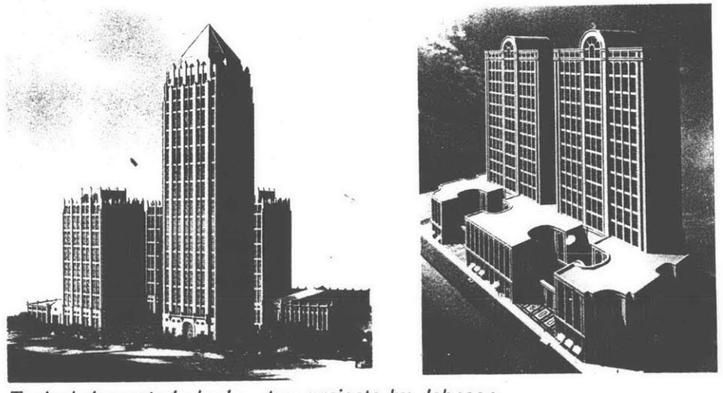
A 1988 Honda shadow

conditions. Their rough cast finish is an inevitable outcome of the crude sandcasting method of manufacture. The Vincent's design is not strictly utilitarian. But it is very much based on functional considerations and the intrinsic qualities of the machine. A 1987 Honda Shadow on the other hand is a Decorated Shed. Its form is associative. It is designed to look vaguely reminiscent of a Vincent. Today the Vincent is steeped in mystique. The Honda's designers have tried to capitalize on its image as a marketing device. The cylinder fins on the Shadow are just for show. The bike is actually water cooled. The inner essence of such a machine becomes irrelevant. One buys it to look tough rather than because it is a beautifull object in its own right.

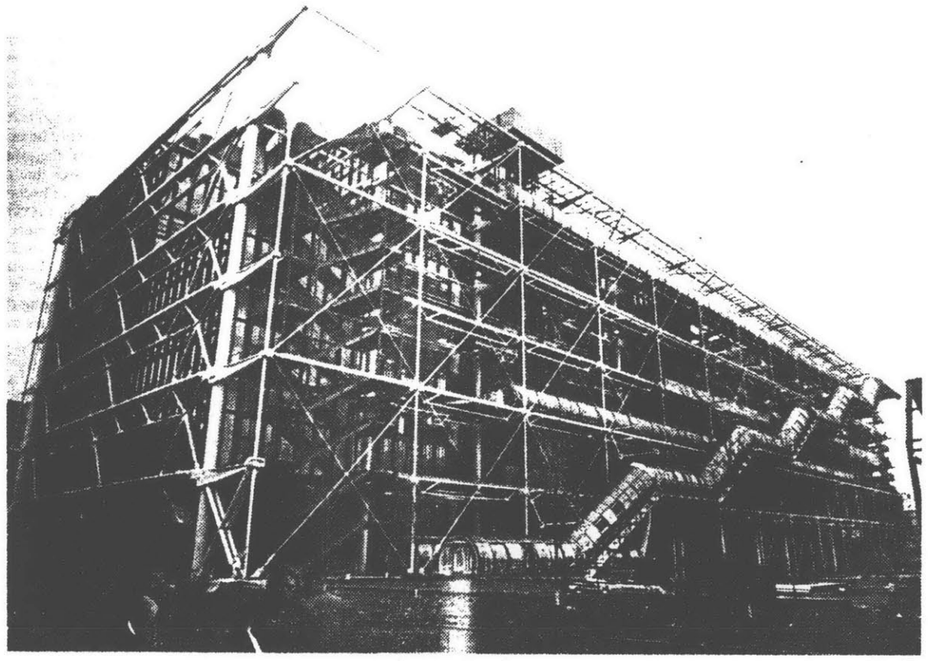
Rob Malden, in his thesis Tectonics in Architecture, discusses how " decorated sheds" are a phenomenon of the Information age. Today, meaning is increasingly equated to image rather than essence.[11] In architecture, the problem with this is that buildings become mere marketing commodities like the Honda. People become mere consumers. Decorated sheds create stage sets. A shoddily built assemblage of brutal and inhospitable spaces can hide behind a marble facade of Roman grandeur. I personally prefer the honesty and integrity of a duck to the artifice of a decorated shed. I'd rather see a building which says "this is what I am" than one which hides behind gratuitous symbolism; a thing rather than a sign.

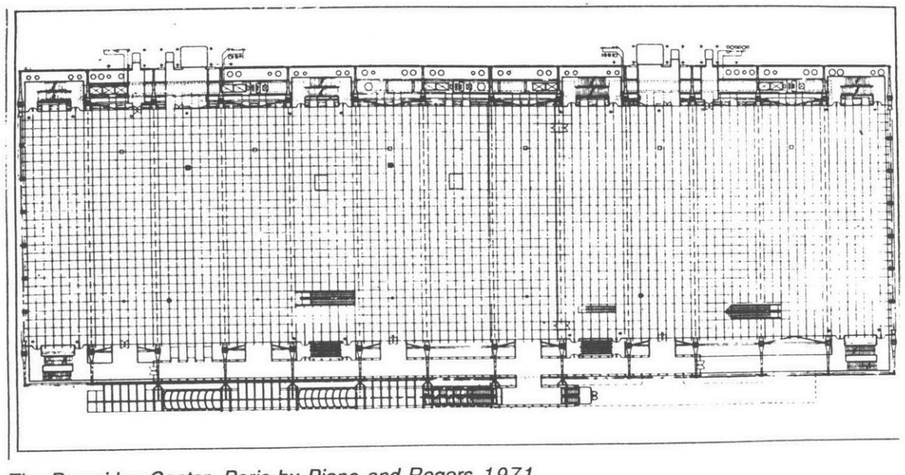
Returning to our own subject, industrial structures are unequivocally ducks. Image is not considered in their design. They do what they do. Any didactic capacity they might have is unintentional. Yet, perhaps it is because if this lack of intent that they can communicate so clearly and honestly what they are.

"It's a traditional look with historical references. . . . The historicism is there. . . . Now, after 50 years, we are getting that feeling of expression."
—Philip Johnson and John Burgee,
Atlanta Constitution, May 8, 1985



Typical decorated sheds - two projects by Johnson Burgee, one in Atlanta, Ga. the other in Boston, Ma.





The Pompidou Center, Paris by Piano and Rogers, 1971

Webster's dictionary defines Tectonics as "the science and art of construction, the activity that raises construction to an artform... a poetics of construction." One could claim that the utilitarian design of an industrial structure is not purely tectonic. Simply exposing the building elements is not enough. They must be expressed, their properties exaggerated. Utilitarian efficiency has to be sacrificed to some degree to accommodate this expressiveness. The question becomes how far can one sacrifice these utilitarian concerns for the sake of expressing them. There is a thin line between honest expression of construction and structural exaggeration simply for expression's sake. The Russian constructivist Iakov Chernikhov stated "the exaggeration and assertion of the construction constitutes an unnecessary parading and vulgarization of it."[12] Many modern buildings have employed inappropriate, gratuitous or even false structural heroics for aesthetic effect, to connote their techno-utopian ambitions. It could be argued that Piano and Rogers' Pompidou Center in Paris exemplifies such an exaggeration. A principal theme of the Pompidou Center was flexibility. The placement of services on the outside and the 140 foot clear floor span structure were all designed to maximize this perceived flexibility. This flexibility is clearly expressed. However, most of the activities inside do not actually require such large scale flexibility. Thus although the center is tectonic in that it shows off its components, it does so in a clearly exaggerated, expressive manner. The Pompidou Center sacrifices functional criteria in order to create the ultimate machine architecture. In a sense, the Pompidou center is a decorated shed posing as duck.

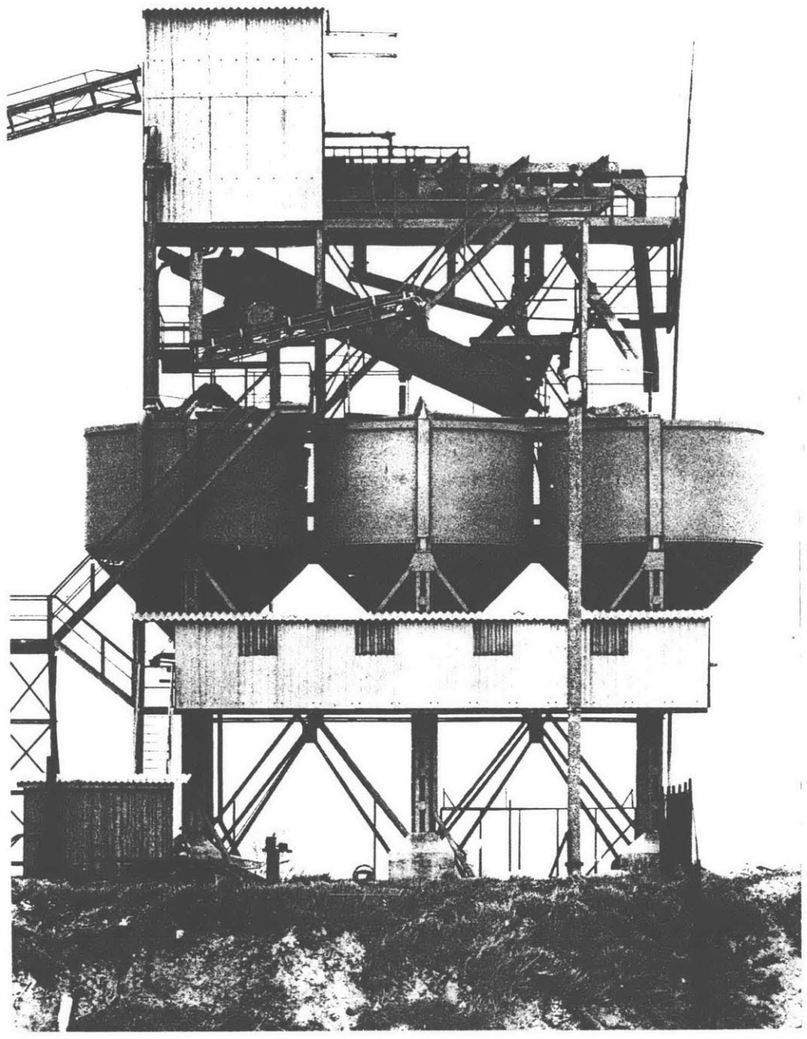
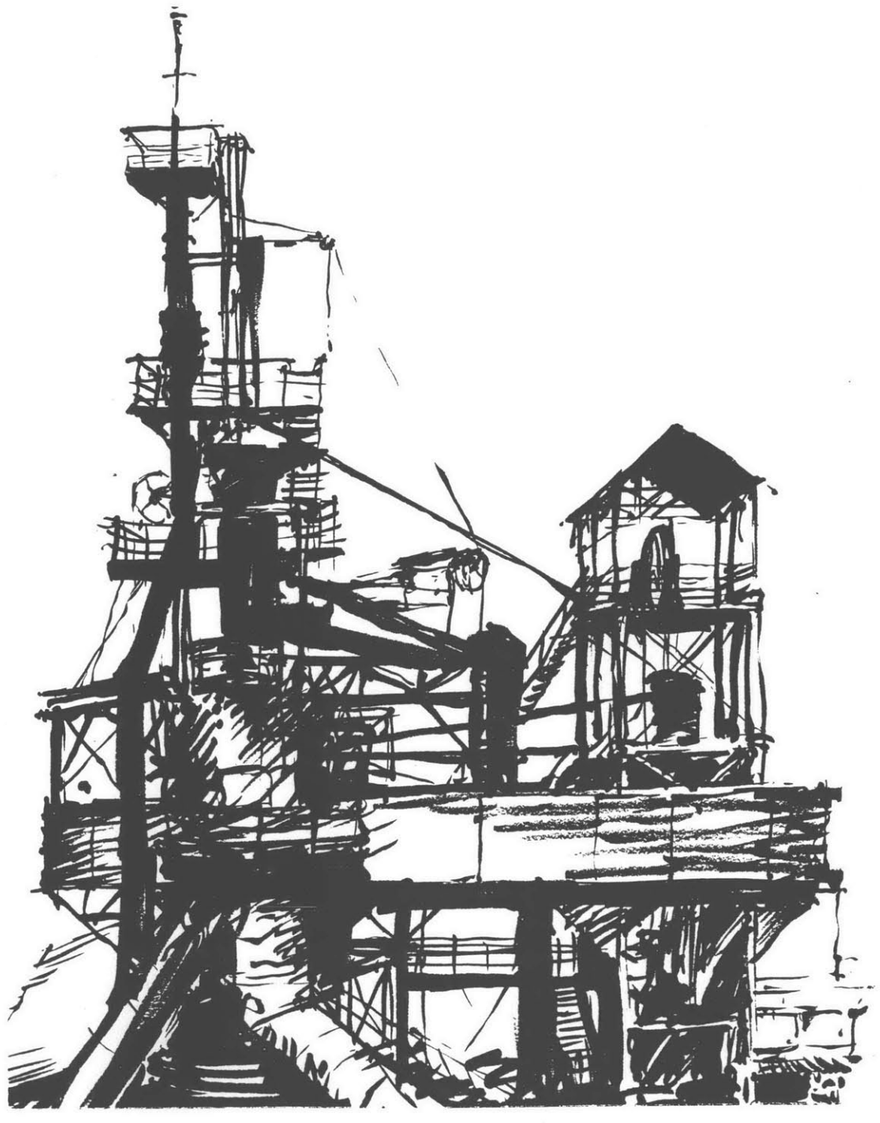


photo by Bernard Becher

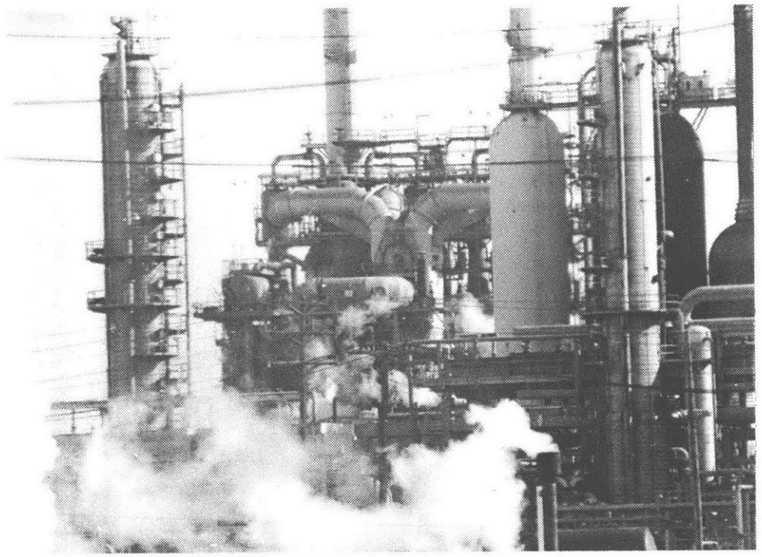
Industrial structures exemplify tectonics as the art of appropriate construction without exaggeration. Applied to architecture this would mean that building components appropriate for the particular application can be configured and exposed so as to express what they do. But every component would have some functional justification. Functional necessity sould not be exaggerated for expressive effect.

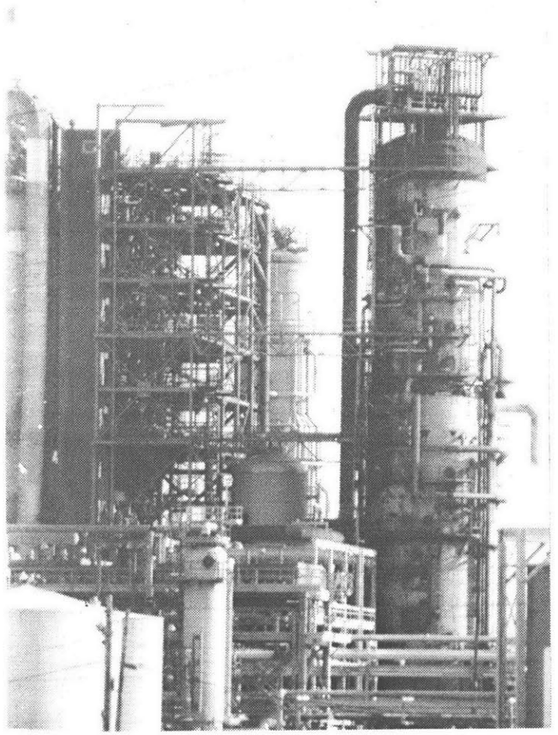
In summation , Industrial structures exemplify at least four characteristics which I feel are desirable in architecture. They are heterotopically ordered, complex assemblages of autonomous components. Discrete, clearly defined spaces within them are displaced so as to allow residual or slack space in between. The exposed steel framework creates a sense of transparency and obscures the edge between inside and out. The lack of artifice creates an honest and legible tectonic expression.



III: A UTILITARIAN FUNCTIONAL ORGANIZATION

"The constructive approach by no means denies art nor supplants it by technology and engineering, nor does it ignore aesthetic content as the means of artistic effect... It does not seek to solve particular aspects of a problem in isolation, but aims at the best utilization of all the possibilities, both the formal and compositional, and the technical and constructional, by linking them together in a creative process of synthesis." Iakov Chernkhov





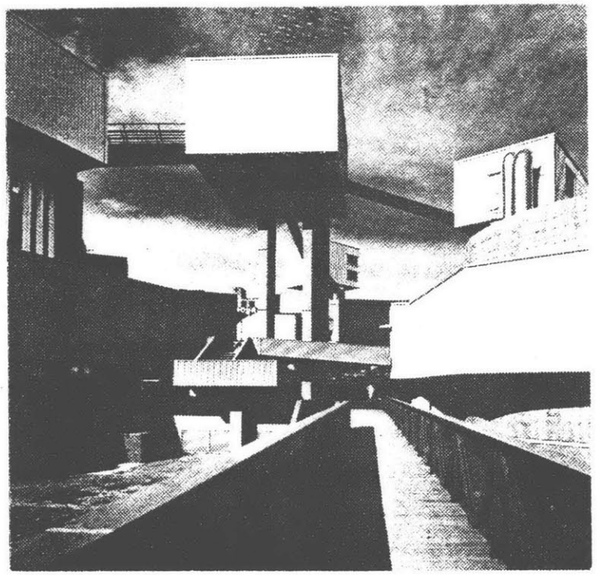
How can these four characteristics be incorporated into architectural design? I believe this cannot be achieved in a capricious manner. Ideally, these characteristics should evolve out of the design process rather than simply being applied superficially as an end in themselves.

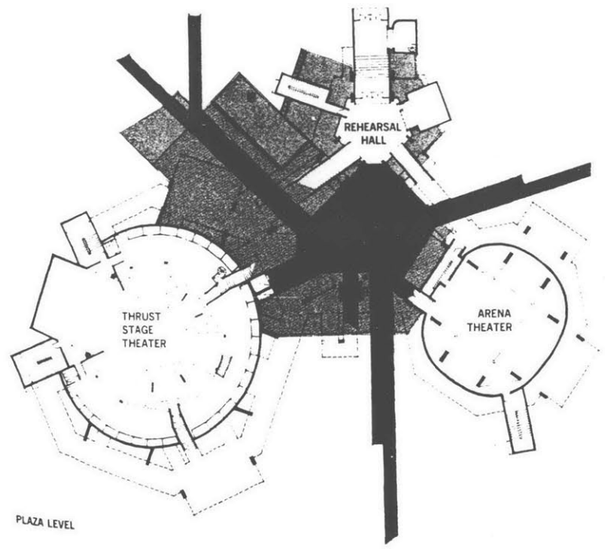
Although the Exxon refinery at Linden might appear quite chaotic and disorganized at first, it is in fact very tightly ordered. Nothing is configured or placed arbitrarily or gratuitously. An Industrial structure is organized according to strict functional, utilitarian and economical criteria. Appearance is more or less the inconsequential outcome of this functional organization. Here Mies Van Der Rohe's famous dictum " Form follows function" is to be taken literally.

One possible way of achieving the sort of complexity and diversity exemplified by industrial structures might be to design a building following the same utilitarian functional methodology with which they are designed. Its appearance would be an inconsequential outcome of this methodology. Of course this approach has been proposed before. In Towards a New Architecture, Le Corbusier stated " The House is a machine for living in". This notion of buildings as machines has remained a fundamental tenet of modern architecture.

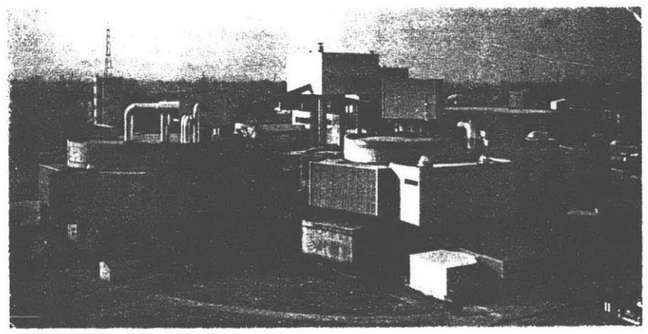
A particularly relevant example of such a functional architecture is John Johansen's Mummers Theater in Oklahoma City. Of this building, Johansen states:

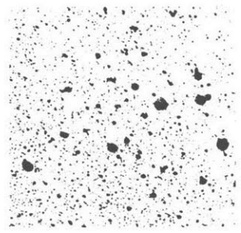
> "The design process is not one of composing but of rigging or assemblage. Each element, whether enclosed functional space, conveyor tube or structural member, goes about its work directly and independently. The way of dealing with functional elements is to position, prop and connect them. ... The relationship is organizational, not formal."





The Mummers Theater, Oklahoma City, Okla. by John Johansen, 1970.





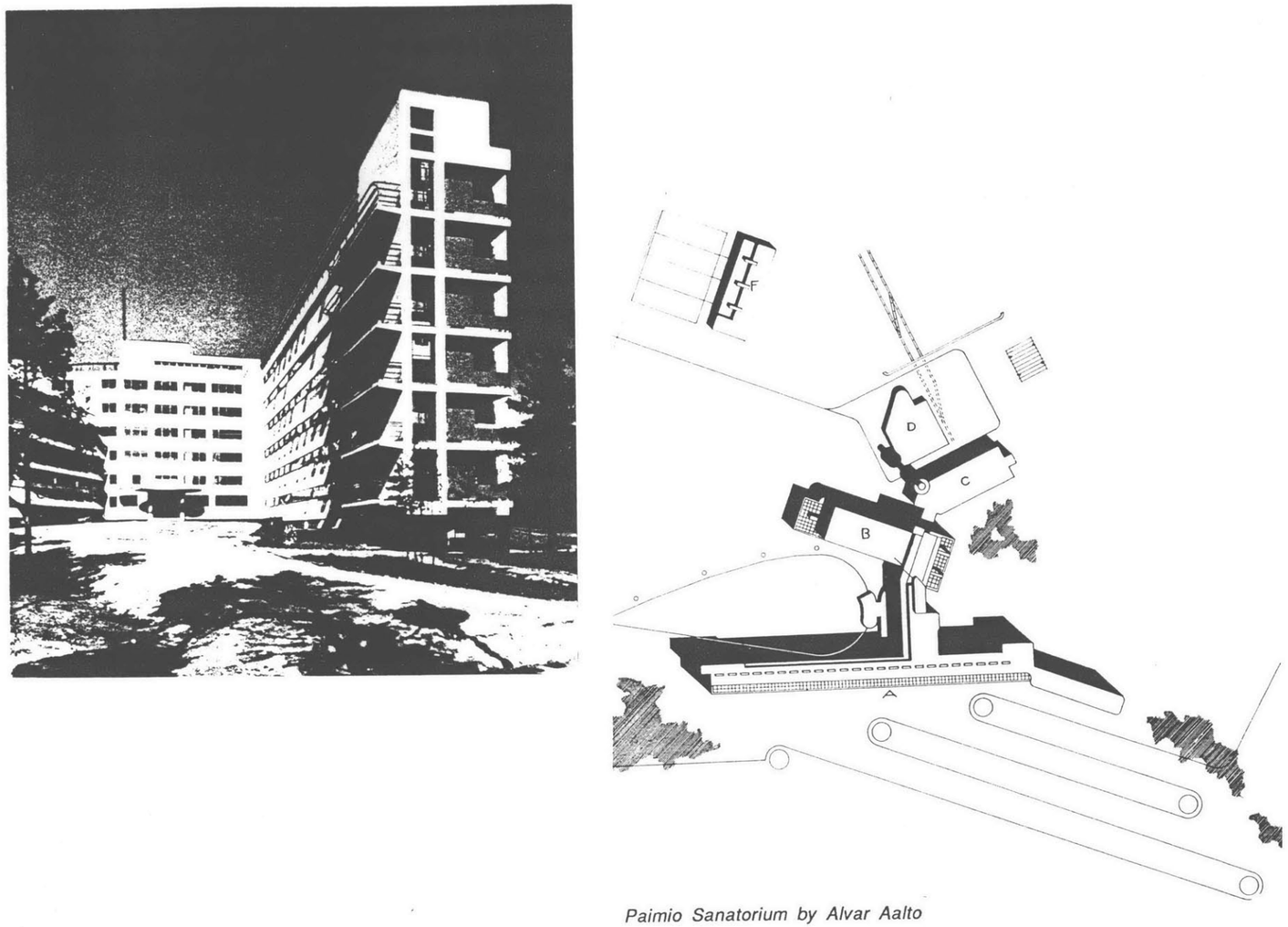
He goes on to say:

"It is the surprise unexpected juxtaposition, superimposition, crowding, segregation and confrontation of elements which accommodates the human movement patterns which give whatever architectural quality this construction may have. The concern is that of reality, immediacy, honesty, economy. " [13]

He states that the formal, compositional organization of a building as practiced historically is no longer applicable in modern society. His way of getting around the need for compositional order is to refer to the organization of electronic circuitry. The Mummers theater is conceived as "three components with sub components attached, interconnected by four circulating systems superimposed at separate levels to avoid cross circuiting."[14]

However, the purely rational and functional design approach which created a blast furnace is not readily applicable to the design of buildings. This is so because in architecture, the specific functional requirements are obscure and difficult to categorize . Human beings are not as rationally understandable and homogeneous as gravel or iron ore. There are many different and often intangible factors to consider. How can one list all the functional criteria which would affect the design of a building as complex as, say, a community center?

Architecture is, in the end, about human experience. A building can be designed like a machine, according to functional criteria. However, a definition of function is required which takes these experiential qualities as well as the more technical ones into account.



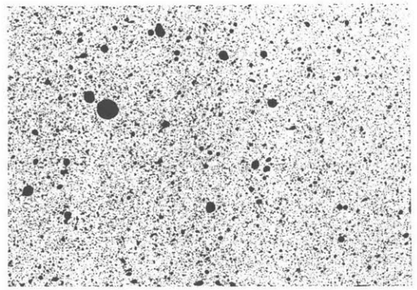
Paimio Sanatorium by Alvar Aalto

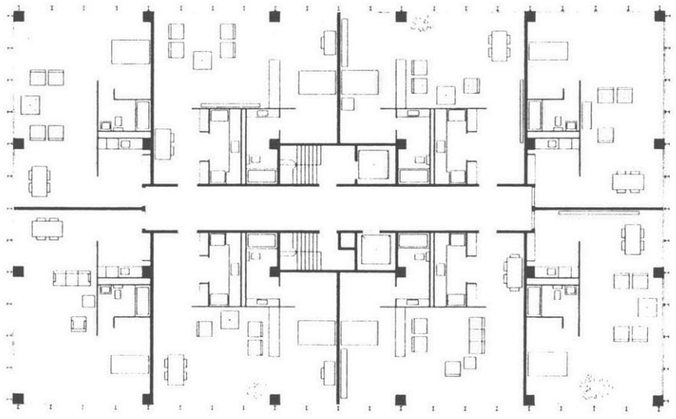
Peter Pfau and Wes Jones have said "When experience becomes the *telos*, function is restored to the lower case form of its original status; it becomes visible again as an intention directed to the service of man, rather than to itself as an end."[15]

Helmut Schulitz defines a broad functional approach. He discusses "the three C's which generate form": context, content and construction method.[16]

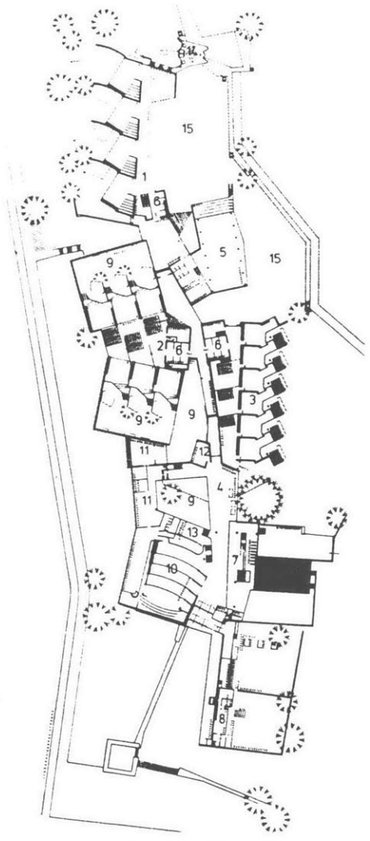
The context includes the physical, cultural and political environment. A building can be configured to do more than simply fit into its site. It can interact with and improve its neighborhood. It can also engage the site and transform it into a place with particular intrinsic qualities. A building can be configured in such a way that it enhances a user's experience of its context. The work of Alvar Aalto exemplifies such an approach. The complex geometry of his Paimio Sanatorium for example is generated by site conditions such as contours, southern sunlight, views etc. Here, the plan is generated by an understanding of the site rather than a superimposed compositional order.

The physical properties of construction materials and their method of assembly will also influence the form of a building, in Schulitz's system. For example, due to the high strength of steel framing relative to other materials (60 ksi versus 3 ksi for conventional concrete) much less steel structure is required to support the same load. In a typical steel framed building, so little steel is required structurally that it provides little sense of enclosure on its own. The enclosure is a separate and non-loadbearing system. Relieved of this loadbearing function, the enclosure can be much more free in its configuration. A solid wall rising straight out of the ground with vertically stacked





Plan of 860 Lakeshore Dr. by Mies Van Der Rohe.
Spaces forced into a rigid structural grid



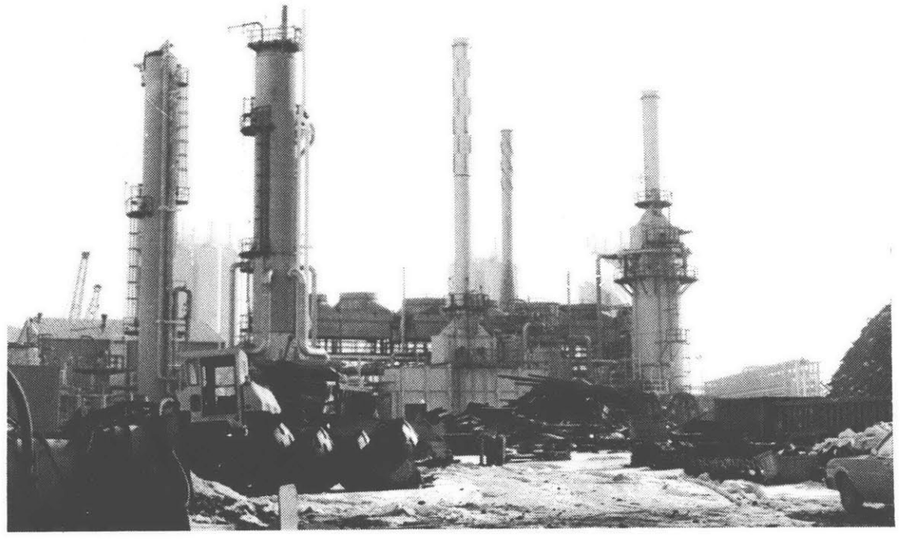
Plan of school by Hans Sharoun.
Free spatial configuration not controled by structural grid.

small rectangular openings once necessitated by loadbearing masonry construction is not necessary with steel framing. Much more spatial complexity is possible. A functionally designed steel frame building would take advantage of this freedom and articulate the separation of structure from enclosure.

Finally, Schulitz claims that form is influenced by content as well. This does not imply that there is a direct correlation between use and form. However, the qualities of each space within a building can be manipulated to affect our experience of that space, to give it a particular character appropriate to its use. Some of these qualities are;

- dimensions and proportions.
- accessibility, movement through and degree of privacy
- light quality
- definition of edges and degree of enclosure.
- adjacency to other activities

Rather than working out a structural or compositional organization (a rigid structural grid or axis of symmetry, for example) then configuring the various spaces to fit, the spaces within a building can be configured individually then superimposed by an overall organization. This overall organization must be loose enough tho accomodate the diversity of the individual components which it contains .

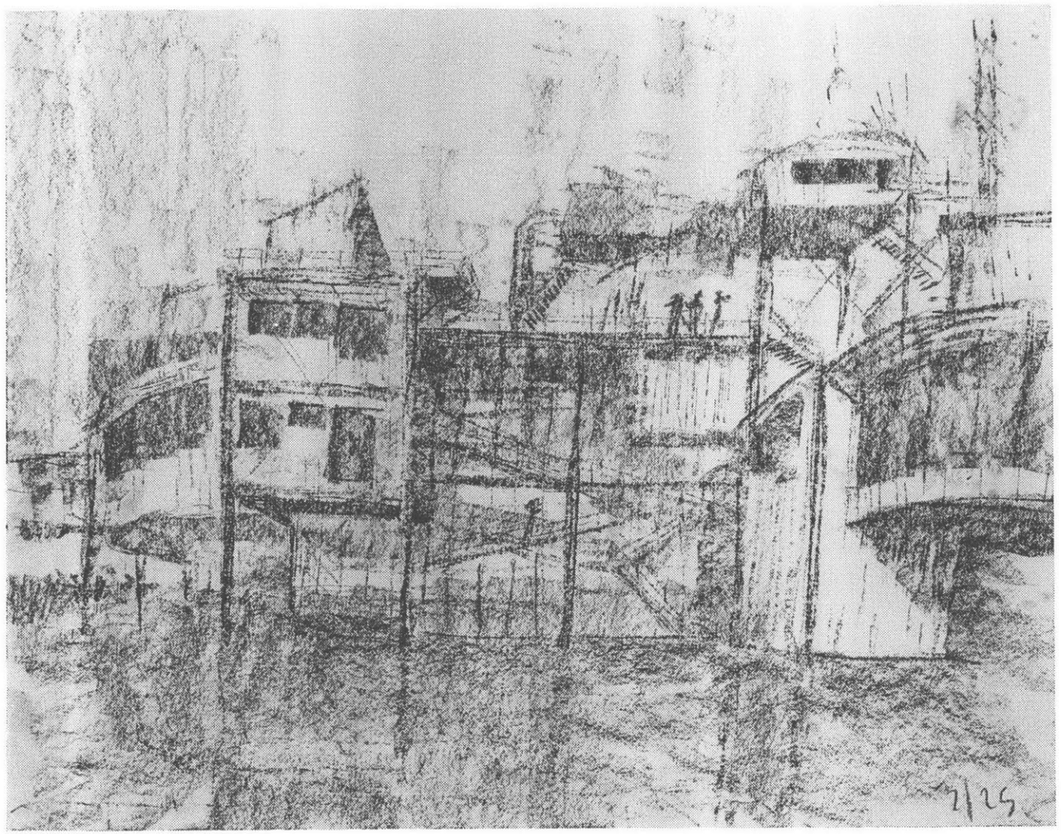


However, in architecture, "function", no matter how broadly defined, will always be insufficient to determine the exact form of a given building. The function of an oil refinery is relatively clear cut. It makes oil. The ideal form for each step of the process can be determined in unambiguous engineering terms. In architecture, not only are the functions hard to determine but there is a minimal correlation between function and form.

Beyond basic ergonomic requirements most human activities are quite adaptable. Most of our daily activities could be easily carried out in a basic Butler building. Thus some more or less irrational and purely compositional ordering is inevitable. Even the Mummers theater, which its designer, Johansen, claims is "purely organizational not formal" shows clear signs of formal composition. Without such compositional order, a building would appear as an incomprehensible jumble.

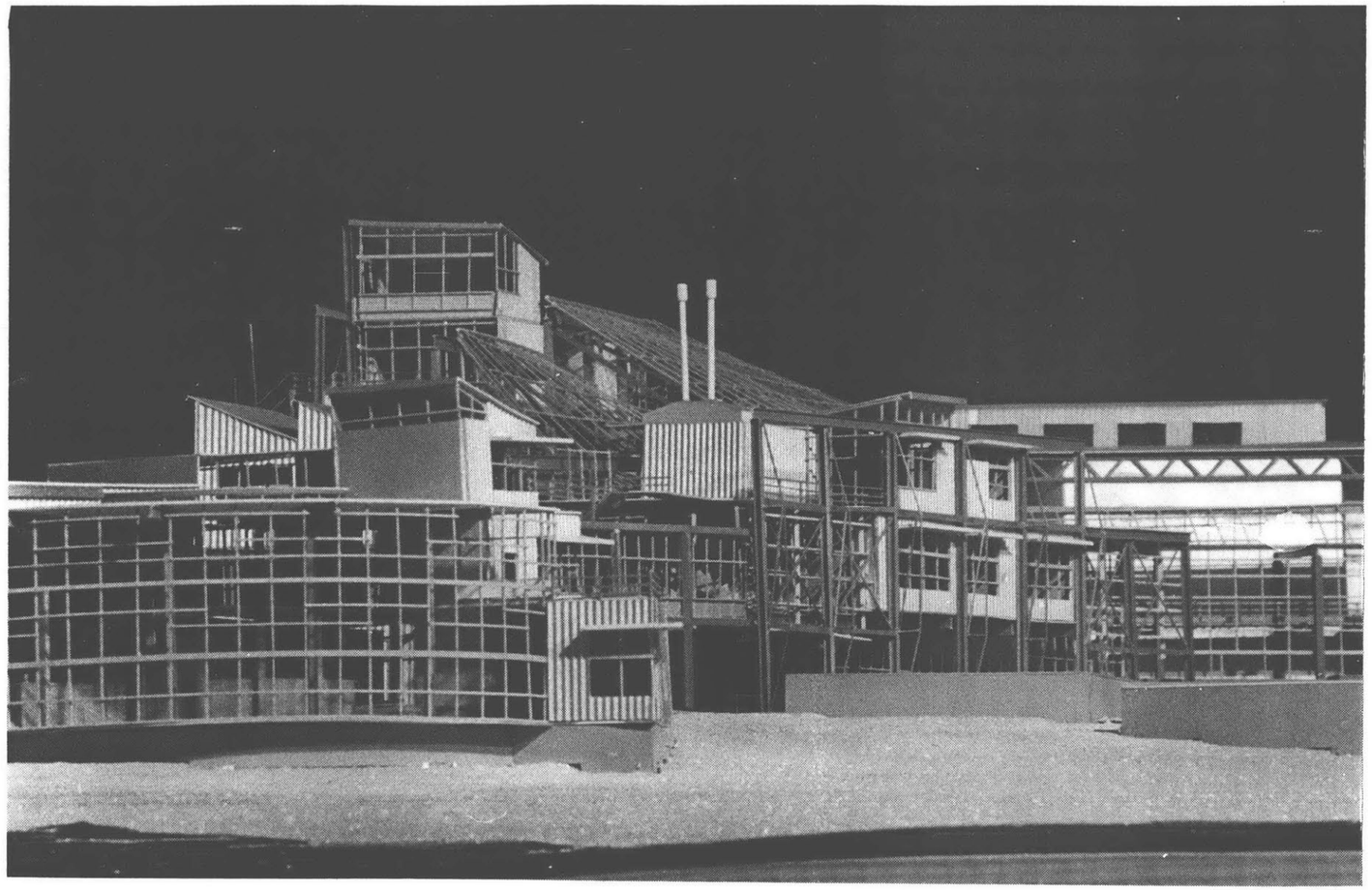
In summation, it might be possible to incorporate these four characteristics into architecture by following a functional design methodology. The main problem in doing so is determining what the functions are. The experiential as well as the technical qualities of a building must be considered. Helmut Shulitz's three c's, context, construction method, and content, define a broad categorization of functional criteria which can influence the form of a building. However, no matter how broadly defined, a purely rational, functional design approach is insufficient to create architecture. Some degree of not-so-rational compositional order is unavoidable. This compositional order should not be dominant and all-encompassing. It can be subtle and evolve out of the functional criteria.

IV: AN ILLUSTRATIVE DESIGN

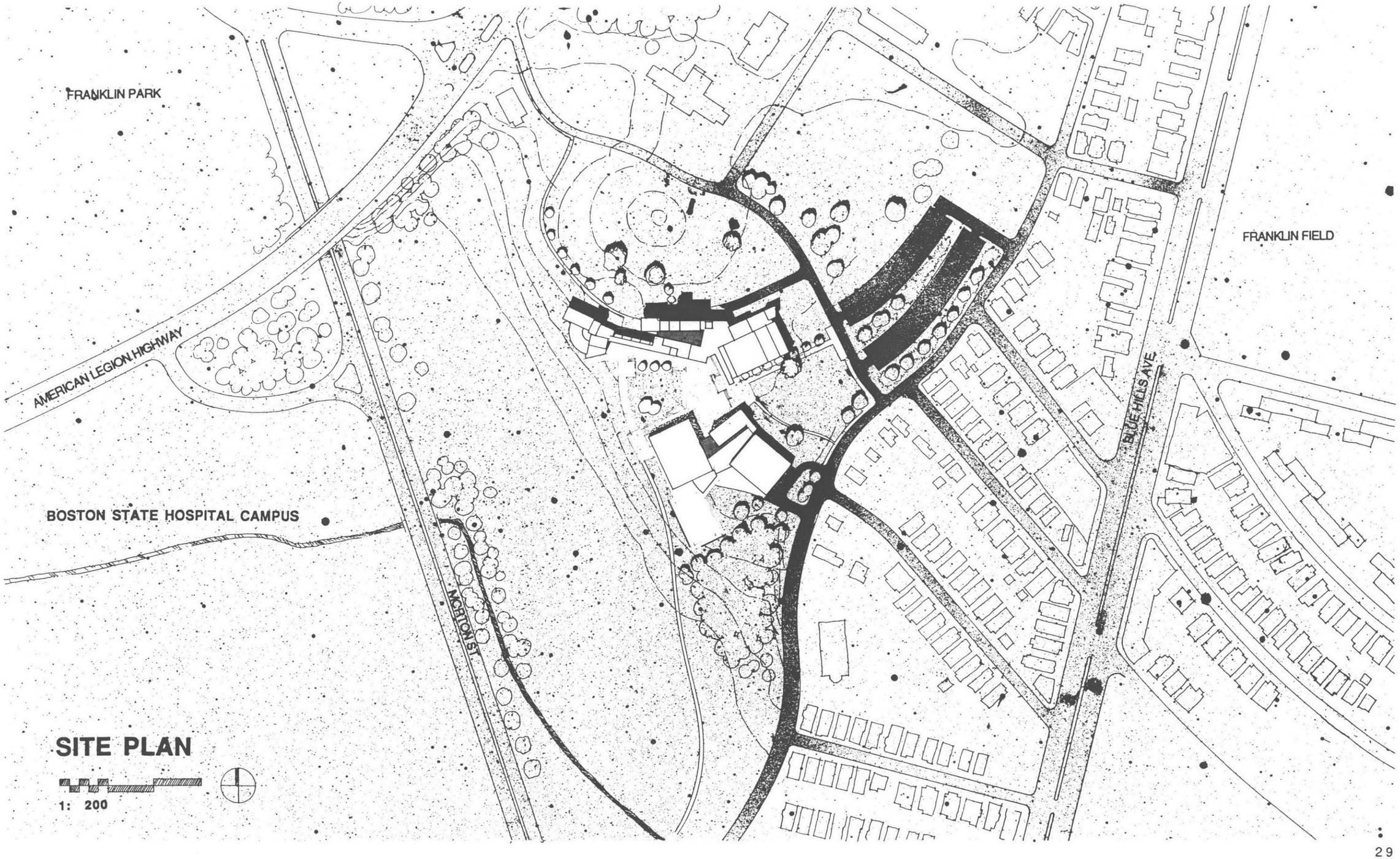


"Let a man then know his worth and keep things under his feet. Let him not peep, steel, or skulk up and down with the air of a charity boy, a bastard, or an interloper in the world which exists for him. But the man in the street, foinding no worth i himself which corresponds to the force which built a tower or sculptured a marble good, feels poor when he looks on these. To him a palace, a statue or a costly book have a forbidding air,... and seem to say like that, 'Who are you , Sir ?' Yet they are all his, suitors for his notice, petitioners to his faculties that they will come out and take possession. The picture waits for my verdict. It is not to command me."

Ralph Waldo Emerson



To illustrate the transformation of the four characteristics discussed above, I have attempted to incorporate them into the design of a community center to be located on the abandoned Boston State Hospital site in Jamaica Plain. This chapter will first present the design then describe the design process. In so doing, it will discuss some of the functional criteria which generated this design following SChulitz's three c's categorization.



SITE PLAN

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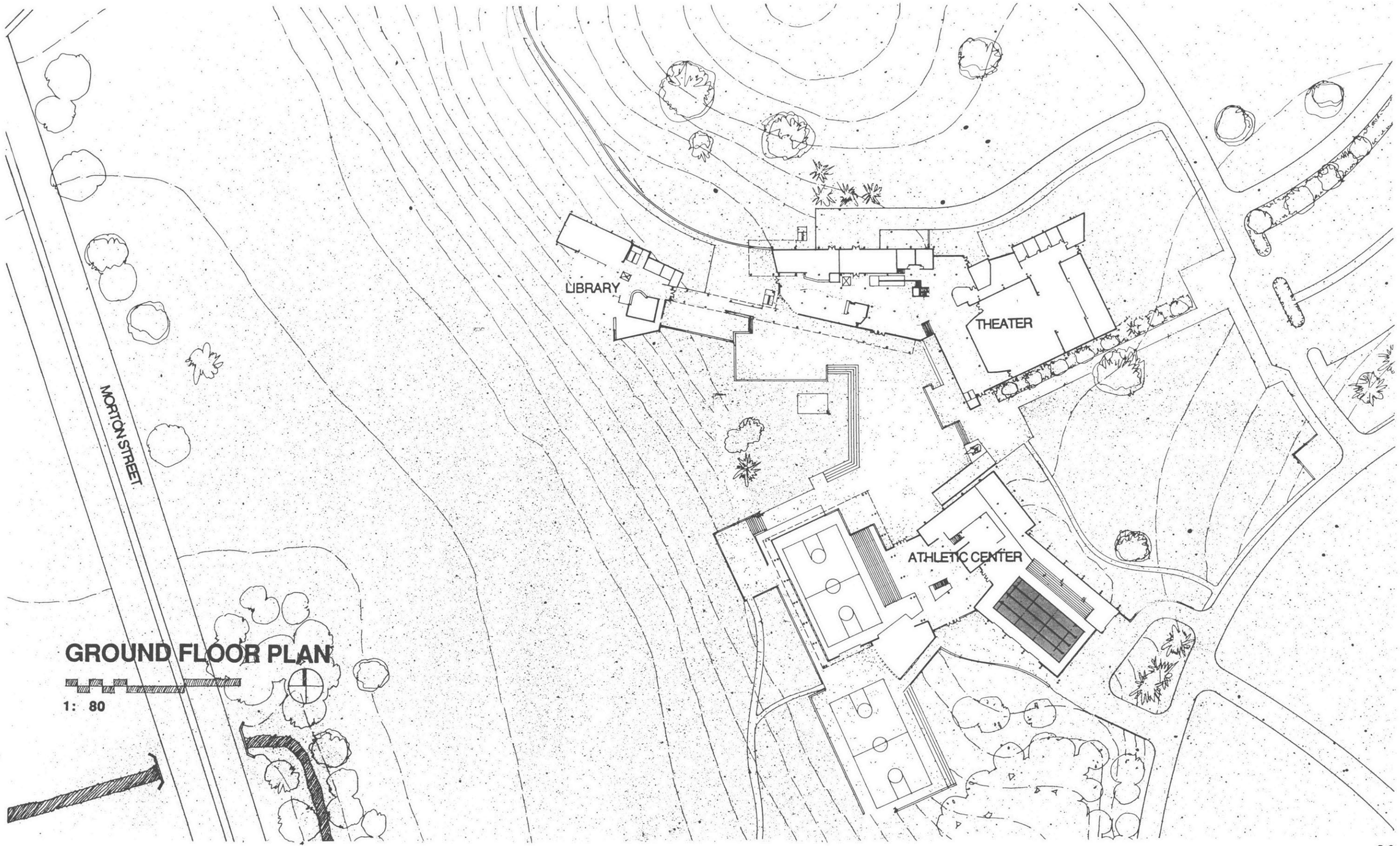
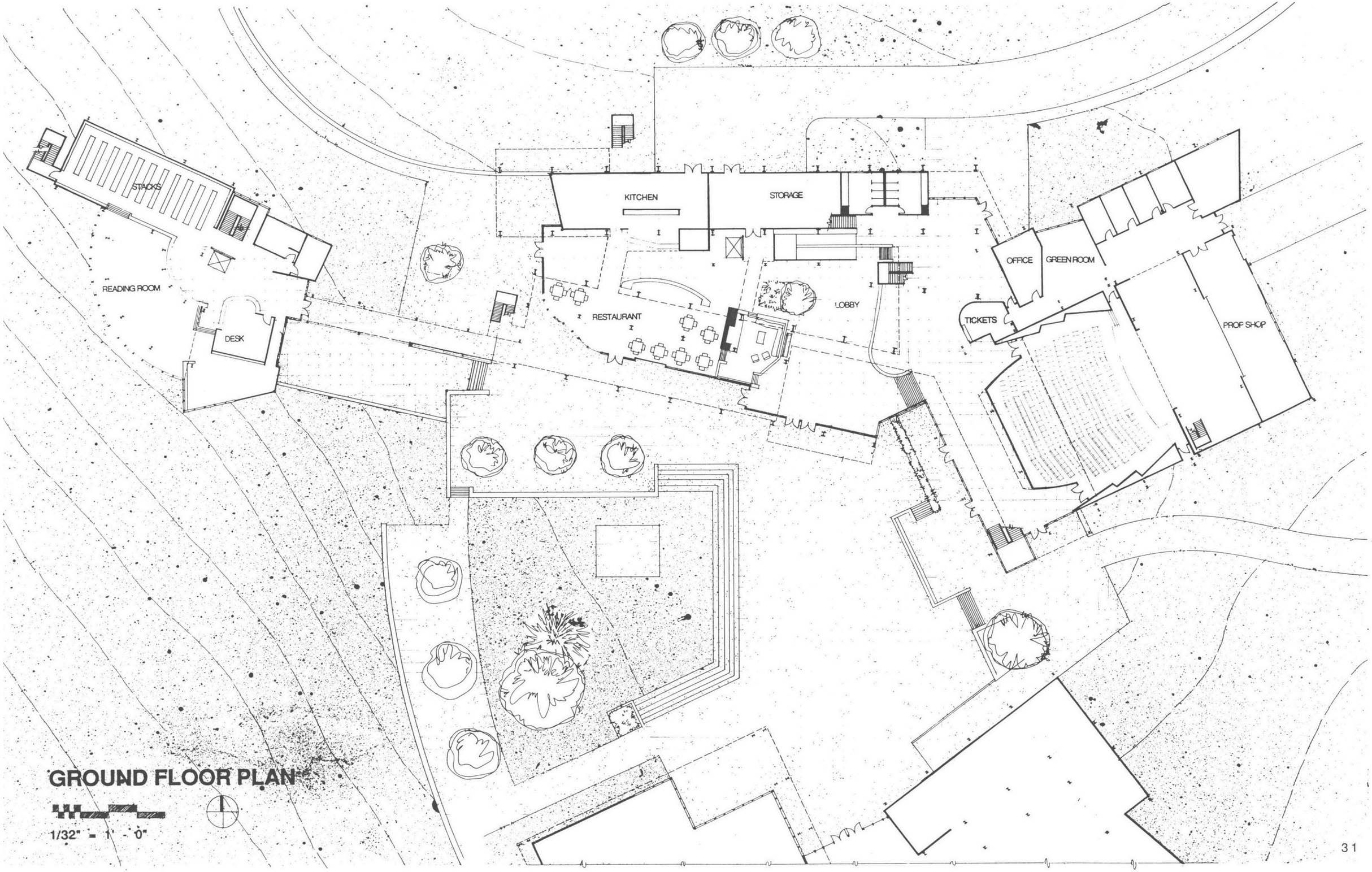


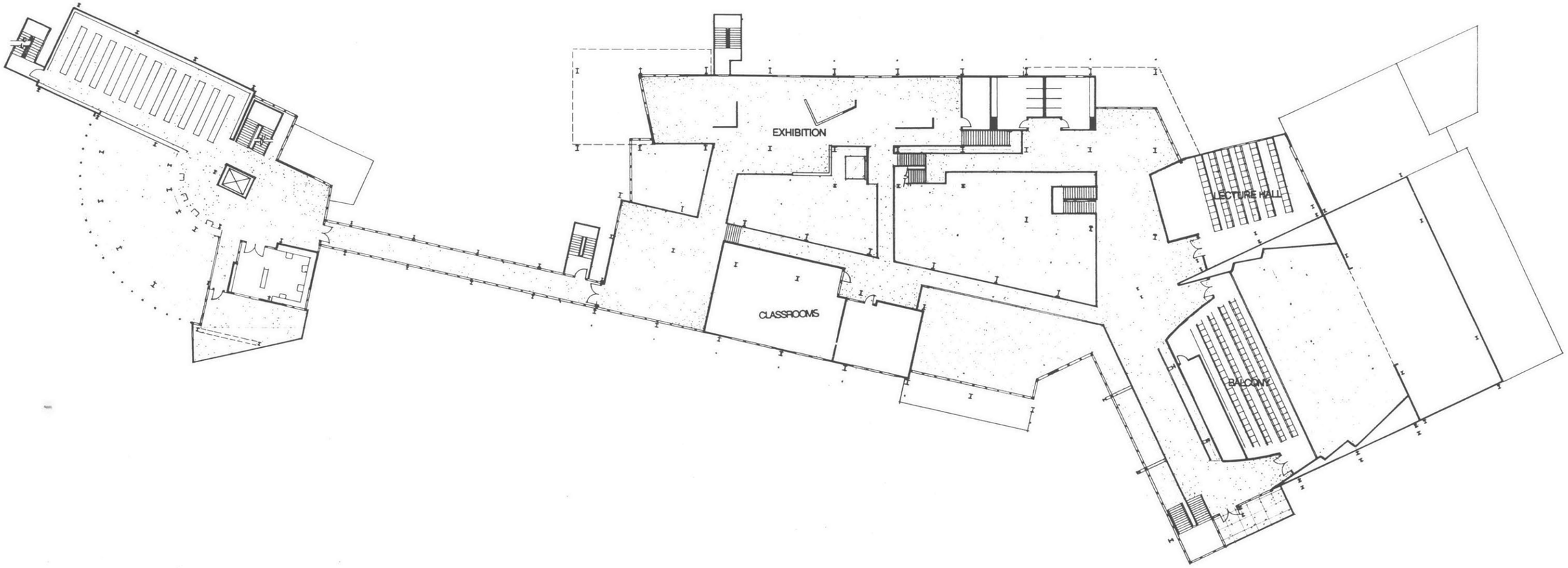
GROUND FLOOR PLAN

1: 80



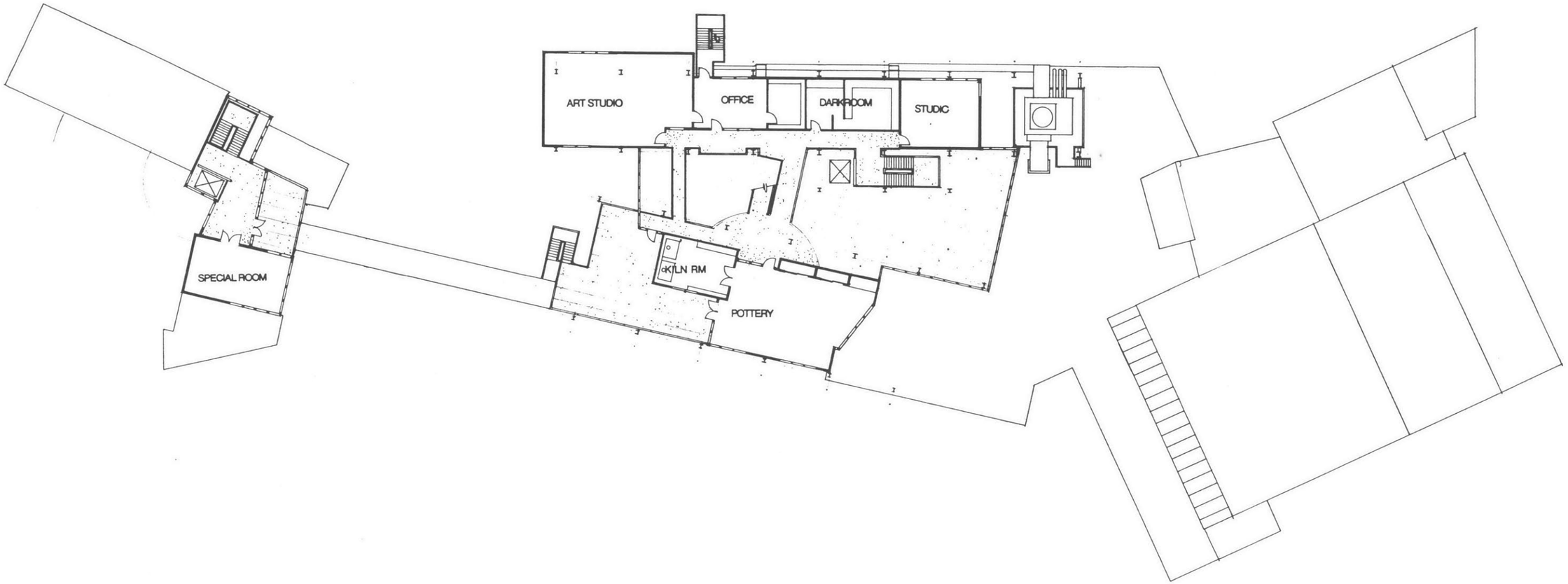
GROUND FLOOR PLAN

1/32" = 1' - 0"



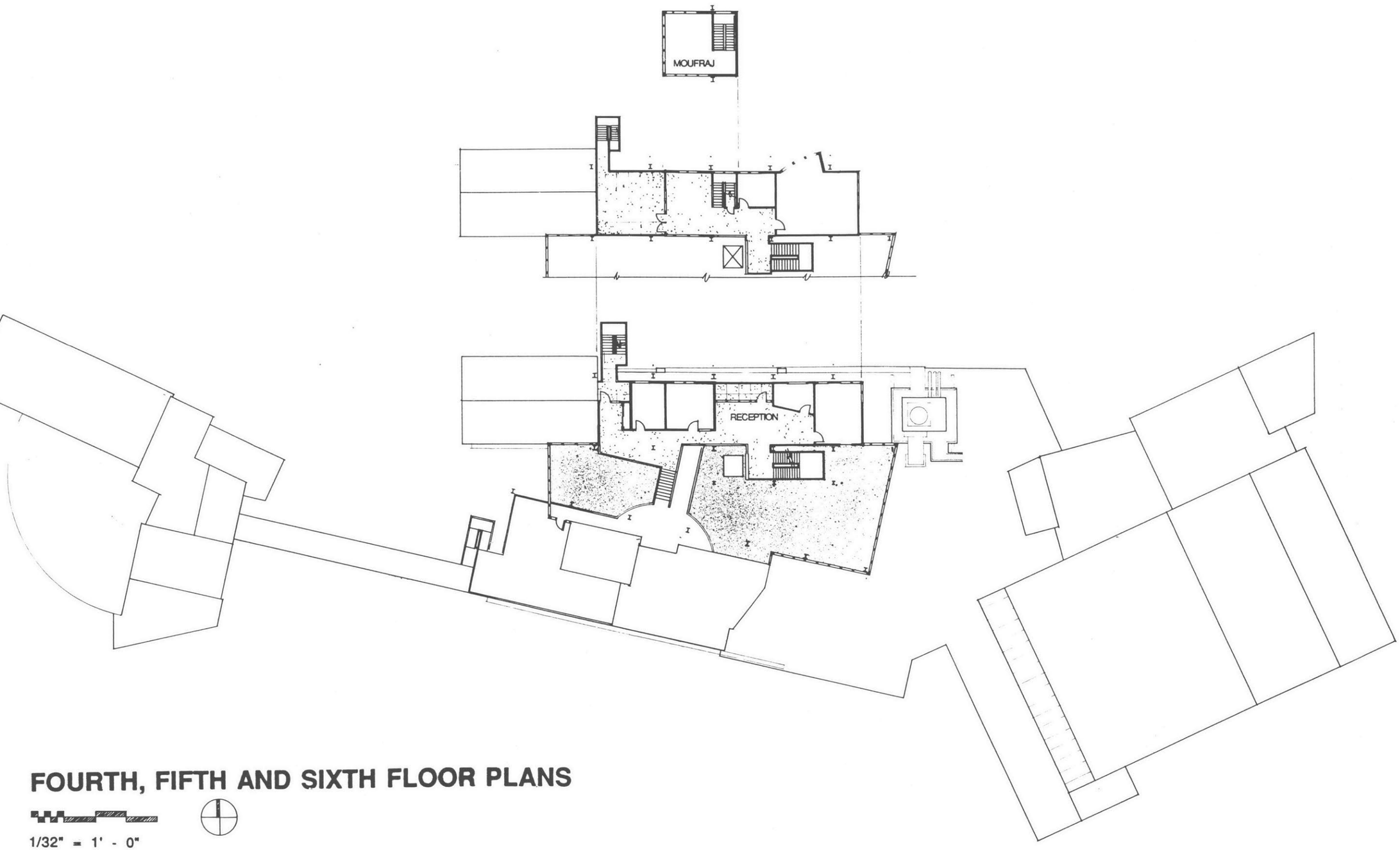
SECOND FLOOR PLAN

1/32" = 1' - 0"



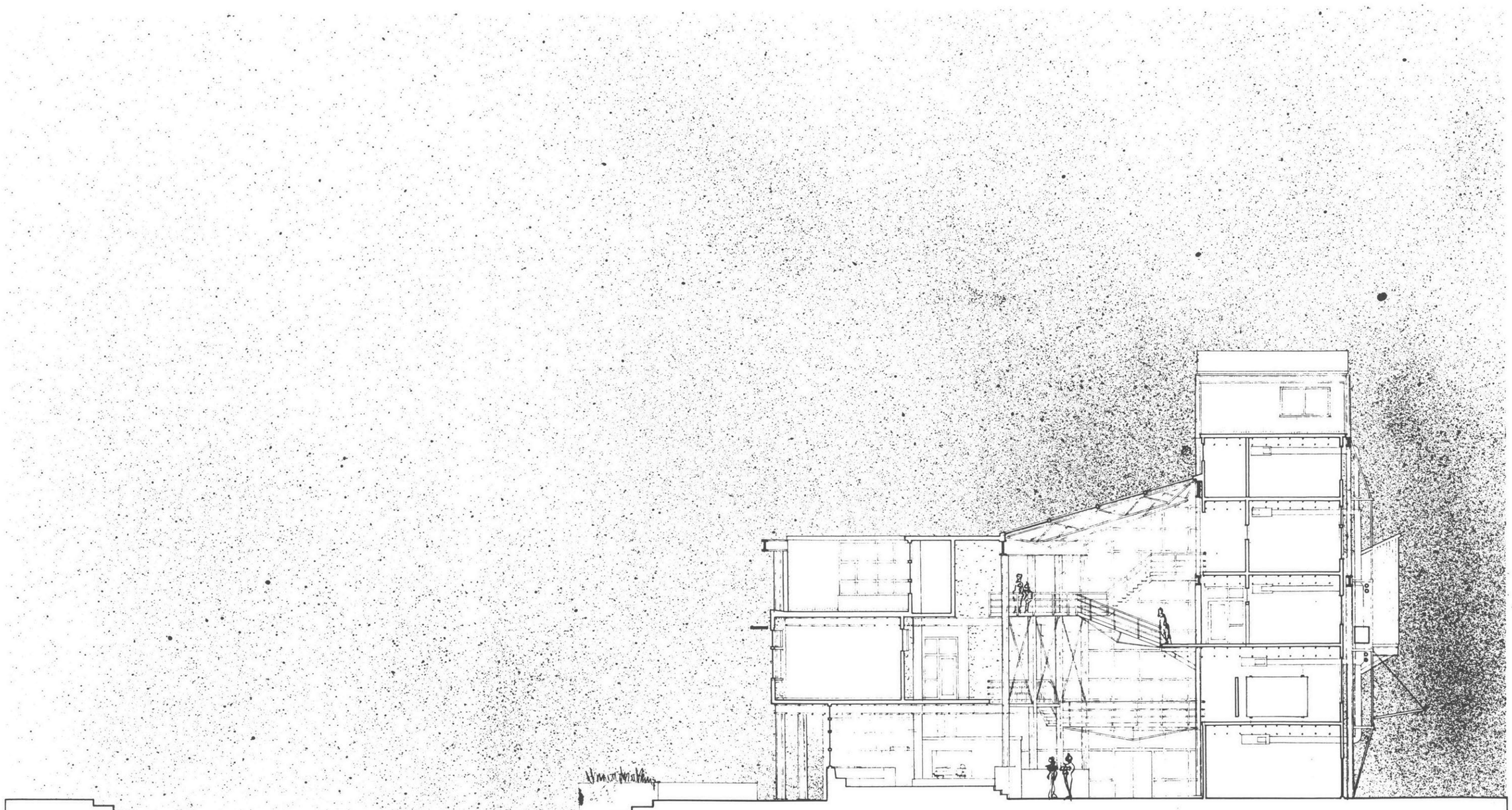
THIRD FLOOR PLAN

1/32" = 1' - 0"



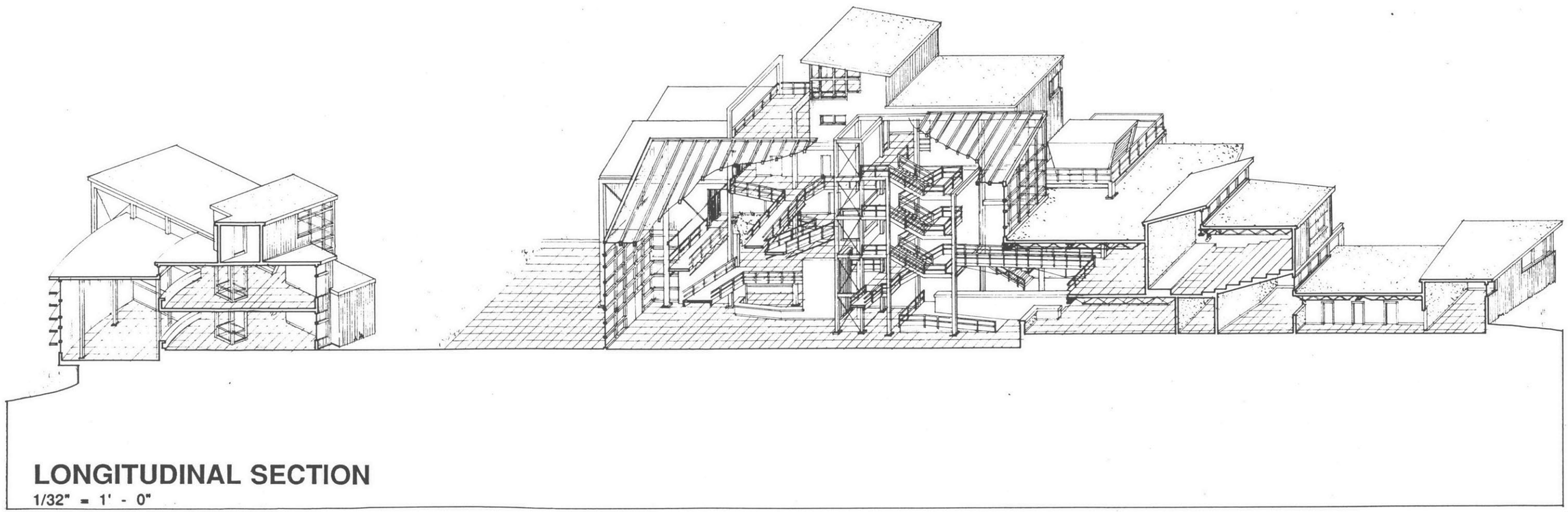
FOURTH, FIFTH AND SIXTH FLOOR PLANS

1/32" = 1' - 0"



SECTION AT ATRIUM

1/32" = 1' - 0"



LONGITUDINAL SECTION

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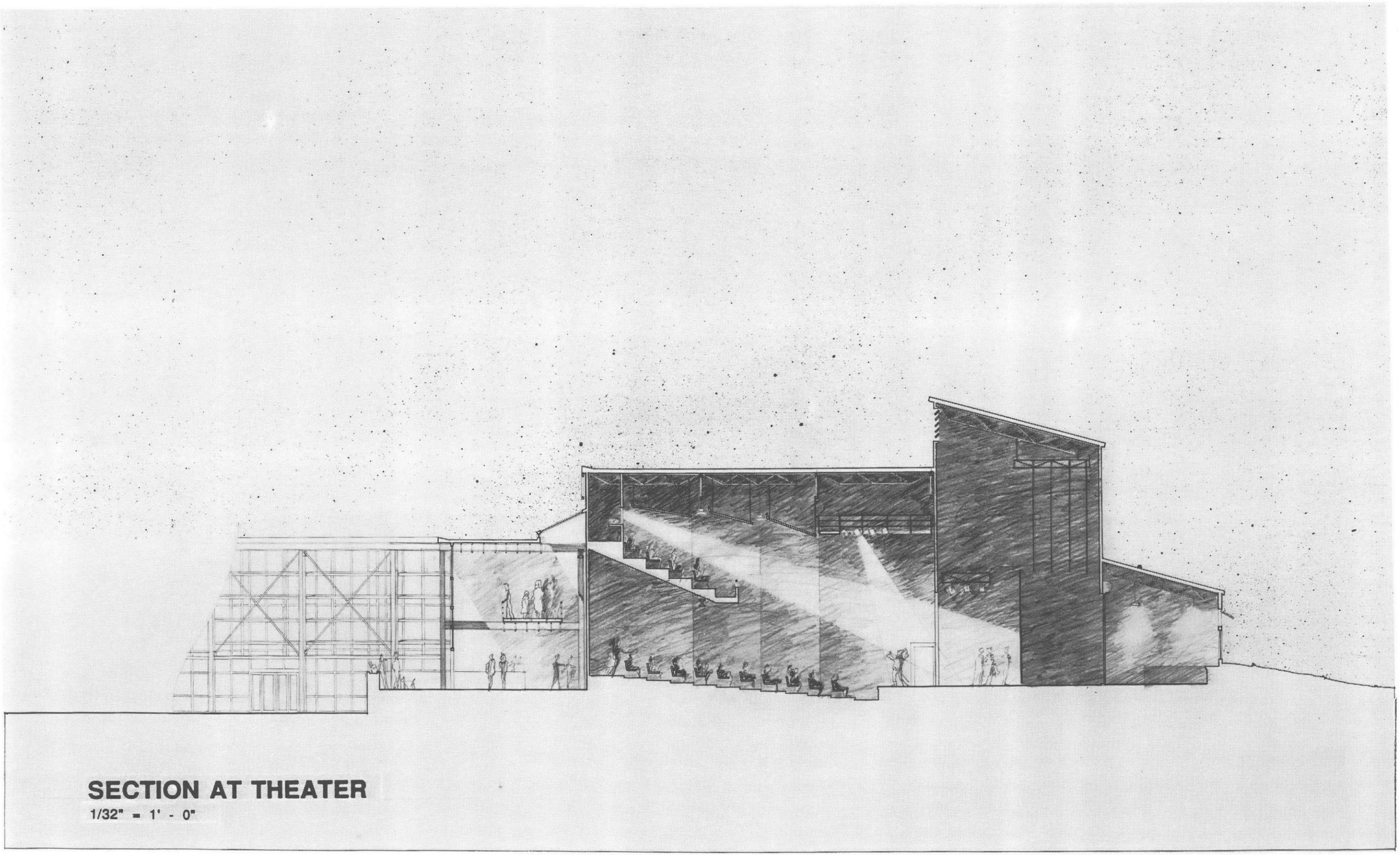

SECTION AT THEATER

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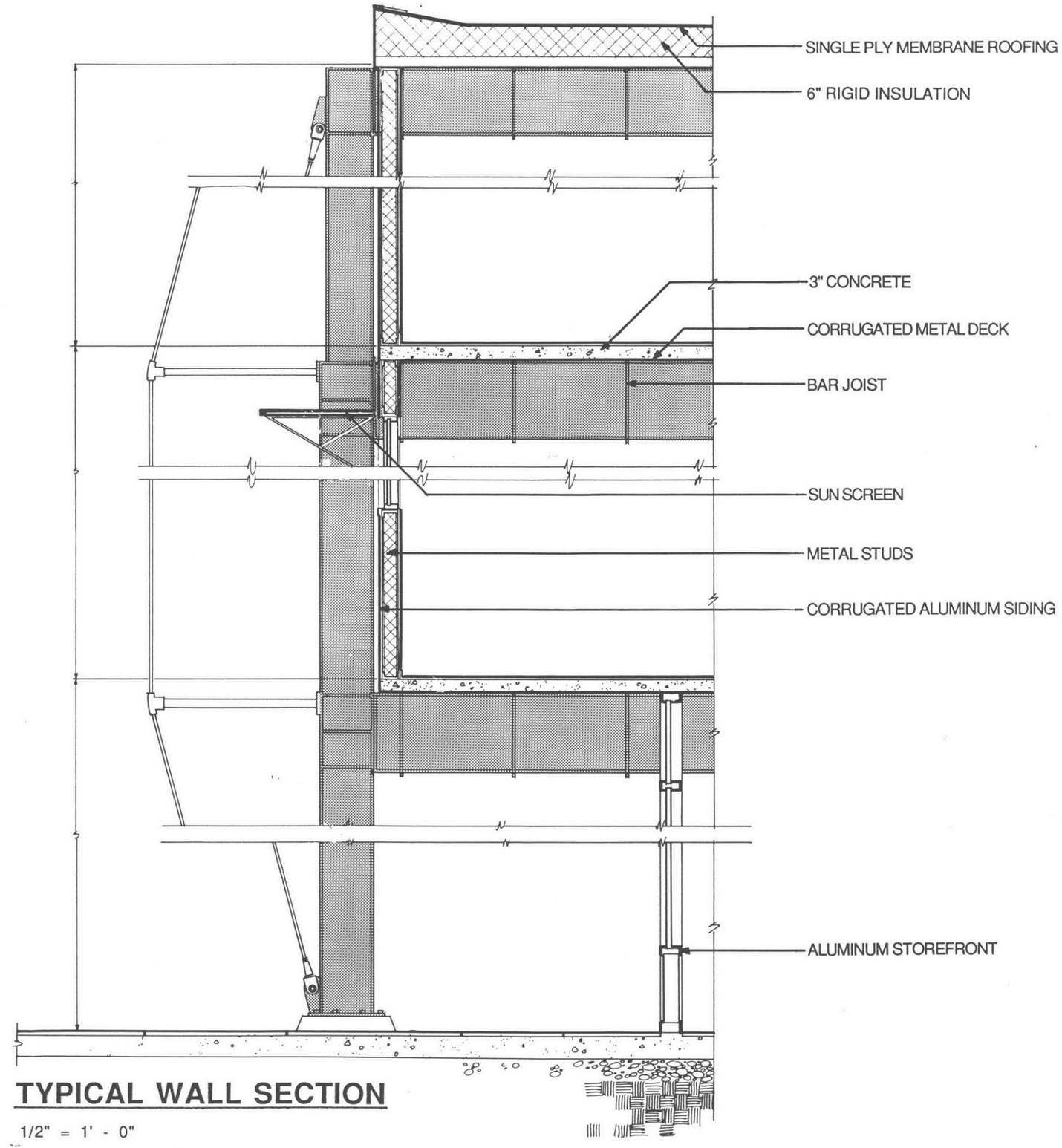
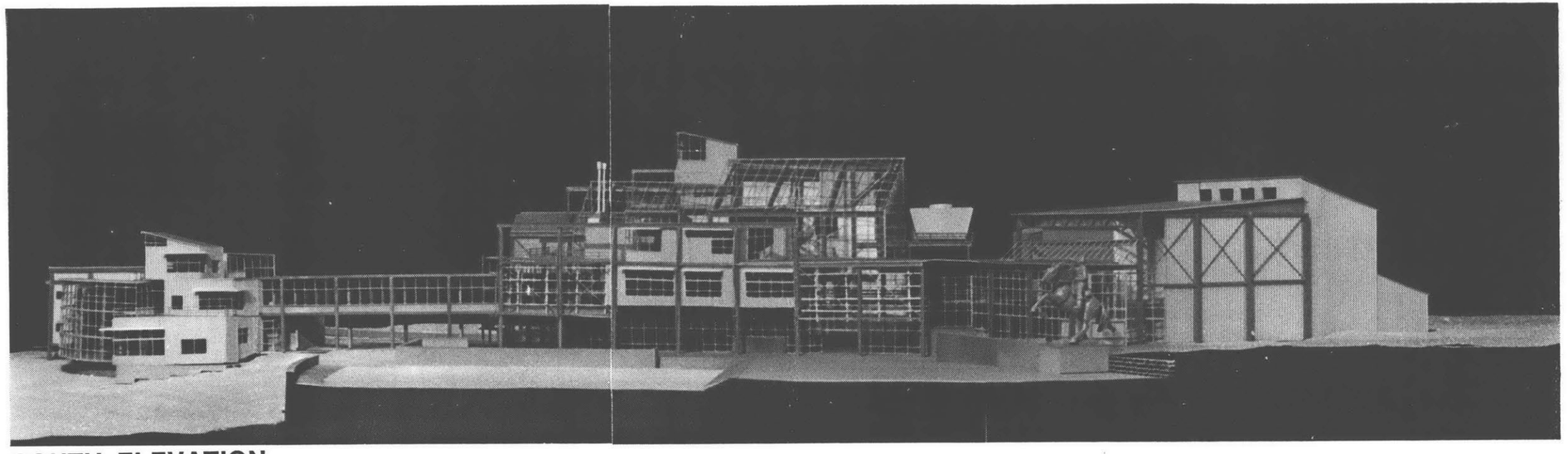
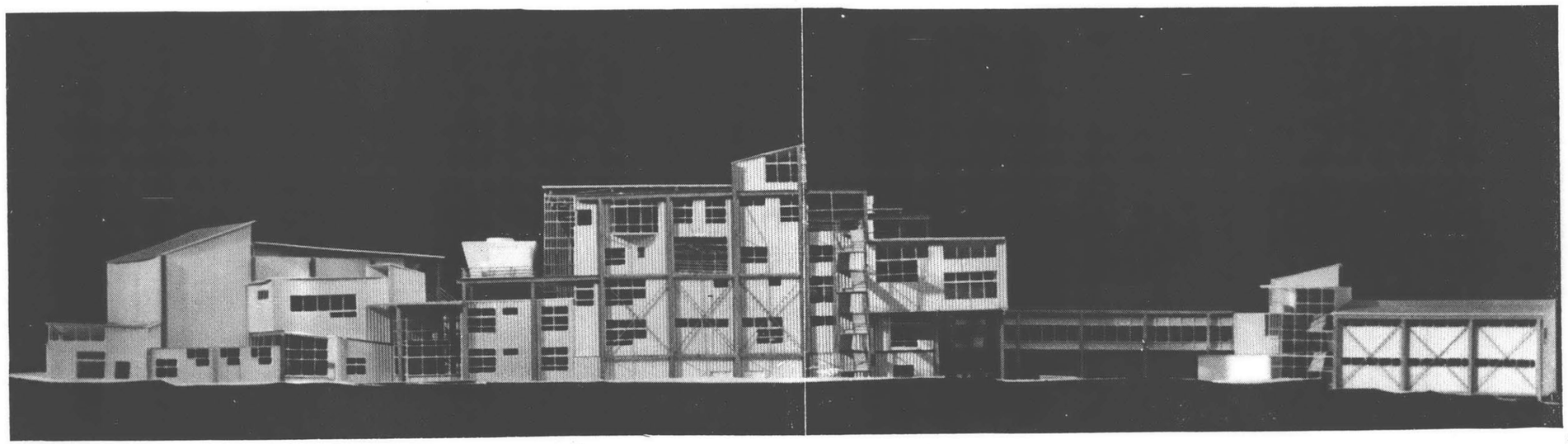


TYPICAL WALL SECTION

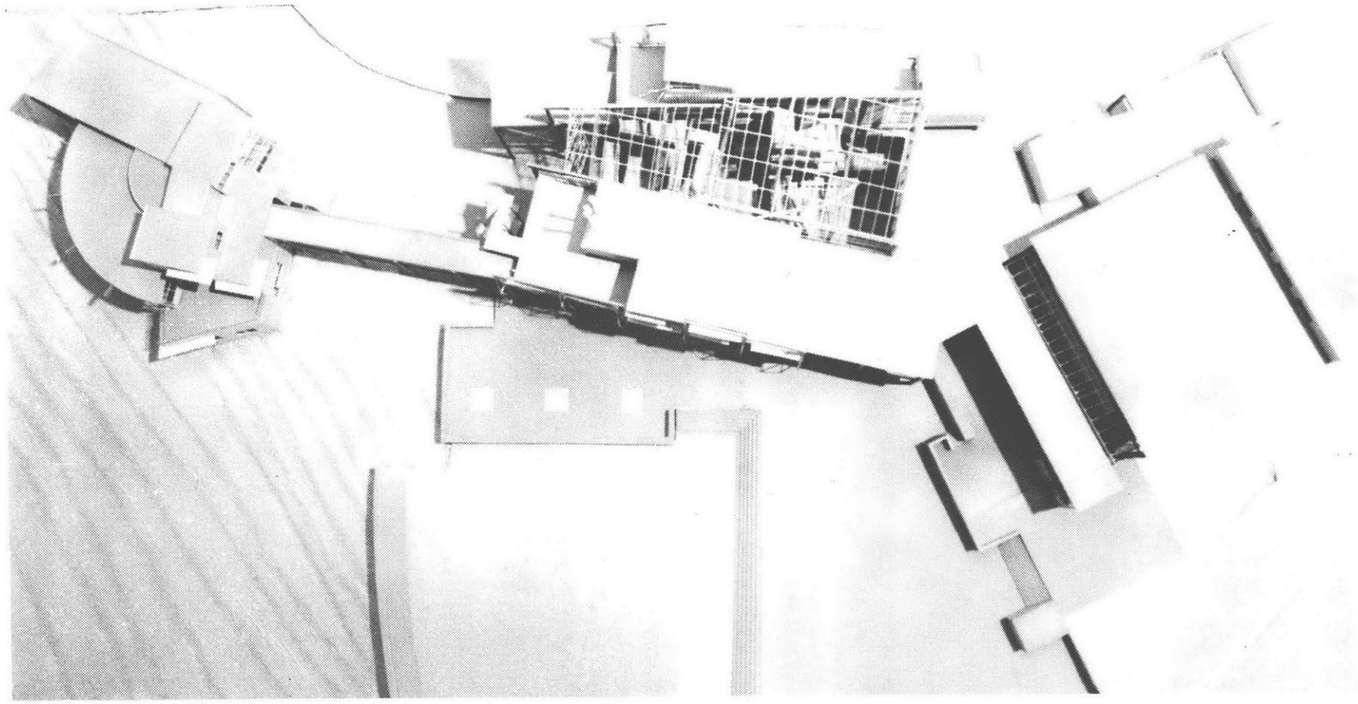
1/2" = 1' - 0"

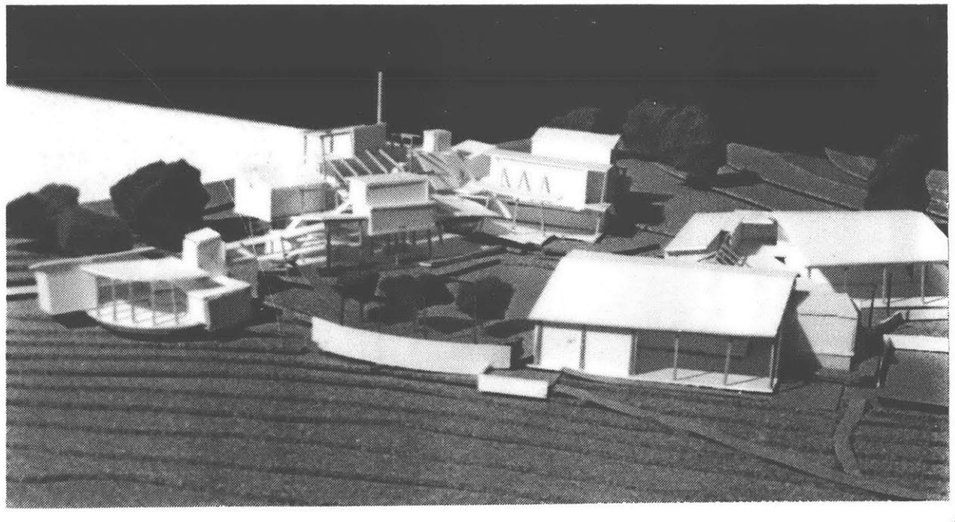


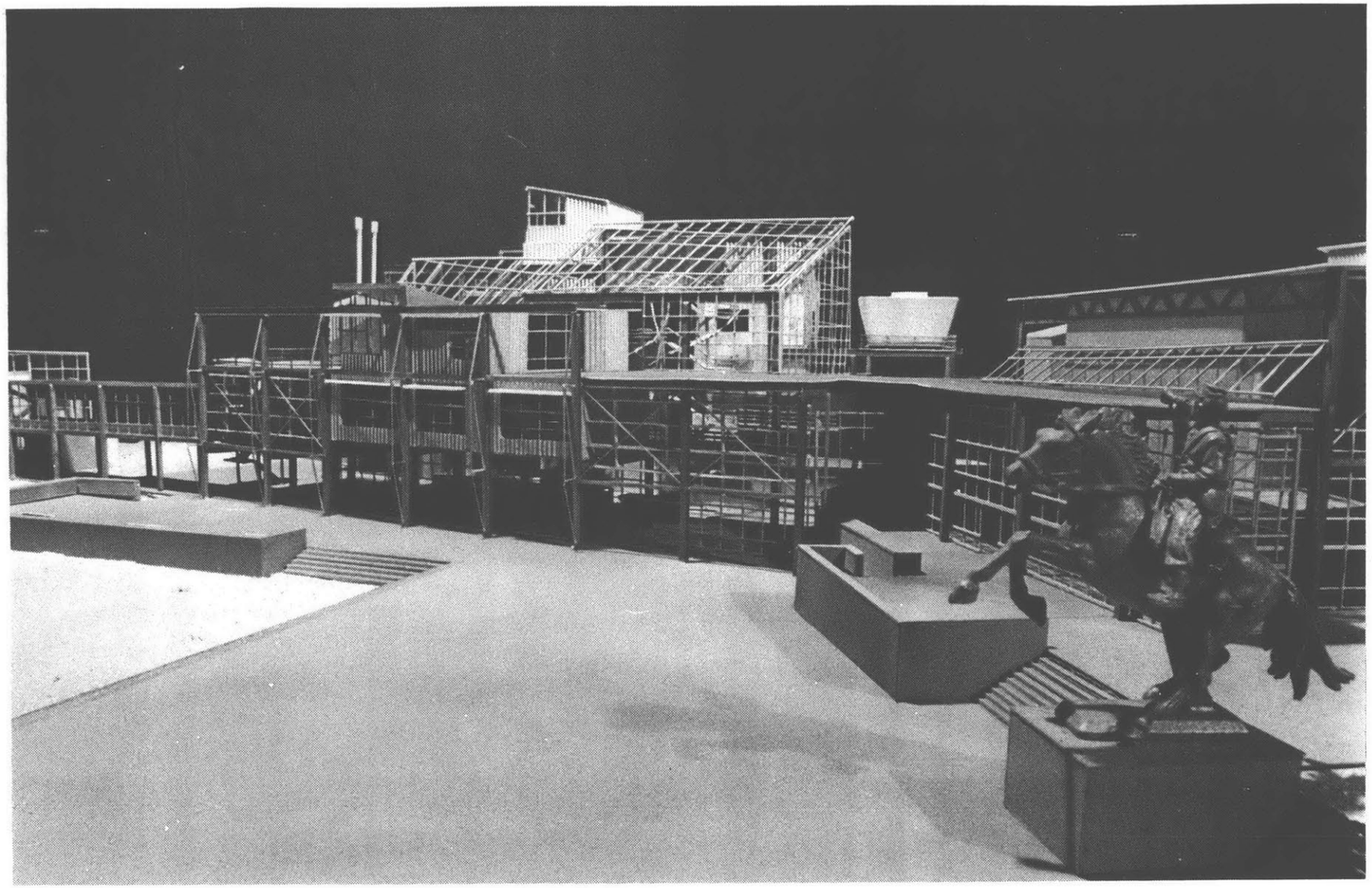
SOUTH ELEVATION

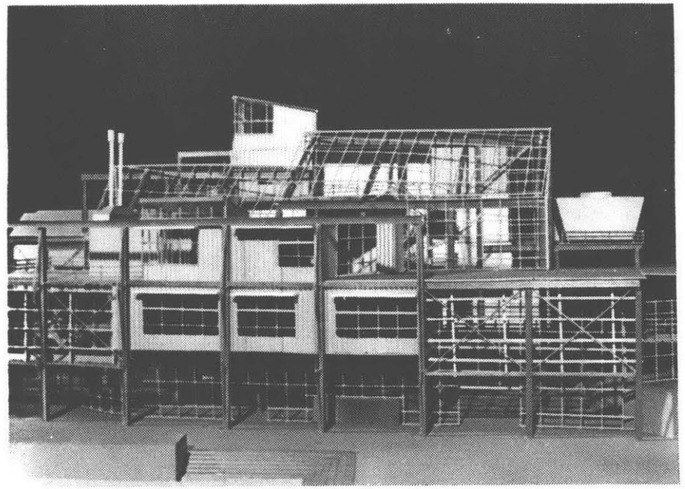


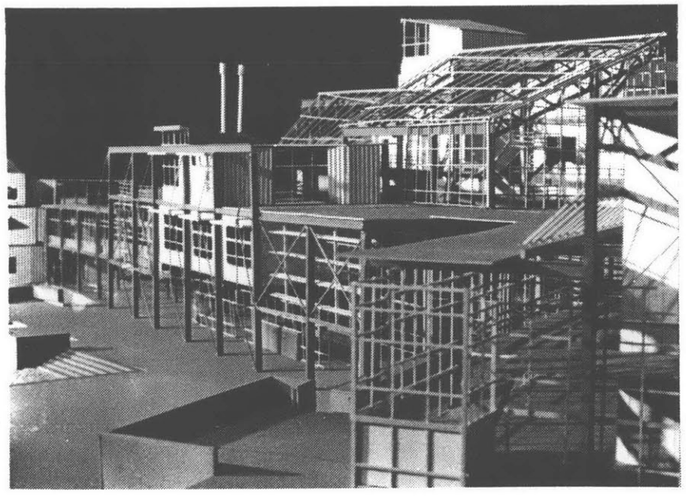
NORTH ELEVATION

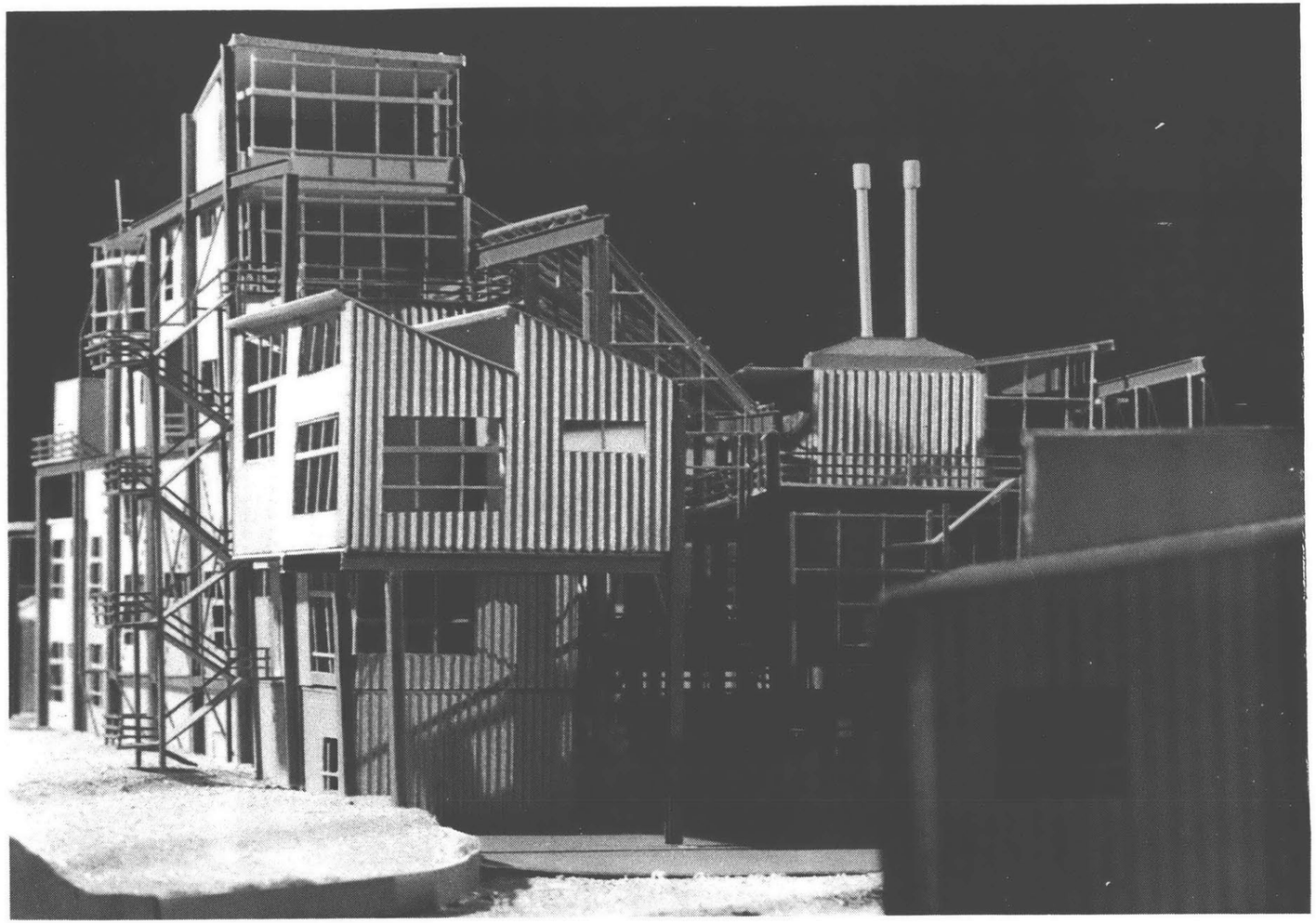


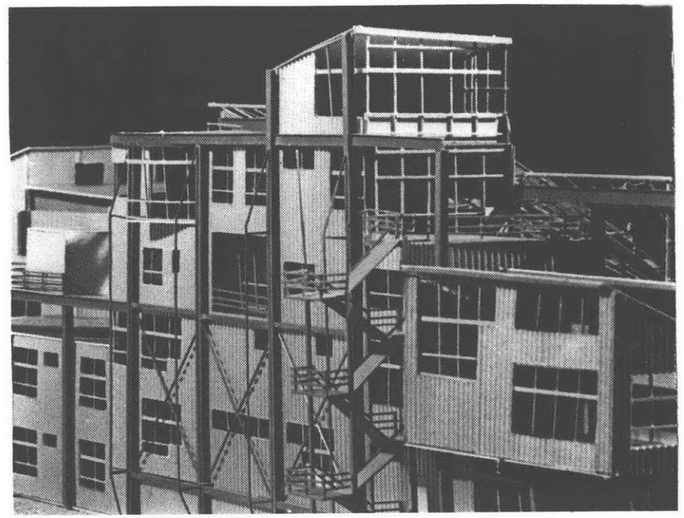


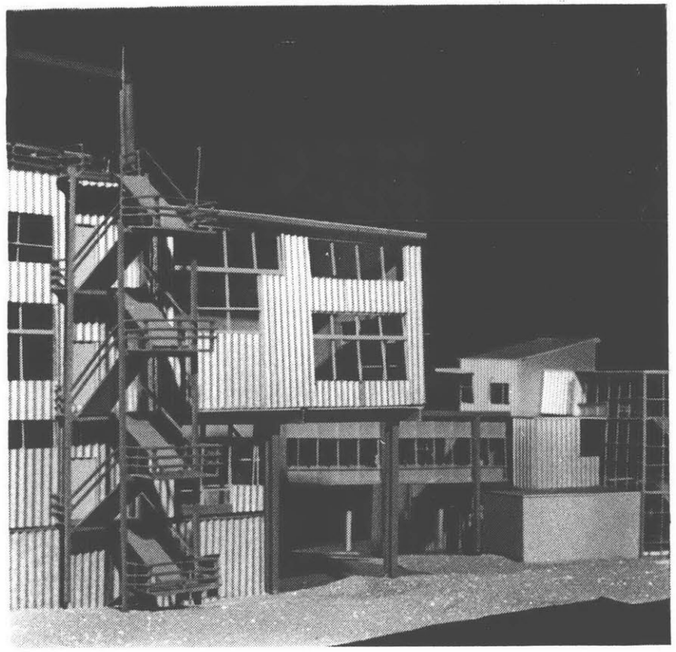


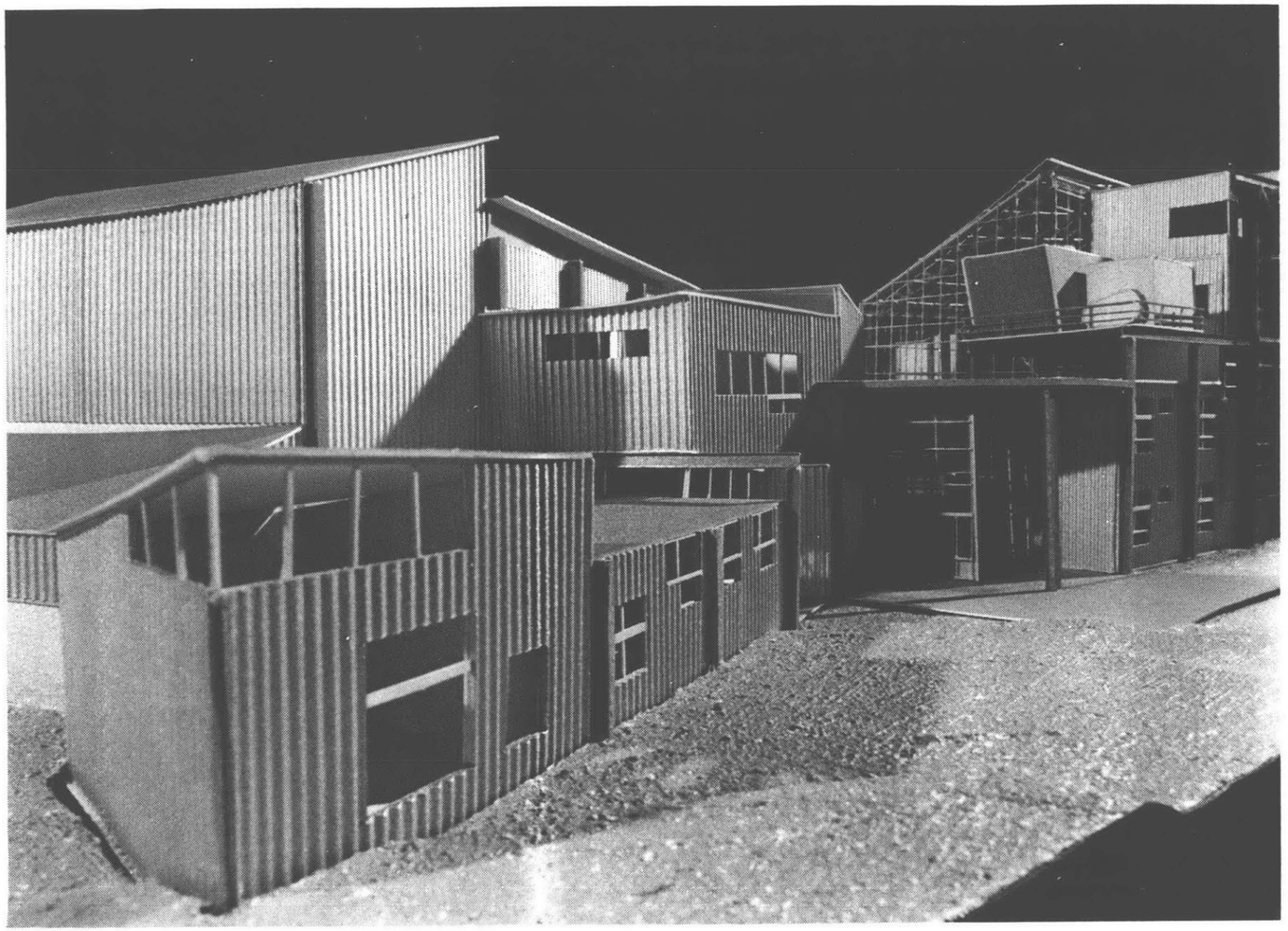


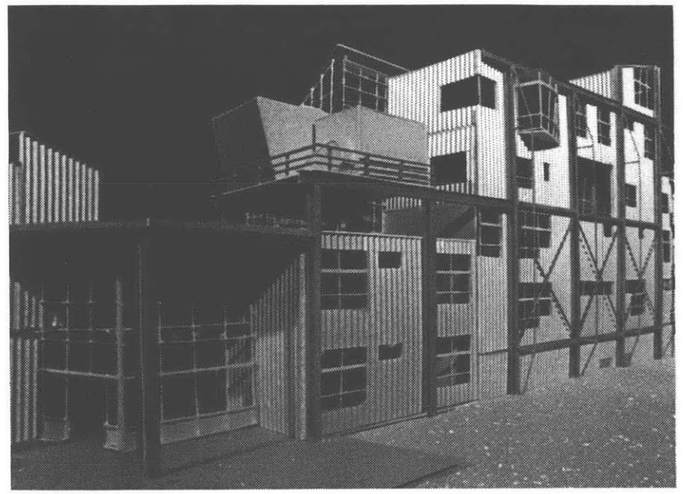


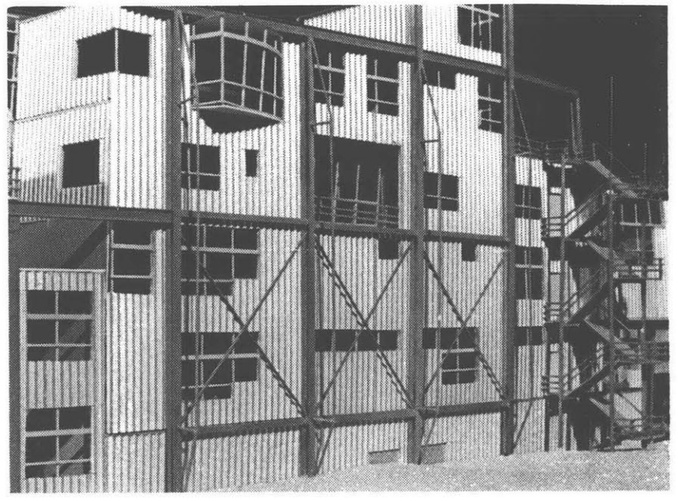


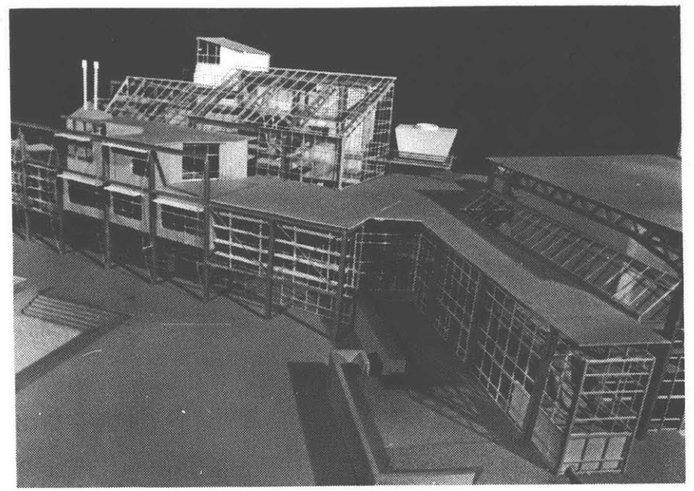


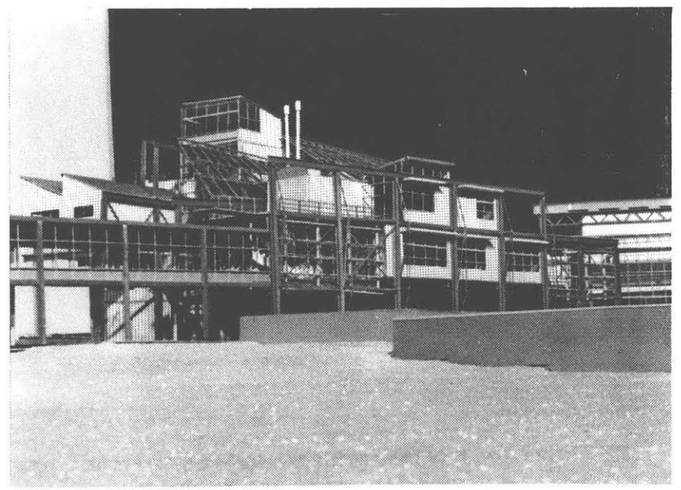


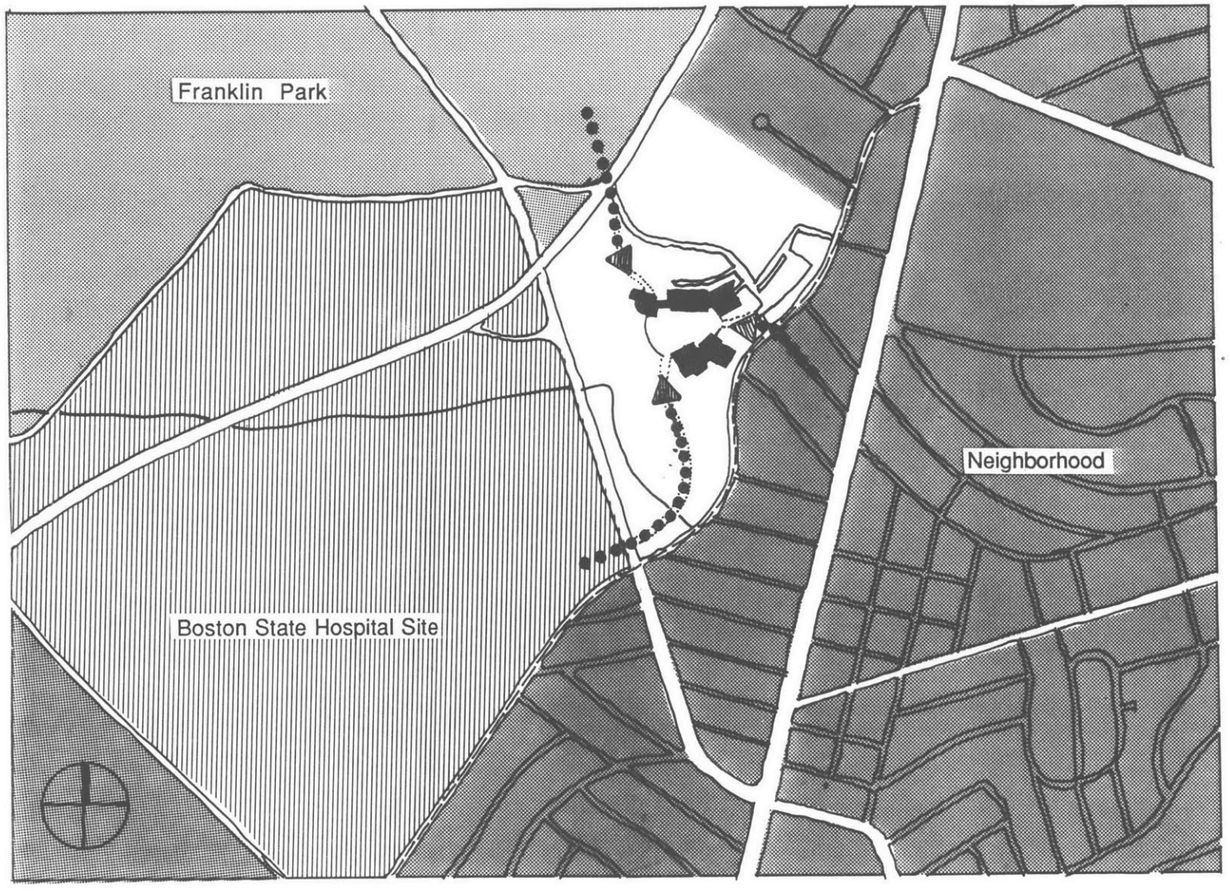












Site diagram showing center as conection of three relms
old neighborhood,Franklin park and Future development of hospital site.

Context

Context can have both a social/cultural and a physical sub-category. At the social level, I envision a Community Center as being more than the minimal provision of facilities. A big problem in contemporary America is the absence of public domain. People are feeling increasingly alienated, both from the physical environment and from each other. There is no place short of a shopping mall to go to and just be in public - to hang out and feel a part of the world. Furthermore, many people yearn for a sense of community, of a group larger than their families to which they can belong and contribute. Yet the paucity of public domain inhibits the development of this community spirit. I envision this community center operating similarly to the town square of many old southern towns: a true center of a community, a shared public domain. People might feel comfortable coming to such a place without any particular activity in mind. The provision of such a public domain would not in itself create a sense of community but it could facilitate such aspirations as already exist.

The logical place to locate a community center is near the center of a neighborhood. However, this particular neighborhood is unusual in that it adjoins the several hundred acre Franklin park. Harvard Street creates a clear boundary between the impoverished neighborhood fabric of Franklin Hill to the south and the open landscape of the park to the north. At present the two realms are very separate. The inaccessible hospital grounds act as a barrier between them.

The future of this site is presently being debated (see appendix A). The Citizens Advisory Committee has recommended that a portion of the entire 150 acre hospital site be retained as open public space. Placing a community center on the East

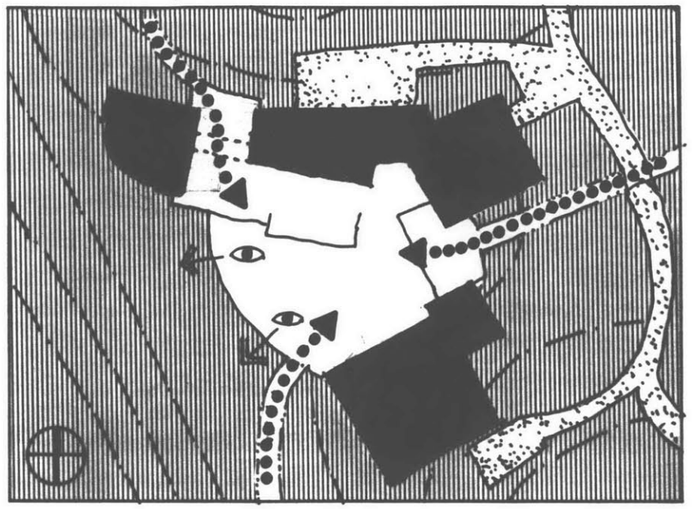
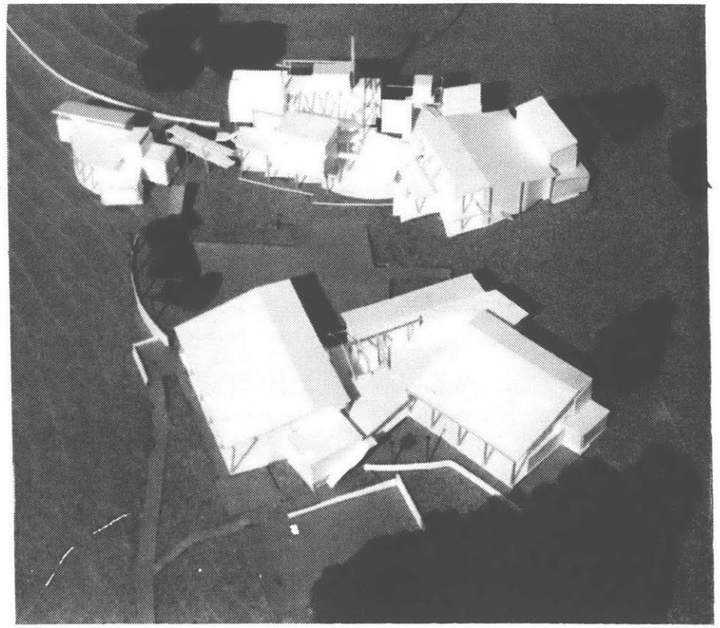
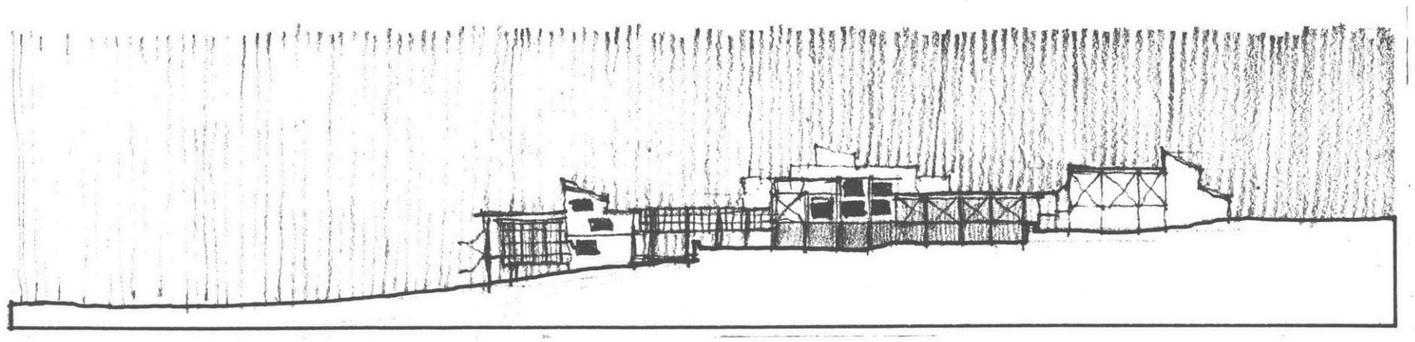


Diagram - buildings arranged around three sides of a courtyard southwest side open to views. Service access around outside.





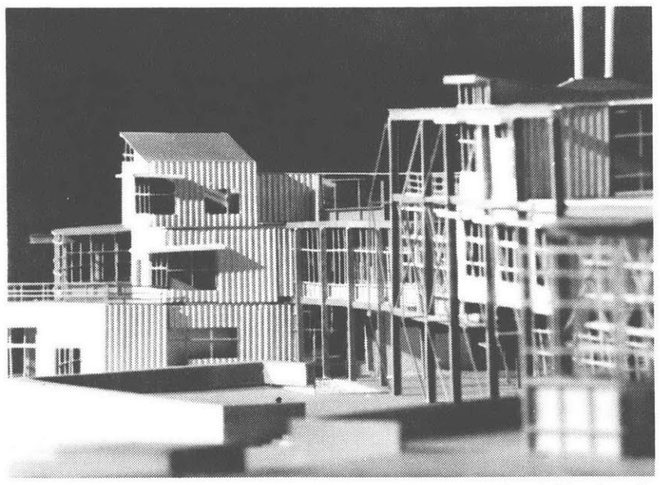
Site section - plaza placed in natural depression just below crest of hill.

campus would claim this open space for the community. It would also bridge the barrier between neighborhood and parkland, providing interaction between the two .

In addition to creating a connection between the old neighborhood and the park, a community center located on the East campus can facilitate the integration of the future development on the 110 acre West campus into the existing urban fabric. It is desirable that this new development not become an island of gentrification, totally cut off from is surroundings. Again, a community center could act as a link between these two realms, the new and the old.

The spaces of the center are organized around a plaza. This plaza would function as an agora or town common - a community gathering place and focal point. The plaza is at the confluence of three pedestrian paths, one to each domain: old neighborhood, new neighborhood and park. This plaza is at once more open than an interior space yet more enclosed and defined than an open landscape. In addition to the more sanctioned activities which surround it, the plaza could accommodate such diverse activities as flea markets, street bands, skateboard kids, etc.

The site incorporates a beautiful rolling hill that rises about 50 feet from Morton Street to the west. The hill is grassy with several stands of old hardwood trees. It has two crests with a small depression between and about 15 feet below them. On visiting the site, I sensed that this depression was the natural place to build. The various buildings of the center are placed around this natural depression, creating a plaza overlooking the stream below and looking beyond to the Blue Hills to the south-west. The buildings are placed so that only one of the old trees on the site is removed.

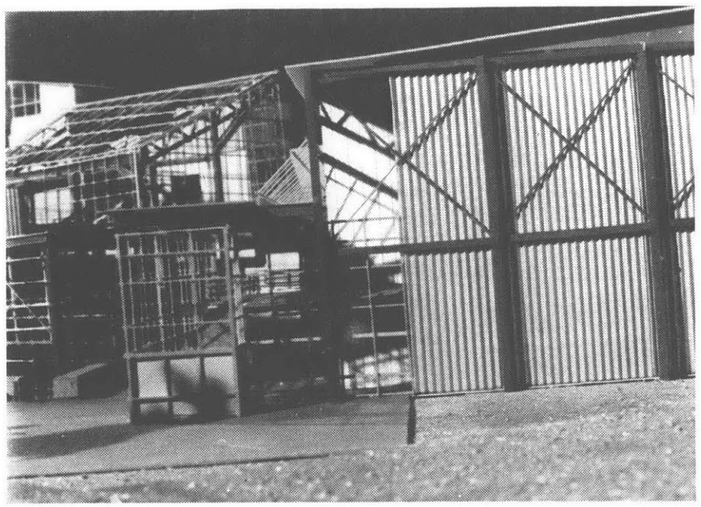


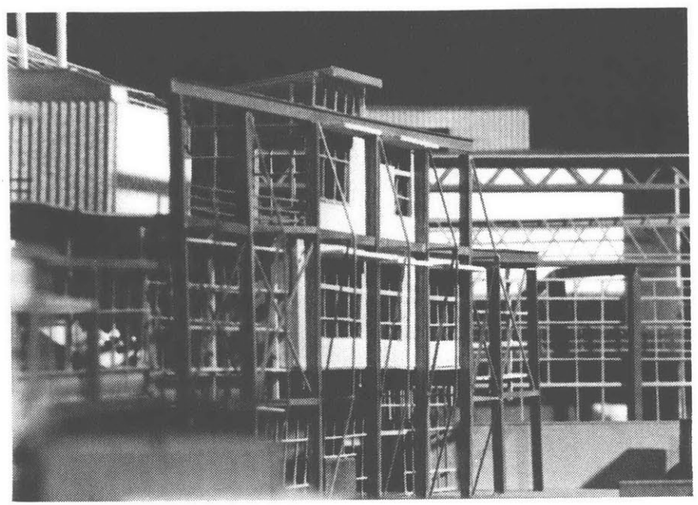
View into courtyard upon arrival from path from old neighborhood

Each of the three approaches creates a different experience of the site. The path from the new neighborhood follows the old hospital roadway across the creek and up the hill alongside a stand of young pines, then climbs up a flight of stairs onto the plaza. Approaching from this direction, one sees the buildings from the road perched up on the hill. But one does not experience the plaza above until entering it at the top of the stairs. The path from the old neighborhood approaches the plaza from above. One arrives between the theater and gymnasium onto a raised terrace. From this terrace, one looks down into the plaza, seeing the three main building entrances and the open landscape beyond. The path from Franklin Park runs parallel to the hill, following an existing stone retaining wall, the only fragment of the site's past life. One approaches the building from the north and enters the courtyard by passing under the building at the bridge between the library and the main building.

The geometry of the four component buildings of the center evolved out of the contours of the site. The large gymnasium and swimming pool buildings for example are placed parallel to the main hill. They are partially sunk into the hill to reduce their massiveness. One enters from the plaza on the second floor and goes down to the gym floor or up to the dance studio, etc. The bleachers follow the slope of the hill so that one can sense the hill inside as well as out.

Thus the location, movement through, and geometry of the plaza is such that it both fits into the physical and social context of its neigborhood and emphasizes and enhances the intrinsic qualities of the site.





Articulation between structure and infill.

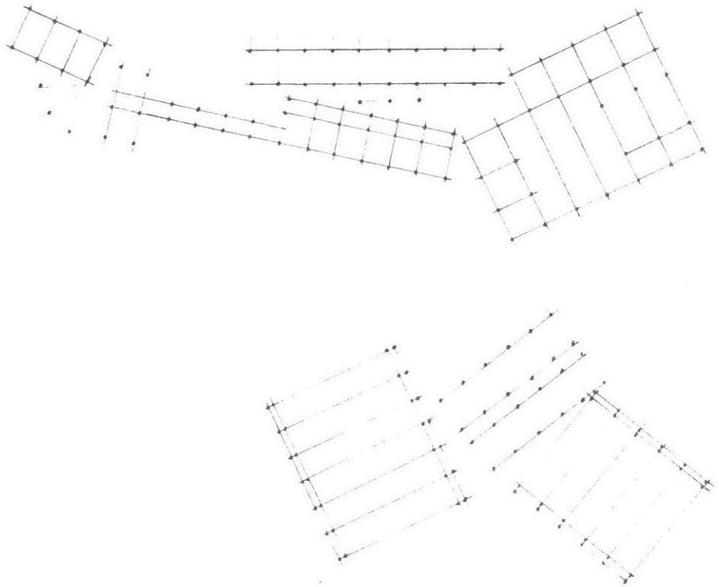


Diagram showing structural grids

Construction method

This community center will be constructed entirely in conventional off-the-shelf steel components. These components allow for flexibility and future adaptability. The primary structure will be I beam columns and beams with bar joists. The columns will be water-cooled where necessary for fireproofing. The flooring will be corrugated metal decking with concrete topping. The wall system will be of corrugated metal siding on metal studs and an extruded aluminum curtain wall system.

All the construction elements, including the structural framing, mechanical systems, operable sunshade devices, solar water heaters, elevators. etc. are left exposed. The structure is configured to maximize material efficiency. The columns are cross - braced for stability. The exterior columns have outboard tensile members to resist the bending moment created by the fixed connections at the floor beams. The mechanical system consist of three heat pumps placed on the roof, one for the gym, one for the library and one for the main building. The ducts and water pipes are located in a three foot wide mechanical zone along the north face of the buildings. Left thus exposed the building clearly shows off what it is and how it works.

There is a clear articulation between what constitutes primary structure and what is infill. The primary structure is configured on four overlapping orthagonal grids. These grids act as a datum, organizing the individual components within them. Although not completely rigid, the structure does not make idiosyncratic moves. These small scale moves are accommodated by the infill systems, the flooring and walls which move freely within the structural framework. Portions of the infill system could conceivably be removed and replaced at some future date

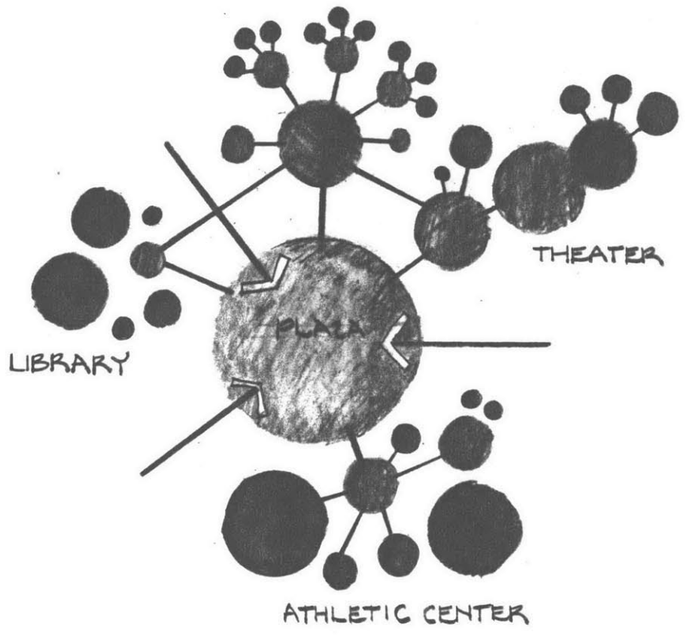


Diagram of hierarchical organization

without disrupting the primary system.

In the hierarchy of structure and infill, the structure clearly wins. Yet it does not totally control and dominate the infill. There is a good deal of latitude. By exposing the structure, this interplay between the two can be clearly articulated.

The structure is placed outside the exterior skin in order to blur the exterior edge and create a sense of depth. Furthermore, there is not a direct correspondence between structure and infill behind. In several places the structure stands free of the wall behind. The sun screens and outrigger tensile members add another layer of depth to the facade. A large portion of the ground floor enclosure is glazing. One can see into and often through the building. One perceives a progression of "insideness" of the various spaces of the center, from the open landscape, to the plaza, to the lobby / atrium, then to a specific room inside.

Content:

The basic program for this center is derived from research into publications and periodicals about community centers. (See Appendix A for program). The center is hierarchically organized from small scale to large. First, each individual activity space is configured and placed according to its own functional criteria.

These spaces are then assembled into four component buildings: the library, gymnasium, community theater and main building. The components are in turn assembled around the plaza according to their requirements for adjacency, service access, desirability of views and southern exposure, etc. The theater for example, is placed at the back of the plaza since it does not require views out. Its lobby fronts the plaza so that theater activity will help to activate the plaza at night.

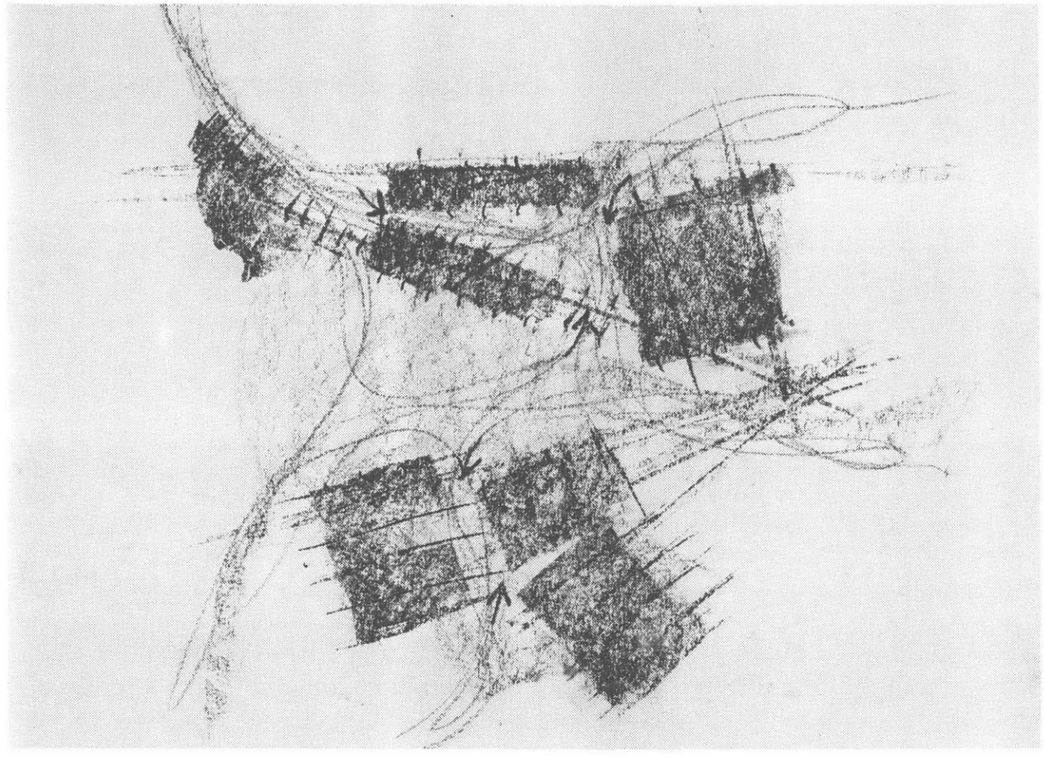
Diagram showing discrete and slack spaces on ground floor descrete spaces are black, slack ones dark grey.

The library is configured so that a bright sunny high-ceilinged reading room looks out over the field below. The art studio is placed to take advantage of indirect, northern sunlight. There is a moufrag or conference room on the top which commands a 360 degree view of the landscape. On the ground floor there is a"livingroom", a raised seating area with fireplace etc. The main lobby is a triangular atrium four stories high, with a glazed roof and activated by walkways, ramps, stairs, elevator, seating alcoves. etc.. Each of these spaces has a distinct individual character appropriate for its use. They aren't all just rectangular boxes.

Each sub-component space and each component building maintains its autonomy. They are then tied together perceptually by a loose structural framework and circulation network.

The discrete activity spaces such as classrooms, offices, etc., tend to be orthagonal and clearly defined. Yet they maintain a degree of autonomy and flexibility. They fit loosely within the structural framework. Each component building is organized within its own structural grid. These grids are displaced at different angles, allowing for slack space in between. The main lobby is such a slack space, defined by the displacement of three structural grids. One enters the lobby through the gaps between grids at each corner.

The first design moves concerned the plaza and locating the various component buildings around it. In the initial design, Components were placed at various orientations in a seemingly arbitrary fashion. In these first passes, the various components were totally disparate and unrelated.(See Appendix C - Preliminary designs). As the design progressed, it became apparent that such total autonomy was not appropriate. There had to be some sort of loose overall organization tying them



together. The question became how much organization was enough and how much was too much. I struggled with this dilemma through several preliminary designs. Each pass seemed to get a little more controlled and organized. Finally, the four structural grid geometries emerged as the datum, the organizers of the various components. Rather than each piece moving completely independently, they move independently within the structural framework. Yet this framework is not totally rigid. The structural grids are displaced according to site conditions. All the angles are based on a multiple of the 25 degree base angle. This angle is that between the athletic building which is placed parallel to the slope of the hill and the north building which is placed due east - west. This move, the geometric organization based on structural grids really tied the diverse elements together perceptually. Thus it was possible to first work out a basic design according to functional criteria then come back and superimpose some sort of compositional order.

In Conclusion, This thesis was an exploration. It began by asking the questions, What do I find so fascinating about industrial structures? and How can an observation of these structures inform my search for a more humane, environmentally sensitive and democratic architecture? Towards this end, I have proposed that it is possible to derive several formal and organizational characteristics from these structures without using "industrial forms" in a literal or associative manner.

This thesis describes four characteristics in particular which I feel are both desirable in architecture and discernable in industrial structures. Industrial structures are informal assemblages of autonomous components. They combine discrete and slack spaces. They have a blurred edge between interior and exterior. And they clearly and honestly express both what they do and how they were constructed.

Once these four characteristics were labeled, the question became how does one transform them and incorporate them into architectural design. Clearly it would be inappropriate to apply them in a superficial or gratuitous manner. So my next step was to examine the process in which these structures are designed and apply the same process to architecture. Most industrial structures are designed following a heterotropic, utilitarian functional methodology. Each component is designed individually according to its own criteria. Then the various components are fit together into a loose overall organization.

I assumed that it would be possible to follow such a methodology in architecture. To do so would require a definition of functionalism which takes into account experiential as well as technical criteria. However as the thesis progressed, it became apparent that no matter how broadly defined, functionalism

alone would not be sufficient to generate architecture. Some amount of not- so- rational formal composition was unavoidable.

I've attempted to explore these characteristics and this design methodology by designing an illustrative design. As a first test of such an approach, this design has proven quite successful. Not only does it exhibit the four characteristics but it appears as if it might be a quite pleasing community center as well.

So in the end, this thesis was an enjoyable and fruitful exploration. Yet, now that its over, I feel it was just the tip of an architectural iceberg. It has brought up allot of important issues. It has begun a personal exploration into design methodology which could one day yield some quite interesting results.

NOTES

[1]David Dunster, ed., Alvar Aalto - Architectural Monographs No.4 (New York: Academy Editions - Saint Martins Press, 1978) Heterotopia: A Study in the Ordering Sensibility of the Work of Alvar Aalto, by Demetri Porphyrios. pg.8.

2 Colin Rowe, The Mathamatics of the Ideal Villa and other Essays, "The Architecture of Utopia" (Cambridge, Ma.: M.I.T. Press,1982.) pg.215.

[3]Le Corbusier, Towards a New Architecture, (London: Architectural Press,1946.) pg. 33.

[4]Colin Rowe, The Mathamatics of the Ideal Villa and Other Essays, " The Architecture of Utopia" . pg.210

[5]David Dunster, ed., Alvar Aalto - Architectural Monographs No.4, pg.9

[6]Ibid. pg.9

[7]Behnisch and Partners - Designs 1952 - 1987, (Stuttgart, W. Germany: Editions Cantz, 1987) pg. 120

[8]Frank Werner, Architectur Ist Jetzt. (London: Thames and Hudson, 1983.)

9Henry Plummer,"Relm of the Landing" Architecture and Urbanism, Aug, 86. pg.48.

[10]Robert Venturi and Dennis Scott Brown, Learning From Las Vegas, (Cambridge, Ma.: M.I.T. Press, 1972). pg.88

[11]Rob Maulden, Tectonics in Architecture, Masters Thesis, Massachusetts Institute of Technology, June 1986. pg.15.

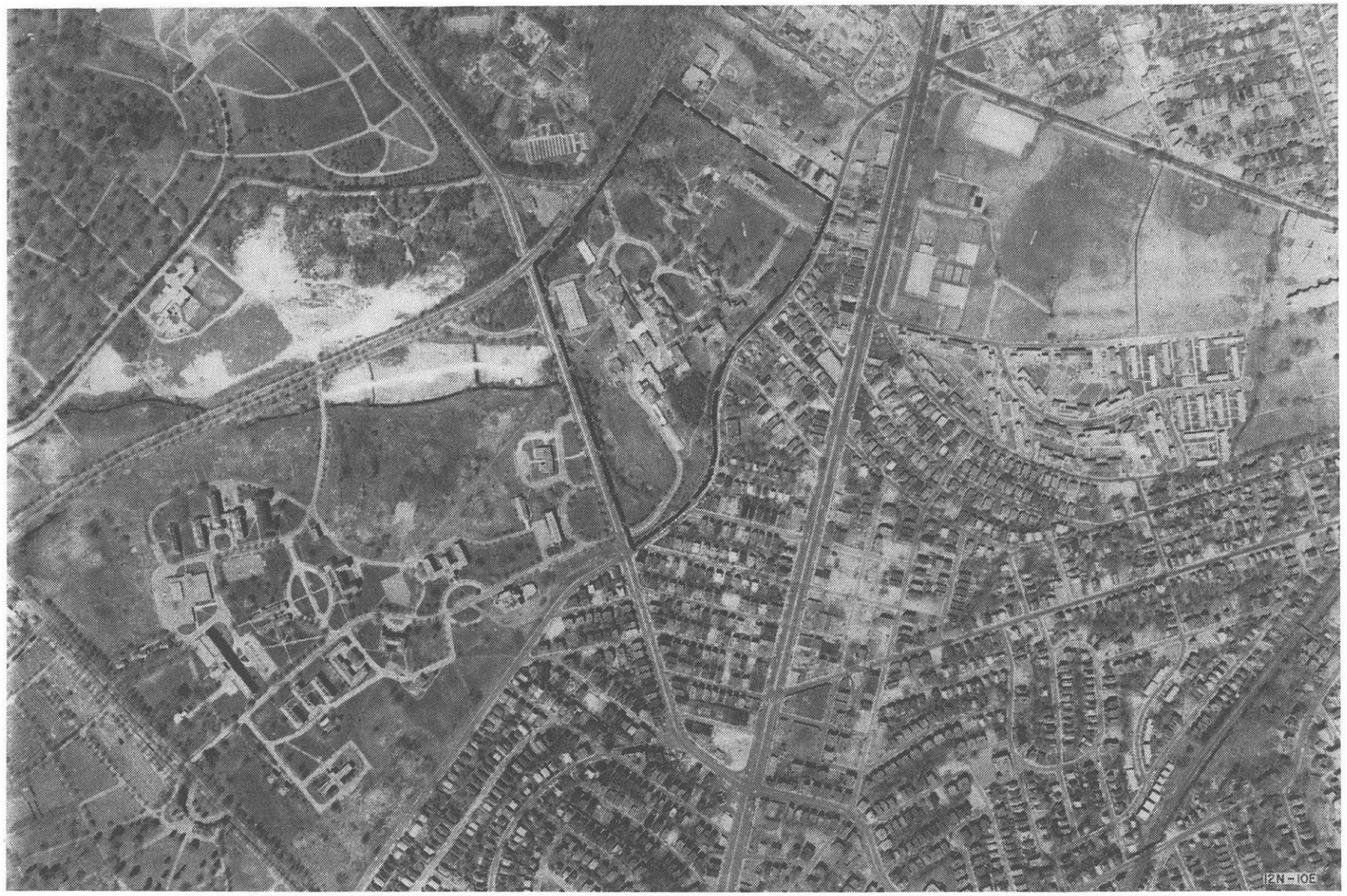
[12]Catherine Cook, Chernikhov - Fantasy and Construction, Architectural Design no.54 (October, 1984), London: A.D. Editions Ltd.. pg. 50.

[13]John Johansen, "The Mummers Theater, A Fragment not a Building" Architectural Forum Vol. 128, May 1968, pg. 66. Ibid. pg.67.

[14]Rob McCarter, ed., "Catolog of the Building: Machines exhibit." Pamphlet Architecture no 12, (Princeton, N.J.: Prineton Architectural Press, 1986.) pg. 57.

[15]From Conversations with Professor Schulitz while participating in a design studio which he taught at M.I.T. in the fall of 1987."

APPENDIX A: THE BOSTON STATE HOSPITAL SITE.



Arial photograph of site

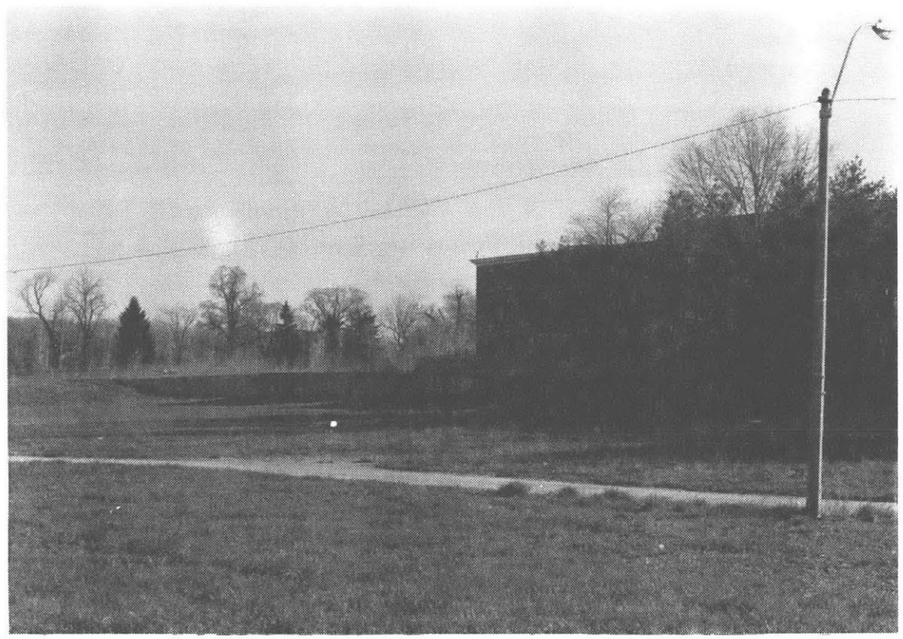
One day several years ago I discovered the abandoned Boston State Hospital campus while on a bicycle tour. I was amazed that such a large and beautiful piece of land would be left abandoned in the middle of the city. The campus occupies 175 acres of rolling hills adjoining Franklin Park in Jamaica Plain. It is about five miles out from downtown Boston.

Franklin Park is part of "The Emerald Necklace" green belt surrounding Boston designed by Fredrick Law Olmstead. The surrounding neighborhood is some of the poorest and most dilapidated in Boston. Nearby Blue Hill Avenue still shows scars from the violent race riots which took place there in the late 1960s. Unlike the South End and Roxbury closer in, this area appears to face little threat of gentrification.

The Boston Lunatic Hospital was first established on the site in 1839. At its peak in the 1950's it housed 3100 patients. With the advent of psychotropic drugs in the 1960's, treatment of the chronic mental patients changed and lunatic asylums became obsolete. By 1980, the hospital had dwindled down to only 200 patients and was closed. The state Department of mental health decided that 125 of the 175 acres were surplus and should be sold. (the remaining 50 acres are to be retained for an acute care facility).

In 1983, the Division of Central Planning and Operations held a series of public hearings to decide what should be done with the land. In 1985, a Citizens Advisory Committee was established to prepare guidelines. These guidelines were published in June 1985 . Some of their recommendations include:

- Jobs for local residents (to attract light industry companies such as Digital)
- Job training and daycare facilities
- Minority business opportunities
- 22 acres of low to moderate income housing 10 to 15 % of which is reserved for Department of Mental Health clients. High



view to site from below - plaza is located approximatly at existing retaining wall.

rises should be avoided.

- Maintaining the existing 10 acres of public vegetable gardens.
- Protecting existing wetlands and providing landscaped open public spaces throughout the site.

In Massachusetts the sale of Surplus state property requires approval of the Legislator. At present, The disposition of The Boston State Hospital site is pending Legislative action.

The State Hospital Campus is divided by public arteries into three separate parcels or campuses. I have selected a portion of the 44 acre "East Campus" as my site. The eastern half of this campus is occupied by the Department of Youth services (a center for Juvenile delinquents). The remaining half has recently been cleared of hospital buildings. The C.A.C.'s guidelines actually called for housing on this portion of the site. However, I feel this would be an Ideal location for a community center. A community center on this site would claim it as public domain while providing a useful public amenity. Also, a center on the East campus could be configured so as to tie the three seperate relms, the old neighborhood, the park and the future development on the rest of the hospital site together.

view from site towards blue hills and hospital campus

neigborhood fabric

APPENDIX B: Program for a Community Center

I. Community Theater

the theatre will accomodate a variety of uses from conventional drama to pop music to lectures to cinema. The stage is a proscenium type but has the option to be converted into athrust stage by adding a movable stage extention.

A. Theater auditorium for 400 people (at 7.75 sq. ft. per person)	3,100 sq. ft.
B. Stage / Backstage	2,000 sq. ft.
C. Lobby (adjoins main lobby)	1,400 sq. ft.
D. 100 place theatre/ lecture hall.	1,000 sq. ft.
E. Music Practice / recital room.	400 sq. ft.
F. Scenery / prop storage	750 sq. ft.
G. Scenery shop (noise isolation)	1,080 sq. ft.
H. Green room	400 sq. ft.
I. Dressing rooms 4 @ 140	520 sq. ft.
J. Backstage toilets	200 sq. ft.
K. Backstage storage	200 sq. ft.
L. Managers Office	200 sq. ft.
M. Projection / lighting booth	160 sq. ft.
Total	10,110 sq. ft.

II. Gymnasium / Athletics

A. Basketball court (with seating for 300 person)	9,000 sq. ft.
B. Swimming pool (can be partially open to outdoors)	6,000 sq. ft.
C. Weight training / exercise room.	1,000 sq. ft.
D. Aerobics / dance / multi use room	800 sq. ft.
E. Racquet ball courts 3 @ 800 ea.	2,400 sq. ft.
F. small multi use / classroom	400 sq. ft.
G. Dressing rooms 4 @ 600 ea. (separate dressing rooms for pool)	2,400 sq. ft.
H. Desk /equipment / laundry	300 sq. ft.
I. Managers office	200 sq. ft.
J. Storage	450 sq. ft.
Total	22,950 sq. ft.

III. Arts n crafts

A. Office / supplies	140 sq. ft.
B. Storage	200 sq. ft.
C. Pottery Studio	600 sq. ft.
D. Kiln room.	150 sq. ft.
E. Pottery storage / glaze room.	350 sq. ft.
F. Multi use studios - 2	1000 sq. ft.
G. Dark Room w/ storage	300 sq. ft.
Total	2,390 sq. ft.

IV. Administration/community service offices

A. Directors office	180 sq. ft.
B. Receptionist / secretary (2 per.)	400 sq. ft.
C. Offices 8 @ 140 ea.	1,120 sq. ft.
D. Mufraj / conference room.	400 sq. ft.
E. Storage / closet	100 sq. ft.
Total	2,380 sq. ft.

V. Library

A. Reading room	1,400 sq. ft.
B. Stacks	2,400 sq. ft.
C. Periodicals	400 sq. ft.
D. Entrance lobby	600 sq. ft.
E. Rest rooms 2 @ 80	160 sq. ft.
F. Circulation desk	400 sq. ft.
G. Office	200 sq. ft.
H. Storage	400 sq. ft.
Total	5,960 sq. ft.

VI. Community hall

A. Lobby / central space / circ. - subdivided into several spaces - living room with fireplace - Adjoining theater lobby	3,000 sq. ft.
B. Exhibition space (flexible gallery)	1,600 sq. ft.
C. Function / class rooms - 2	1,600 sq. ft.
E. dining room./ cafe	1,000 sq. ft.
F. Kitchen w/ storage	1,000 sq. ft.
G. Main rest rooms 2 @ 400	800 sq. ft.
Total	9,000 sq. ft.

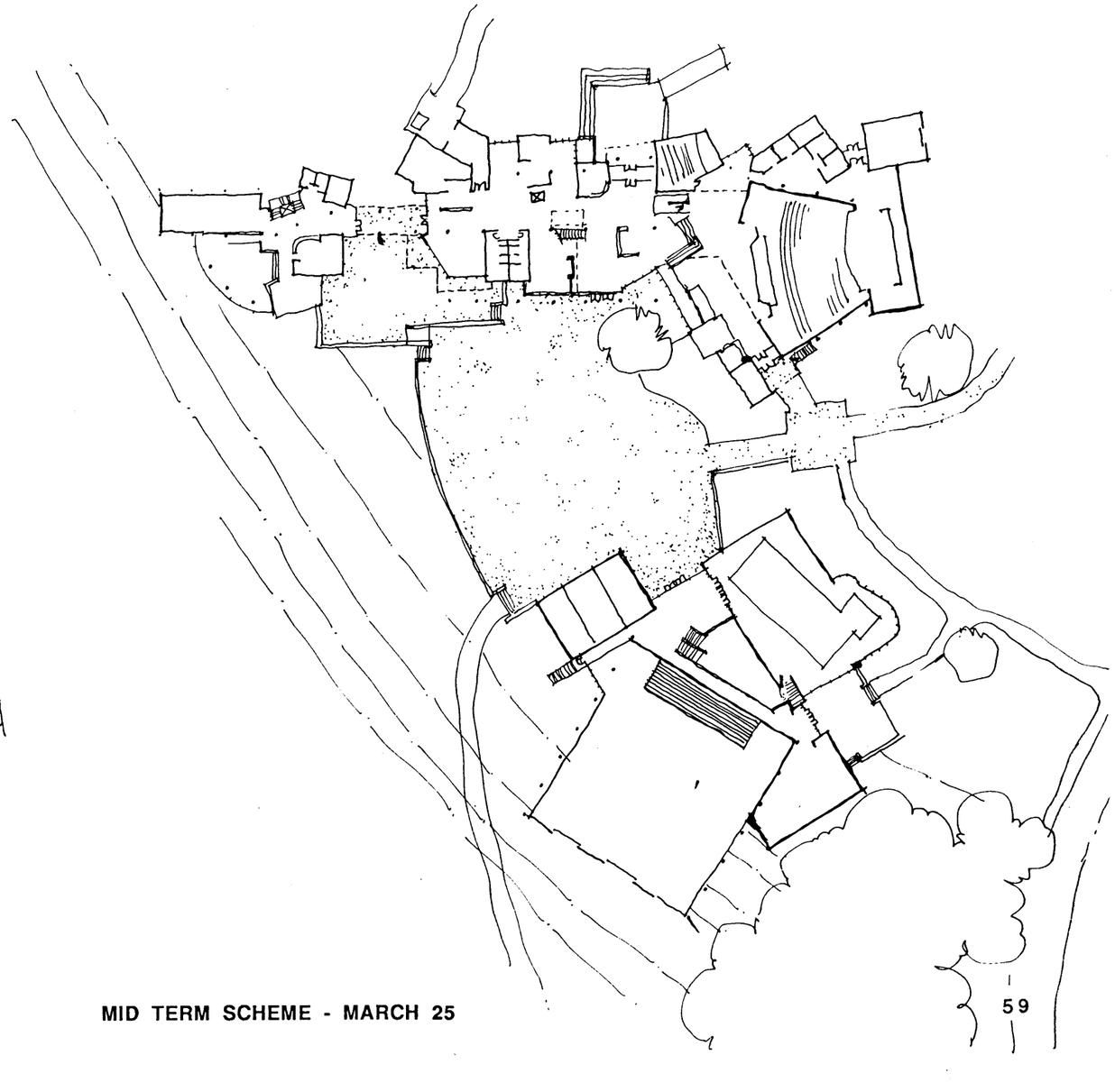
VII. Services

A. Mechanical equipment	300 sq. ft.
B. Janitor / physical plant	300 sq. ft.
C. Storage	500 sq. ft.
Total	1,100 sq. ft.

Grand Total	53,260 sq. ft.
Plus 25% circulation	66,570 sq. ft.

APPENDIX C: TWO PRELIMINARY PROPOSALS

INITIAL SCHEME - FEBUARY 2



MID TERM SCHEME - MARCH 25

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