M.I.Tomorrow:
Visions for East Campus

by

Woo-Hyun Yang

Bachelor of Science in Engineering
Seoul National University
Seoul, Korea
1982

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the
Degrees of

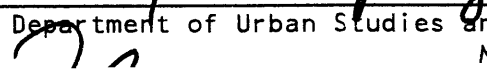Master in City Planning
and
Master of Architecture

at the

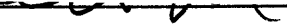Massachusetts Institute of Technology

June 1987

© Woo-Hyun Yang 1987

The author hereby grants to M.I.T. permission to reproduce and
to distribute publicly copies of this thesis document in whole
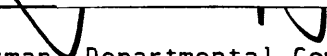or in part.

Signature of Author _____
Department of Urban Studies and Planning
May 8, 1987

Certified by _____
Dennis Frenchman
Lecturer, Department of Urban Studies and Planning
Thesis Supervisor

Accepted by _____
Phillip L. Clay
Chairman, Departmental Committee for Graduate Students
Department of Urban Studies and Planning

_____
Julian Beinart
Chairman, Departmental Committee for Graduate Students
Department of Architecture

M.I.Tomorrow: Visions for East Campus

by

Woo-Hyun Yang

Submitted to the Department of Urban Studies and Planning
on May 8, 1987 in partial fulfillment of the requirements
for the Degrees of Master in City Planning and
Master of Architecture

ABSTRACT

The intent of this thesis is to explore the future form of urban
environment that takes into account its surroundings. The M.I.T.
Campus, as an educational setting in an urban context, is selected as
an example to illustrate essential ideas. In particular, roles of the
Institute in the city and formal implications of the campus are
investigated. The visions for the future M.I.T. campus, reflecting
its ideal roles as an urban university, are transformed into a campus
framework proposal and a detailed design proposal for East Campus.

Two planning and design goals are set for the future change and growth
of the campus: clarity in physical organization and encouragement of
interactions with the outside community. These goals are determined
by a survey of the history of the campus growth, and by a diagnosis of
the physical arrangement and environmental quality of the campus.

Five organizational issues are selected and analyzed to help explore
possible options of campus organization and to formulate development
strategies for future growth and change. These issues are: campus
growth and boundary, service facilities and mixture of function, open
space and development density, accessibility, and symbolism.

Based on the two major goals for the campus, relevant results from the
analysis of the five organizational issues are chosen and refined into
a campus framework proposal. In the proposal, the campus is
reorganized to be well-defined in terms of physical organization. In
addition, to help fulfill its roles as an urban university, the future
M.I.T. campus as proposed would act as an academic, cultural and
social focal point for the community.

Thesis Supervisor: Dennis Frenchman
Title: Lecturer in the Department of Urban Studies and Planning

If it be your will That I speak no more And my voice be still As It was before I will speak no more I shall abide until I am spoken for If it be your will

.

There is a strong belief that the main purpose of planning is to provide for growth in the future, with an implicit understanding that the growth would be inevitably accompanied by a change of ideas. A change of ideas usually refers to replacing old concepts in order to cope better with new and different situations. It is quite true that most of the general architectural concepts which have spilled over into campus planning and design have come from the works related to urban planning and design. And as with urban planning and design, the most difficult phase in the process of campus planning and design is the formulation of planning principles which acknowledge the potential change and growth.

When we predict the future growth, there are several difficult problems we usually encounter; the actual speed and the rate of growth, setting of the horizon years, and stages of development, just to name a few. But, one needs to consider more than just a quantitative growth prediction in the planning process. Another decisive issue in the planning process is the prediction of future image.

M.I.T. seems to be at a critical stage in its development where a comprehensive look at its future is essential. The Institute must provide an environment stable enough to retain its integrity through changes, and flexible enough to adapt to the growth and the needs of new generations.

The main purpose of this thesis is to formulate a development

strategy to guide growth and change of the M.I.T. campus, and to develop a plan for its future image. The results contained herein make a proposal of the M.I.T. campus framework and a detailed design proposal for East Campus, and are intended to help guide the improvement of environmental quality of the campus in the future.

This thesis is constructed as follows:

Chapter I.   Investigation of the history and typology of the American campus from a particular point of view - the relationship of campus to its context. A description of ideal roles of a university in an urban context.

Chapter II.   A brief historical description of growth and changes of the M.I.T. Campus, and a diagnosis of the physical structure and environmental conditions of the campus, as a process of problem-identification.

Chapter III.   Setting of planning and design goals for the future growth and for the improvement in the environmental quality of the M.I.T. Campus. A series of discussions on possible options of five planning and design issues, which encompass campus growth and boundary, service facilities and mixture of function, open space and development density, accessibility, and symbolism.

Chapter IV.   Refinement of the planning and design issues into relevant development concepts and a design proposal - a

campus framework and a detailed design for East Campus.

This is done through selection of relevant results from

the analysis of the five organizational issues, and

through transforming them into design ideas.

CHAPTER I.

American higher education has largely adhered to the "collegiate" ideal rooted in the medieval English universities, where students and teachers lived and studied together in small, tightly regulated colleges. These collegiate characteristics of American colleges and universities contrast with the typical pattern of continental European universities, which is more often concentrated on academic matters, with little attention paid to students' extracurricular activities. American colleges and universities have required not only classrooms and other academic spaces, but also dormitories, dining halls, recreational facilities, student unions, and even social clubs which hardly found in a traditional European university.

Starting in the Colonial period, Americans began to move away from the European tradition by creating individual colleges at separate locations rather than clustering them at on location. This helped foster the autonomous nature of each college as a "community" in itself. The development of these "autonomous" colleges was further aided by another innovation, namely placing of colleges in the countryside or even in the wilderness. This romantic notion of a college in nature, removed from the corrupting influences of the city, became an American ideal. But in the process, a college had to become a miniature city, stressing its integrity as a self-contained community. And its design became, in this sense, an experiment in urbanism.

The word "campus," which means a "field" in Latin, sums up not

only the unique physical qualities of the American college, but also

its characteristics as a self-contained or self-sufficient community

and its architectural expression of educational and social ideals. In

this chapter, I will investigate the contextual implications of campus

examples by categorizing them into several types, and then examine the

social roles of an urban university, from the viewpoint of how a

college or university campus as a community is related to its context.

1.1   Campus and Context: Typology of Campus

As a logical starting ground for this study, I

will investigate, in this section, several types of

campuses from various periods and their conceptual

meanings, stressing their relationships to the context.

By doing so, we can understand the underlying ideas of

a campus layout and the trends of its development. We

can also learn the degree of interaction the campus had

with the outside world.

This approach would eliminate the superficial

knowledges based on examining only the formal issues of

the campus layout. It also enables us to discover new

dimensions of campus planning and design, which may be

highly relevant to the recent and future needs of the

campus planning process.

1.1.1   Enclosed Quadrangle Campus

Fig. 1.1

Fig. 1.2

Shapes of campuses have been influenced as much by the social and educational ideals of the time as the actual physical planning itself. In 1379, the first building form was invented in New College in Oxford (Oxford, England). It was "enclosed quadrangle," containing all of a major college's requirements: a chapel, a hall (used for dining, lectures, and other assemblies), scholars' and masters' chambers, and quarters for the head of the college. In the next two centuries, eighteen more colleges were founded at Oxford and Cambridge. These colleses, for the most part, followed the pattern laid down at New College, both in their organizations (with the arrangement of teachers and undergraduates living together), and in the quadrangular arrangement of their buildings.

There were several reasons for the use of the enclosed quadrangle or courtyard pattern at the English colleges. First of all, the quadrangular form made sense simply in terms of planning and land use. In the crowded towns of Oxford and Cambridge, colleges made the best use of small lots by building around their perimeters, thus getting the maximum building space for the acreage. Another reason was the tradition of the cloistered monastery. From an architectural point of view, the monastic and collegiate programs were nearly
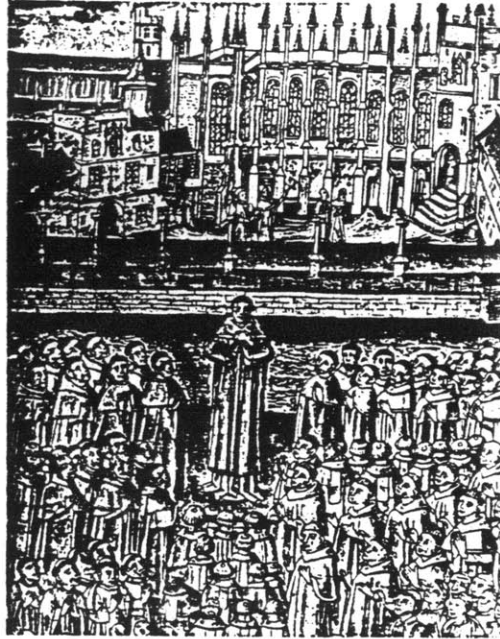
Fig. 1.1 New College,
Oxford, England
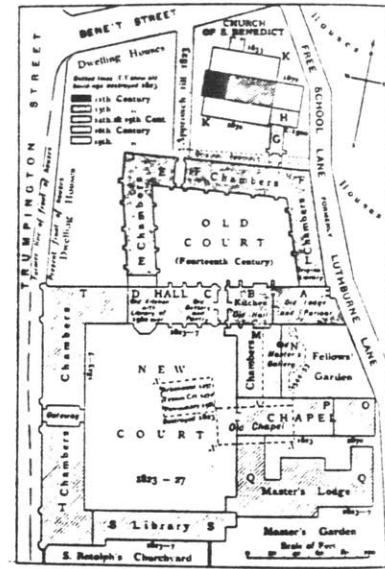
Fig. 1.2 Plan of Corpus
Christi College,
Cambridge, England

identical in that monastery basically provided the

housing for a community of unmarried men and boys, with

spaces for sleeping, eating, instruction, and religious

services. Thirdly, because of its shape the enclosed

quadrangle was useful as a defense against potential

enemies. It also enabled college authorities to close

off the college from a few gate points ,thus giving

them the advantage of greater control over the

students.

1.1.2   Three-Sided Courtyard Campus

The enclosed quadrangular form was later

transformed into several variations both in England and

in America. One of them was a "three-sided courtyard"
(or three-sided quadrangle). This new form was
believed to be from the Renaissance notion of planning,
in contrast to the Medieval concept of enclosed
quadrangular form.

The openness of three-sided courtyard suggested a
more sympathetic and less defensive attitude toward the
world outside the college. This planning concept was
popular in many Colonial colleges in America. The
outward-turning idea was expressed in form of separate,
three-sided quadrangle or its variations. Both

Fig. 1.3   Harvard's "Yard" system and William and Mary's baroque

Fig. 1.4, 1.5 "axial pattern" seemed to adopt the same opening-out
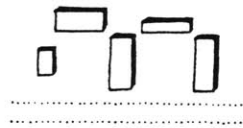
Fig. 1.3 Harvard University
in 1763. Cambridge, MA
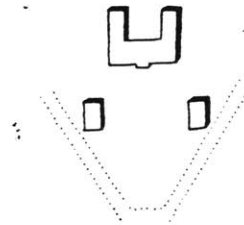
Fig. 1.4 College of
William and Mary
in 1732
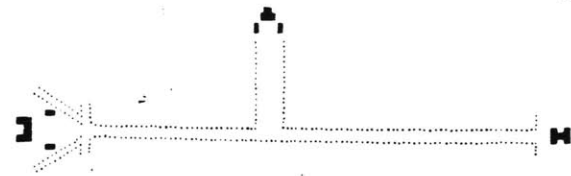
Fig. 1.5 Axial Pattern, College of William and Mary

idea in their arrangements, even though they look quite different. The intercourse between a college and the outside community, or within the campus itself was made possible by providing "common areas" surrounded by buildings and opened to the world outside.

1.1.3   Linear Campus

Fig. 1.6   When the famous "Yale Row" was conceived in the eighteenth century, it was hailed as a bold and impressive innovation in collegiate planning, in that
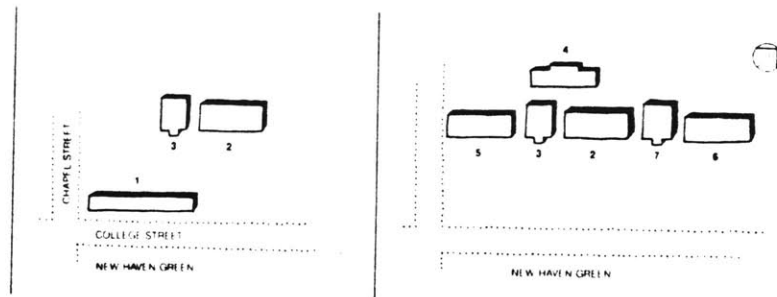
Fig. 1.6 Yale College in 1717 and 1803
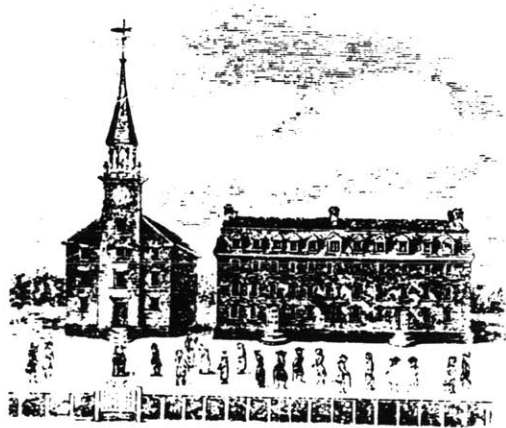
Fig. 1.7 Yale College in the 1780's

the structure was to be an integral part of its urban
environment. Yale College was laid out in a linear
fashion, facing a large green space - New Haven Green.

Fig. 1.7

This urbanistic concept was very unique because of
the buildings' relationship with respect to the street,
and also because the campus could provide various
activities for both the students and the community
members. Therefore, the uniqueness of the Yale Row is
owed mainly to its urbanistic arrangement, and not its
linear shape. This type of arrangement later helped
develop urban colleges such as Johns Hopkins University
in Baltimore, and M.I.T.'s old campus in Boston.

1.1.4   Linked-Structure Campus

As colleges became bigger and their needs for more
buildings on campus grew, a new concept of campus
planning was invented: linked -structure system. This
concept originated from the Ramee's plan for Union
College (Schenectady, New York). The plan was a
variation of the three-sided courtyard pattern, the new
concept being that a series of buildings were linked by
arcades, surrounding the central courtyard.

Fig. 1.8

The idea was refined later in the Jefferson's idea
for University of Virginia (Charlottesville, Virginia)
- a "pavilion system" of linked structures along the
colonaded sides of a mall, the Lawn, with a central

Fig. 1.9

structure, the Rotunda, as a focal point. The nature
of Jefferson's design was an "academic village" - a
group of buildings, each having its own independence
and individual character, just like a town.
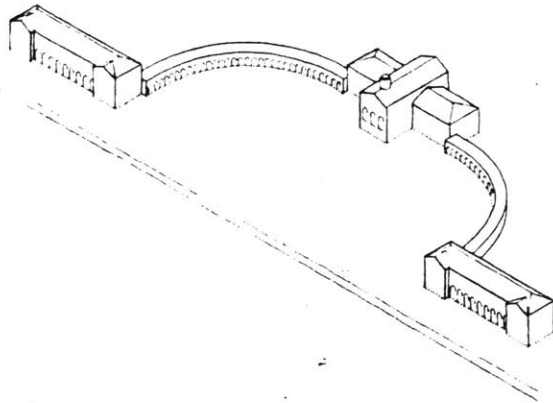
Fig. 1.8   Union College
by Ramee
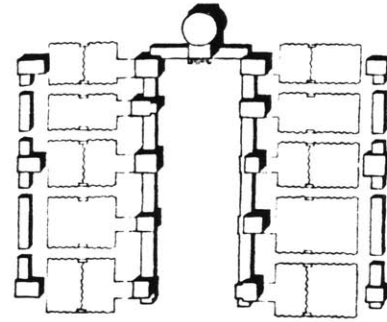
Fig. 1.9   University of
Virginia,
designed by Jefferson

By 1900, the Beaux-Arts system of architectural
planning had come to the service of the new type of
university - the Beaux-Arts Campus. But this concept
is considered to be the same idea as the Jefferson's in
that many buildings were related and linked each other
for the purpose of making the whole complex as a "self-
sufficient" university city. Some examples of this

Fig. 1.10   concept are: Standford University masterplan,

Fig. 1.11   University of Chicago, and Columbia University.
Fig. 1.12
        While Beaux-Arts architects generally approved of
Jefferson's design, they were not totally satisfied
with it, and subjected it to transformations in their
own plans. The Beaux-Arts system was at its best in
creating unity out of variety. Modifications from the

Fig. 1.10   Masterplan of Stanford University, 1888,
by Olmsted and Coolidge

Fig. 1.11
University of Chicago,
Rendering of Master
Plan, 1893

Fig. 1.13   Masterplan of M.I.T., by Bosworth

Fig. 1.12   Masterplan of Columbia University, 1894

Jeffersonian pattern were achieved in various ways, principally with the Beaux-Arts device of creating secondary axes and subsidiary groupings of buildings.

Fig. 1.13   M.I.T.'s new campus plan in Cambridge was an example of designs based on the Beaux-Arts system: it called for extended wings and a large structure with interrelated buildings, in order to encourage the interrelationships among departments, which is appropriate to a technical school's orientation or curriculum.

1.1.5   Village Campus

Fig. 1.14   At Princeton (originally College of New Jersey) in 1746, another unique pattern of placing a college in an open space was devised. A large building, Nassau Hall, was erected a good distance from Nassau Street. The spaciousness of the area between Nassau Hall and the road and the generally rural character of the campus were appropriately expressed by the term "campus." This distinct physical environment was characterized by spacious village green, away from the traffic and the outside world, in contrast to the cloistered European quadrangle.

This idea of a campus in rural surroundings was continued by several rural colleges in the nineteenth century, which tended to emphasize the natural environment regardless of their actual locations.
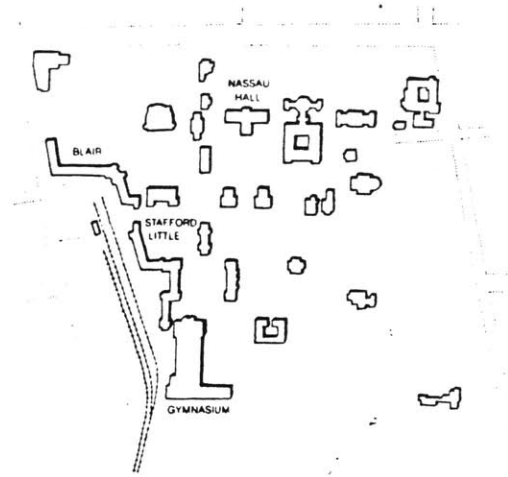
Fig. 1.14 Plan of Princeton University, 1909

Frederick Law Olmsted adopted this idea and
developed it further in designing the College of
California at Berkeley. The most remarkable thing
about Olmsted's plan for Berkeley was its conception of
the college not as a separate entity, but as an
integral part of a large community whose special
physical character would promote a beneficial
environment for the students. This new idea of the

Fig. 1.15 Cornell University in the 1880's

campus as an informal group of buildings in a park-like

setting gave the flexibility needed for future

development. In other words, it made possible to

accommodate the unforeseeable future needs of an

institution. A similar planning idea was used in the

Fig. 1.15   Cornell University plan.

1.2   Urban University and Its Roles

As reviewed above, the five distinctive types of

campuses have their own formal implications, mainly of

educational ideals. The attitudes of colleges and

universities toward their contexts have been changed

very much by educational ideals. And they have had a

direct bearing on the campus plan's physical form.

In many cases, modern university campuses are

located in cities and they constitute intergral parts

of the physical structure of urban areas. When we

consider a university in a city, the campus cannot be

conceived as a separate entity due to the complexity of

the city. In this sense, urban universities may

receive more attentions in their formal implications

and their roles in the city.

Accordingly, a university should exist as an

entity which has positive relationships with the city

in many aspects. An urban university cannot be

isolated, and needs connections to the bigger environment in which it is located. This notion of an urban university supports the idea that a university is not merely a place for academic learning, but also a place which belongs to the urban communities where various activities occur.

Here, the emphasis is to be put on what roles a university should play as a part of its urban

University as Resources

environment. First of all, an urban university should be the heart of a city in terms of the utilization of resources available in the university. One of the central purposes of the university ought to be to use its resources, talents, and energies to improve the quality of its own immediate urban environments, and to eliminate the obstacles wich may prevent the full enjoyment of the benefits of an urban civilization.

Improvement of Amenity & Service

Secondly, a university should provide an opportunity or potential for improving local amenities and services. This role can be accomplished by appropriately arranging the university's physical environment. This would require the campus being structured in such a way that outside communities have an easy access to the facilities available on the campus. Again, the campus must not be an isolated castle with a wall separating itself from the outside communities.

Public   Another related role of an urban university should
Participation
                be to encourage as much public participation as

                possible in university activities. Both informal and

                formal contacts with the public would ease the tension

                between university and the public, which most urban

                universities face. The conflicts with the outside

                community, especially when a university tries to expand

                its campus, could be eased by allowing the community to

                be involved in the decision-making process in campus

                planning.

1.3   M.I.T. and Its Context

                M.I.T,'s main objective has been educating

                engineers and scientists. However, emphasis on a more

                broad-based education in recent years has led to

                improvements and more attention being paid to the

                campus environment and extra-curricular activities of

                students. With the increase of enrollment, the

                Institute has tried to foster community identification.

                One of the most obvious areas of concern is the role

                the Institute should play in the community to which it

                belongs, as the Institute stretches beyond its present

                boundaries in terms of size, and influence.

Fig. 1.16   The M.I.T. campus is situated on a stretch of land

                fronting the north shore of the Charles River basin in

Cambridge. It occupies a continuous one and one-third of a mile long strip of shore overlooking the city of Boston. The location, which is near the heart of the Boston Metropolitan area, and the size of the campus alone make the Institute an important and powerful entity in the Boston area.

In spite of these advantageous locational characters, the Institute is not fully utilized as a useful resource by the nearby urban areas. Because of the Charles River, at least a visual relationship has been established between the M.I.T. campus and the city of Boston. However, that is not the case of its relationship with Cambridge, visually or physically; for example, ambiguous boundaries, poor accessibility, traffic problems, and so on. One of the reasons for these problems is that M.I.T. has been expanding at a rapid rate, perhaps due to the availability of barren sites nearby, without considering its impact on the surrounding communities. At the same time, the M.I.T. campus has been quite closed to public in terms of accessibility of its facilities. This may be partly because of security reasons of the research projects.

Despite the aforementioned problems, M.I.T. has considerable potentials to become a successful partner with the city of Cambridge, and to strenthen its

Fig. 1.17   relationship with the Greater Boston region.
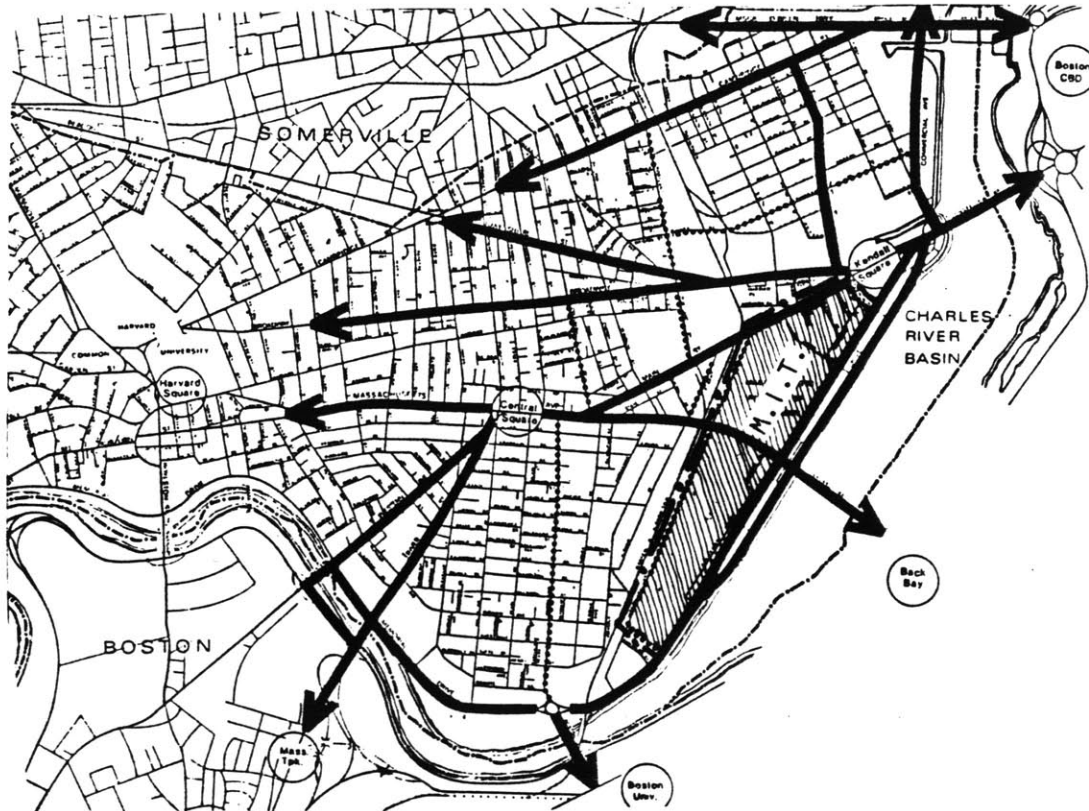
Fig. 1.16 M.I.T. Campus in Cambridge

Fig. 1.17 M.I.T. Campus in its Regional Context

CHAPTER II.   GROWTH WITHOUT PLANNING

The history of the M.I.T. campus can be summarized in short as "growth without planning." Except the original masterplan of Bosworth, the M.I.T. campus seems to have expanded just to meet the demand for more facilities, without any conscious planning at an overall campus scale. This resulted in only the "growth in size" of the campus, unaccompanied by a corresponding "growth in quality."

The following sections present a brief history of the M.I.T. campus in relation to its context, and a diagnosis of the campus based on study of the campus history.

2.1   Growth of the M.I.T. Campus

Boston   M.I.T., founded in 1860, built its first building
Campus
                  in the vicinity of Copley Square in Boston.

                  Subsequently, six structures were constructed in the

                  area and they were crowded together, with no open space

                  in between for relief or expansion. The M.I.T. campus

Fig. 2.1   in Boston was very typical of technical schools in that

                  it was is composed of several buildings in city blocks

                  for convenience.

                      However, one special feature of the Boston campus

                  was that Boston's cultural center grew around the

                  Institute and thus, provided the students with an

easier access to cultural and social opportunities than
possible today. The Boston Public Library, the Museum
of Fine Arts, theaters, and churches were concentrated
around the Copley Square area.
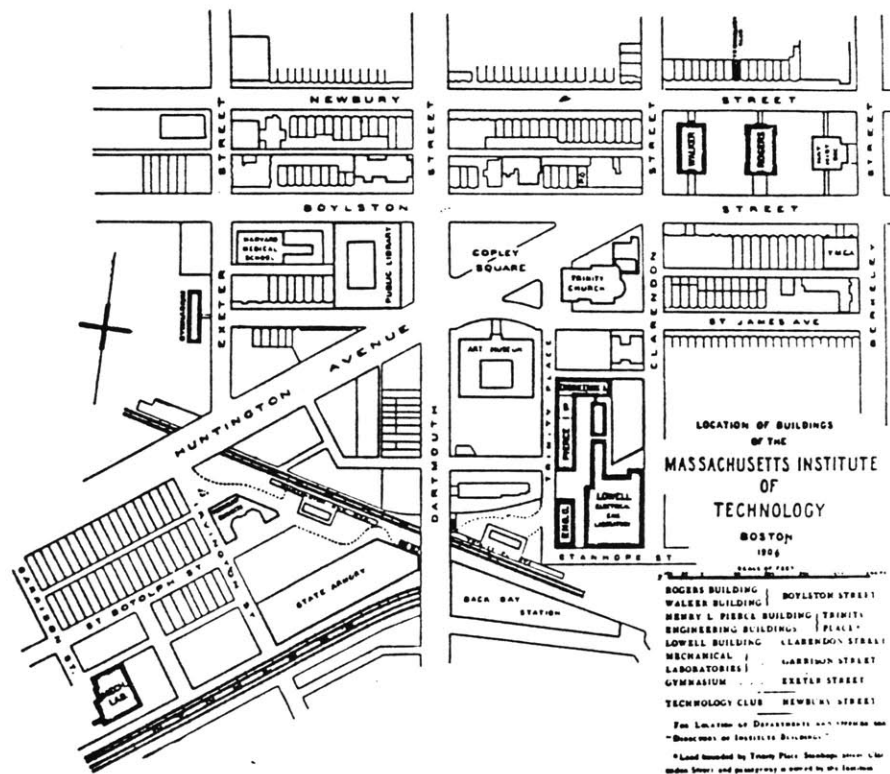
Fig. 2.1 M.I.T. in Boston, 1904

Cambridge
Site

Fig. 2.2

After half a century, cramped for space at its
original location, the Institute purchased 43 acres of
land east of Massachusetts Avenue in Cambridge,
extending from the railroad behind Vassar Street to
Charles River. When M.I.T. made its decision to
relocate its campus to Cambridge in 1911, the filled
land which it now occupies was mostly vacant. Laid out
in residential lots of row house width, the land had
hardly been developed in the years following the

opening of the Harvard Bridge in 1890.

Fig. 2.2 M.I.T. Site before coming of the Institute,
1903, Cambridge Atlas
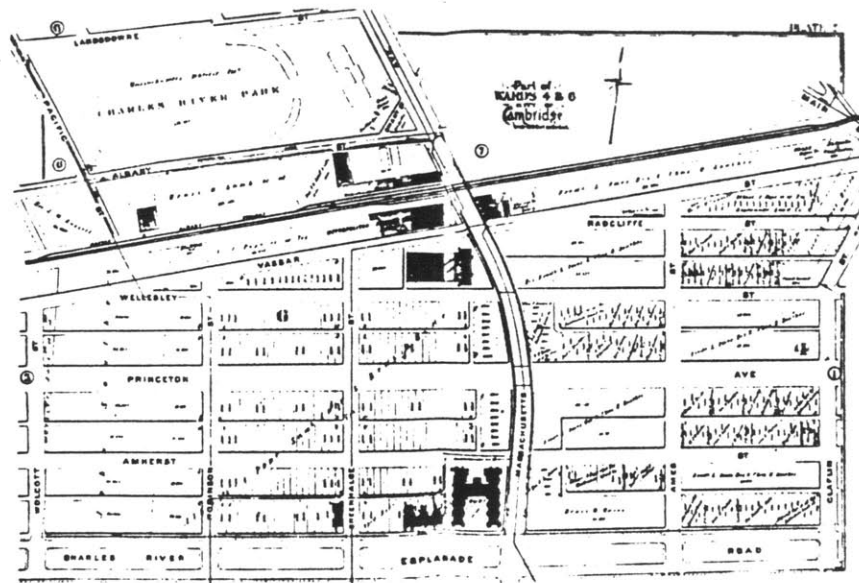
Masterplan   M.I.T. faculty and alumni were determined to build

student facilities on the Cambridge land as well as

academic and laboratory buildings. The proposed

location for student facilities was along Massachusetts

Avenue, near the residential district around Riverbank

Court (now M.I.T.'s Ashdown House) rather than near the

manufacturing district on the north and east edges of

Fig. 2.3   the property. But, Welles Bosworth, who was

commissioned by M.I.T. for designing its new building

and the master plan, reversed the scheme envisioned by

the Institute, feeling it was important to have the

academic or study facilities on the western section

because of its proximity to the public transportation:

he thought the Kendall Square subway would provide an

adequate and facile access to students facilities

placed on the east side of the plot.
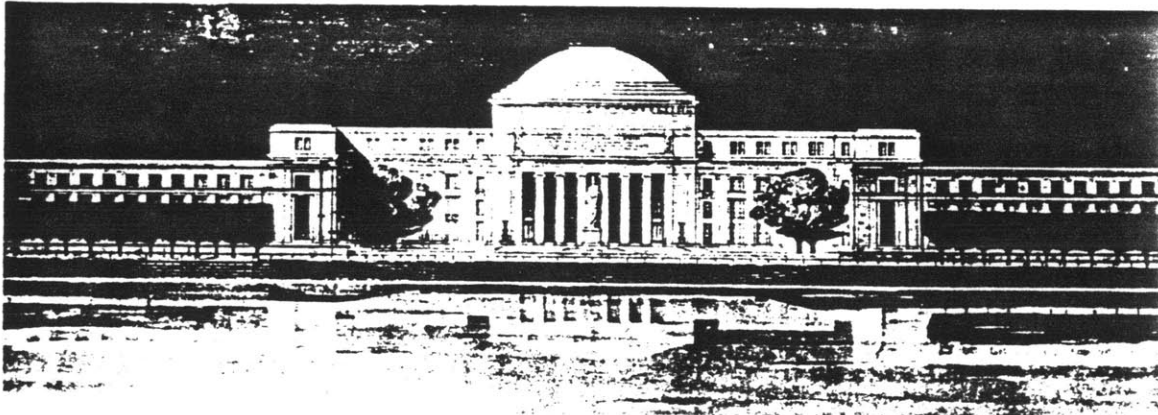
Fig. 2.3 Original M.I.T. Masterplan by Welles W. Bosworth

Charles
River

Fig. 2.4

One obvious and remarkable idea in the Bosworth's
master plan was to use the bank of Charles River as
part of the Great Main Court (now Killian Court), by
climaxing a series of descending paved terraces with a
platform at water level. His design for Walker
Memorial showed the similar design idea with rows of
trees that flanked the sides of the court and the
roadway along the river. Even though the main court
with steps and unimpeded access to the Charles River

did not appear in subsequent drawings, in 1923,

Bosworth was still working on the relationship of the

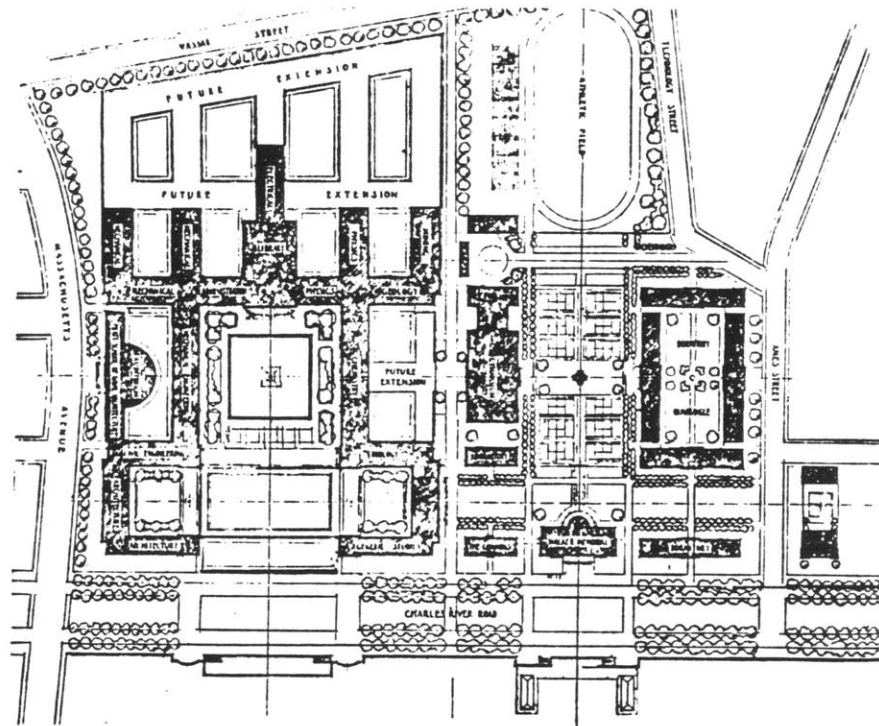main court facades to water; a drawing shows a large

pool there.

Fig. 2.4 Bosworth's M.I.T. Plan

Main
Complex
                Before the World War II, the campus had been

shaped by arranging departmental buildings, chiefly

based on the original plan. The campus was in general

efficiently arranged and differentiated in form. The

great main court was surrounded by the main complex

where the major academic departments, research and

classroom facilities were concentrated in one

Fig. 2.5   structure. The idea was that four story buildings

would be continously liked altogether, at all levels,

free of interior bearing walls, within which academic

space could be freely assigned according to needs. The

flexible interior construction, therefore, could be

readjusted with a minimum of effort and cost, as one

department grew or another contracted.

Mass.   This main complex had been filled out and balanced
Avenue
with additions during twenty-three years. In 1937, a

new entrance to the Institute was opened on

Massachusetts Avenue. This new entrance became a major

access point to the campus since that time and

overturned the orientation and framework of the whole

campus from a north-south directional arrangement to

east-west directional one.

Vassar   The north side of the main complex and Vassar
Street
Street was developed into another complex of single

structures. These buildings did not need to be

connected each other and did not depend on close

integration with other departments. They were designed

to house heavy and noisy machinery, so natually they

were located in separate, low buildings. This was a

contrasting feature to the main complex which consisted
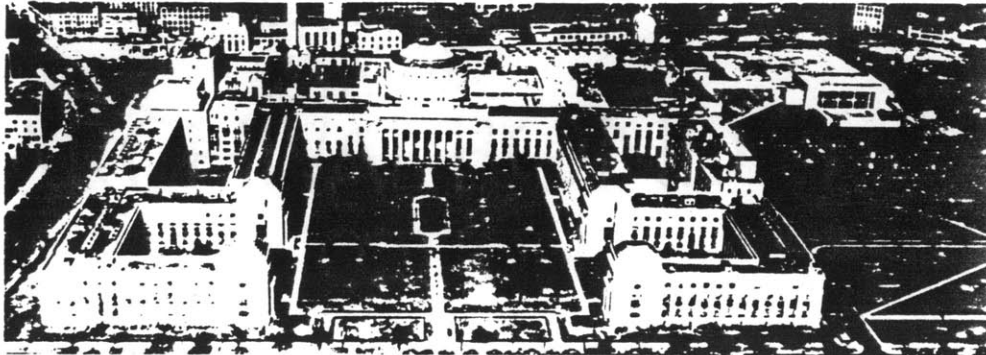of connected and relatively higher buildings.

Fig. 2.5 M.I.T. Campus in 1940

Student
Facilities

In the Bosworth's original plan, the student
facilities were located on the eastern portion of the
site, including two dormitory quadrangles, Walker
Memorial for dining and indoor recreation, a running
track and an athletic field for outdoor sports, and
Alumni Pool. The athletic facilities were centralized
and located as a buffer zone between dormitories and
academic complex. The students who lived on the campus
could move from activity to activity with minimum of
time and effort, because all the supporting facilities
were nearby.

After M.I.T. purchased the land west of
Massachusetts Avenue in 1924, some of the student
facilities were relocated there and some new facilities
were built on that site. With the additions of Chapel,
Kresge Auditorium, and Student Center later on, the
West Campus has become the center of student amenities

which Bosworth had originally intended to occupy the

eastern portion of the original site.

During the war years, non-academic needs of

Fig. 2.6   students life were stressed in organizing the campus,

resulting in provision of extensive housing and

recreational facilities, and the development of

atheletic facilities, which shifted the focus of some

activities from East to West Campus. The idea was to

provide more cultural and social facilities than ever.

As a result, the original framework of campus land use

largely disappeared even though activities were still

centralized.

Fig. 2.6 M.I.T. Campus in 1946

Expansion to   Postwar constructions have focused mainly on
East & West

student housing and recreation facilities, chiefly on

the west side of Massachusetts Avenue. These

a. 1916 - 1938

b. 1939 - 1945
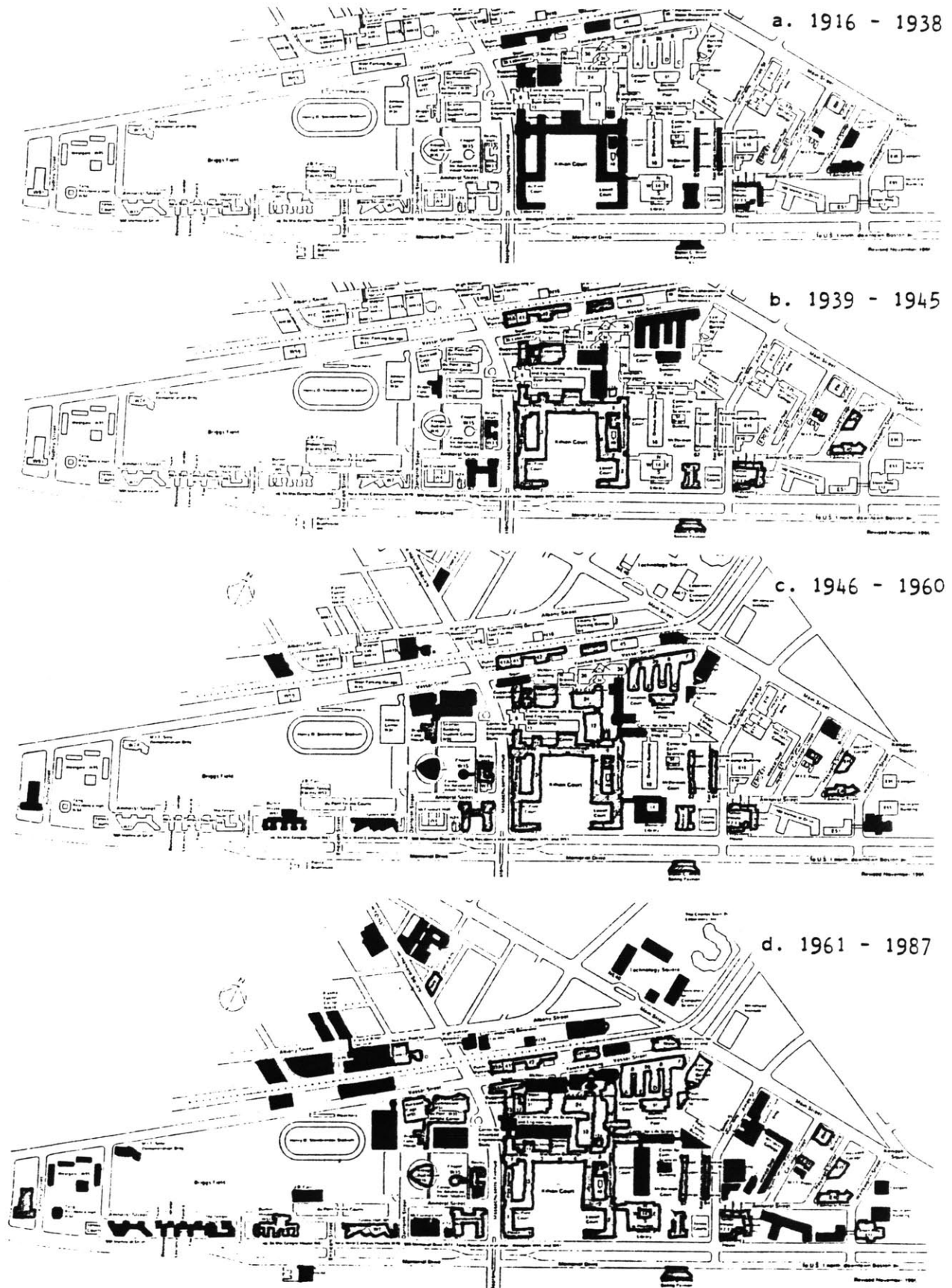
c. 1946 - 1960

d. 1961 - 1987

Fig. 2.7 Growth of M.I.T. Campus

developments came from re-evaluating attitudes toward
the place of student life at the Institute. However,
there has also been a significant growth in the
academic facilities which characterized lateral
expansion to both west and east. Many new buildings
were connected to the main complex, and some were built
at the edge of the existing campus. With the rapid
Fig. 2.7   increase of the campus in size, complete centralization
has proven to be difficult.

2.2   Diagnosis of the M.I.T. Campus

        As reviewed in the previous section, M.I.T. has
grown and expanded in many ways and for many reasons.
The growth is obvious in that the size of the campus
Fig. 2.8   has increased from 43 acres in 1911 to about 200 acres
in 1982.

1911 :
43 Acres

1930 :
90 Acres

1962 :
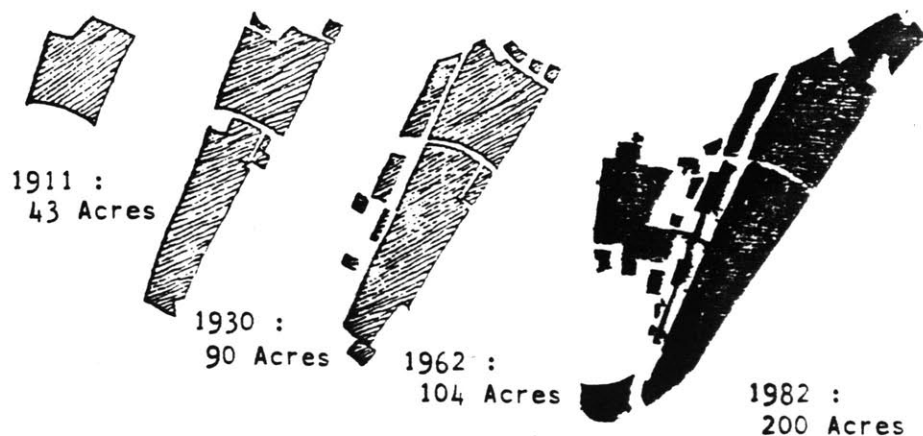104 Acres

1982 :
200 Acres

Fig. 2.8 Expansion of M.I.T. Campus

In this section, I will discuss two major
organizational problems of the M.I.T. campus, based on
study of the campus history.

Lack of
Clarity

First, the campus lacks clarity in spatial
organization. Clarity in organization is especially
required in the case of gradually-grown environments,
such as the M.I.T. campus. The main body of the M.I.T.
campus has been constructed on empty lots in the manner
of attaching new buildings to the old ones and outdoor
spaces having been molded and transformed in the
process.

As a result, Bosworth's clear differentiation of
land use and activities in the original plan has
largely disappeared or has been destroyed. And a new
system of spatial organization has not been
subsequently developed to take its place. This has
resulted in problems of usage. Many users have
suffered from inconvenience of having to orient
themselves in the complicated buildings and to find the
hidden access ways to outdoor open spaces. The
building layout without an understandable spatial
hierarchy makes for monotonous environments, and
structures and building forms of different kinds throw
users into confusion.

Strategic development plans could transform the
campus into a better environment with a conceivable

organizational order. Improvement of environmental
quality on the campus can be accomplished by the
provision of systematic frameworks of campus layout and
by a proper amendment of poorly-defined spaces on the
campus.

To summarize, the problem of lack of
organizational clarity which adversely affects using
and reading the campus was caused by the previous
development plans, which were based on local plannings
and ad-hoc designs without considering the overall
system of the campus.

Lack of   The second organizational problem of the campus is
Interaction
the lack of communal and social spaces; there are not
enough spaces which can attract people to get together
for various activities. The communal spaces would
function as places for social and cultural interactions
or information-exchange environments, as well as for
academic purposes.

According to the history of M.I.T. campus,
orverall integration of the facilities has been tried
by a method of "interconnection." The idea of
"interrelation" of the main complex in the original
plan has been misinterpreted and resulted in merely
"interconnected" buildings. This issue of
interconnected buildings is very much related to the
problem of lack of organizational clarity. Many

buildings were added and attached to the main complex,
simply by following the previous interconnected models
of the main complex. The interrelation idea had been
based on practical reasons associated with the school
being technical in nature, to spatially connect related
departments spatially so as to aid the cooporation
among departments. Some buildings in the main complex,
however, are connected to one another even though the
departments occupying the buildings are not really
related.

The interpretation of interrelation concept should
be broadened to include social and cultural
interactions as well, besides academic goals. It
implies that the social and cultural interactions with
outside should also be encouraged for the fulfillment
of the interrelation ideal as an urban university.
Social and cultural interactions are a crucial
component of an urban university. In this sense, the
M.I.T. campus desperately needs more communal spaces
for the social and cultural interactions between the
M.I.T. community and the nearby urban community.

CHAPTER III.   OPTIONS FOR CAMPUS CHANGE

It is one of the aims of any campus plan to inject the ideals of
the university as an academic, social and cultural organization, into
the proposal for its physical organization. Throughout the history of
the M.I.T. campus, the organizational problems have been caused mainly
by the problems in planning.

It can be said that all the malfunctions, discomforts, and
inconveniences in the campus stem, directly or indirectly, from the
inadequate campus planning and consistent design execution. In this
regard, a campus master plan and design guidelines must be prepared to
keep the campus in a suitable order, and to guide future developments
so that the academic, functional and social ideals could be
accomplished at the Institute in successful and flexible manner.

In this chapter, two major goals are set for the improvement in
the environmental quality of the M.I.T. campus, based on the diagnosis
of the campus. Furthermore, five organizational issues are discussed,
which are considered critical in determining the future of the campus.
By doing so, appropriate options for the change of the M.I.T. campus
can be selected and combined to construct an ideal framework. These
actual synthesis procedure and a framework proposal are presented in
the next chapter IV.

3.1   Goals for the Future M.I.T. Campus

           From the look at the history and the diagnosis of

the M.I.T. campus in the previous chapter, it was found

that there are some serious organizational problems in

the campus framework. To summarize those problems: the

M.I.T. campus has grown without conscious planning at

an overall campus scale, and as a result, only the size

of the campus has grown, without the accompanying

improvement in the environmental quality.

           In order to improve the quality of the M.I.T.

campus, two major goals should be accomplished in

future planning and design. These goals are directly

derived from the two major organizational problems of

the campus, lack of clarity in organization and lack of

interaction.

Clarity in   First, clarity in spatial organization should be
Organization
considered. Since whole campus is put together

randomly with no consistent system of organization,

certain organizational and spatial hierarchies have to

be developed in order to increase the degree of order

on the campus. Along with it, decisions have to be

made on destruction and renovation of worn-out

buildings on campus.

Encouragement   Secondly, social interactions should be encouraged
of Social
Interaction   on campus. In other words, the relationship between a

group and an individual must be considered, and

communal and social spaces should be provided for the

interaction on campus. Since the ideal of a university

is to satisfy the need for an exchange of ideas,

M.I.T., as an urban university, should provide not only

academic opportunities but also social and cultural

opportunities both for individuals and groups. These

opportunities would increase the interactions between

individuals, groups and communities.

These two goals for quality improvement at the

M.I.T. campus should be reflected in the future campus

planning and building design, so that the campus has a

desirable environment for academic, social and cultural

activities. In the following section, five

organizational issues for the future M.I.T. campus

framework are discussed in consideration of the

M.I.T.'s role as an urban university, by relating each

issue to two major goals described above.

3.2   Organizational Issues for the M.I.T. Campus

The following five organizational issues have been

chosen because they are considered to be critical to

the organization of M.I.T. campus in the future. Each

issue is presented along with various possible generic

options, without subjective design projections on the

context. The characteristics of potential solutions

for each issue are described one at a time, without
combining them with other solutions under the other
organizational issues.

It is worthwhile to mention that the evaluations
on each option are to be made on the basis of two
criteria; those are the two major goals for the future
M.I.T. campus, Clarity in Organization and
Encouragement of Social Interaction, previously
described in Section 3.1. Following this
investigation, attempts are made to relate those
options to the context of M.I.T. The actual synthesis
procedure will follow in the next chapter, and will
consist of selecting appropriate options and combining
them so as to construct a whole campus framework.

3.2.1   Campus Growth and Boundary

A campus tends to grow in size, mainly due to the
increase of enrollment and need for more facilities.
The growth of a campus can take one or more directions.
On the other hand, a boundary has a static connotation
; it defines a physical realm. Therefore, logically
there is a conflict between the static nature of
setting a campus boundary and the dynamic nature of
the campus growth.

Three types of interrelationships between campus
growth and boundary conditions are possible: a) balloon

growth, b) fringe growth, and c) germ growth.

a) Balloon Growth

Campus grows in all directions just like an inflating balloon. This type of growth destroys old boundaries whenever the campus expands. Ideally it maintains the pre-existing pattern of growth within the new boundaries. It may require a special site which has no physical barriers around to allow growth in all directions.
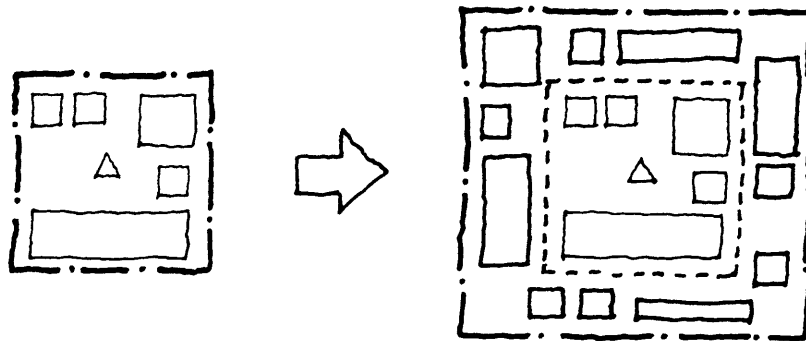
One characteristic of this growth is that the center of the campus is strung inward as the boundary of the campus grows outward, in order to sustain the organizational structure of the campus. Interactions within the campus can be successful, and clarity of campus organization can also be sustained after expansion, as long as the campus framework is well structured for new growth from the beginning.

b) Fringe Growth

Under this type of growth, main body of the campus remains same as before the expansion, and only fringes of the campus are transformed. It is an easy way to expand a campus in that this type of growth breaks only a few points of the existing boundary for expansion, which is safe enough to retain the organizational structure of the original campus.
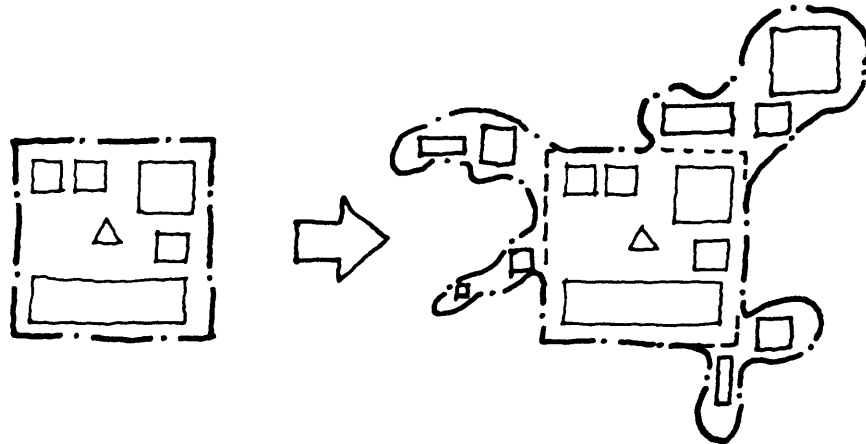

Because this growth is an additive process, it is convenient when a campus does not require much additional facilities at each expansion. Needed facilities can be added at fringes without requiring any major reorganizational process. The fringes may be arranged at those places where the interactions with the outside are to occur.

c) Germ Growth

In this type of growth, the campus grows by locating new sites for development at strategic spots

at the time of expansion, where buildings and outdoor
open spaces are arranged with time, thus the name "germ
growth." This type does not actually have a clear
campus boundary because the campus is composed of
several groups of buildings at different locations.
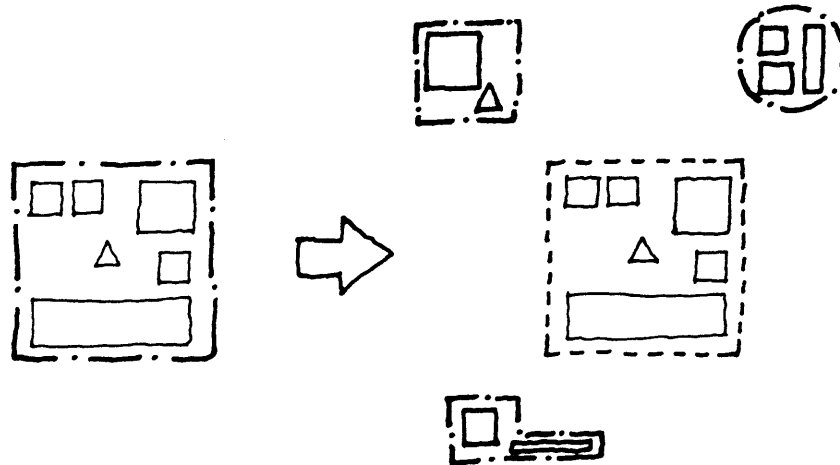
Examples are urban universities located in
densely-developed city blocks; academic facilities are
completely mixed with other functions of the city.
Each group of buildings has a great opportunity to
respond to the surrounding environment.The university
can share its facilities with outside users and vice
versa, and the city can share its own facilities with
students. However, it is accordingly difficult to
achieve organized integration within the campus.

MIT
Context

The M.I.T. campus has expanded mainly via Balloon
and Fringe Growths. In its early days, the campus
enlarged like a balloon except to south direction where
Charles River is located. As the campus has expanded

45

over the years, the railroad, at the northern edge of

the campus, has always been a tough barrier to expand

over. Therefore, the east - west direction was

preferred as the main direction for expansions.
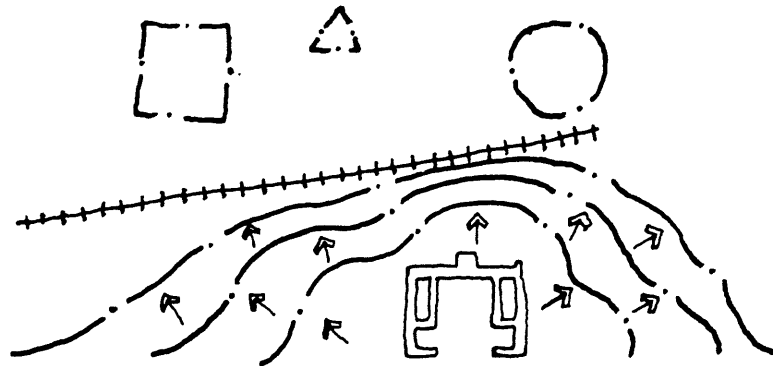
Overall boundary of the M.I.T. campus is not well

defined except on the south side - Memorial Drive and

Charles River. And ideal urban mix of campus

facilities with surrounding urban functions has not

been reached yet. Especially, the east and west ends

of the campus are ambiguous in terms of spatial clarity

They do not give a feeling of a campus boundary, but do

have a lot of potential to be developed in the form of

"fringe growth."

Fig. 3.1
Fig. 3.2

The Tech Square Project and recent Simplex Site

Proposal are good attempts of "germ growth." Especially

the Simplex Site Proposal suggests a new way of

expanding the campus, as a self-sufficient community

with various functions within it. The main issues of

concern are how this site would be related to the main

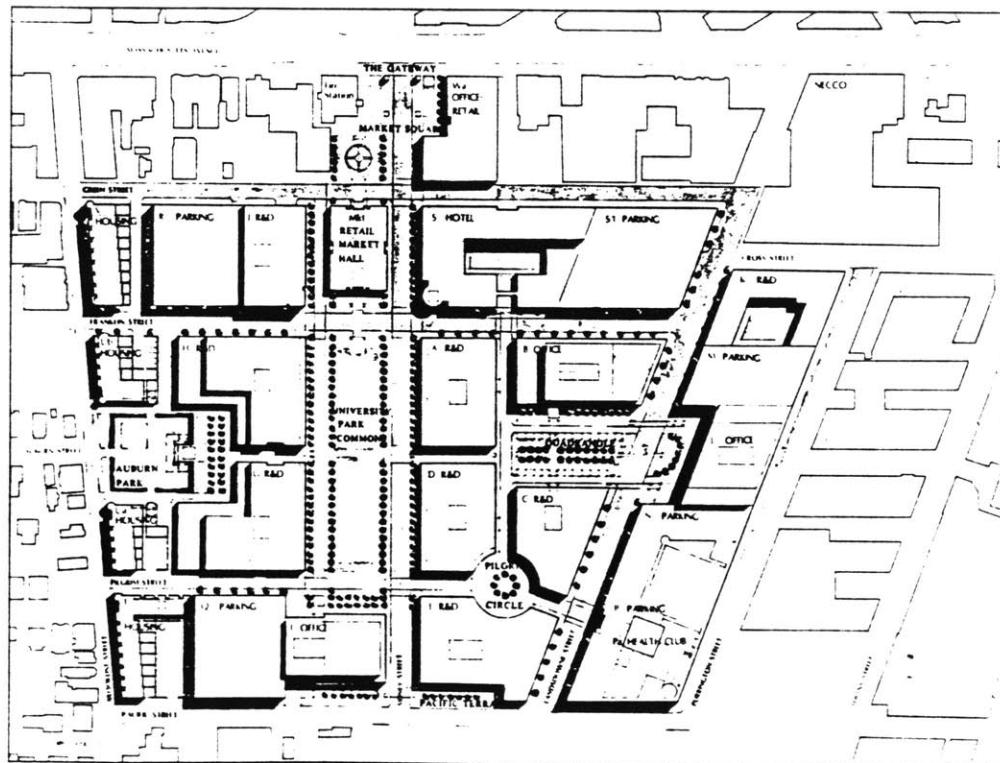body of campus, and how new facilities are to be used.

Fig. 3.1 Tech Square Project

Fig. 3.2 Simplex Site Proposal

3.2.2   Service Facilities and Mixture of Function

As far as functions of Architectural elements are
concerned, there is a simple relationship between
served functions and serving functions. It is quite
convenient to sort all participating functions into
those two groups of functions. Major service functions
(serving functions) act to serve the rest of functions
(served functions). This notion assumes an ideal
mixture of functions. Various campus functions should
be mixed in such a manner that undesirable discomforts,
inconveniences, or malfunctions can be avoided.

Major functions of a university are usually
categorized into four groups, they are academic
facilities, administrative functions, housing, and
service facilities. Among these four functions,
service facilities usually constitute a prominent core
of buildings, because the service facilities function
as a social center of the whole campus, and it serves
other functions in various ways.

There are three ways of locating service
facilities on campus: a) Centralized Service Core, b)
Multiple Service Nodes, and c) Disaggregated Service
Facilities.

a) Centralized Service Core

When a campus has aggregated service facilities at

a central location, that part of the campus becomes a
functional core. This pattern is quite common in many
campuses for the purpose of integrating the campus by
means of service core.
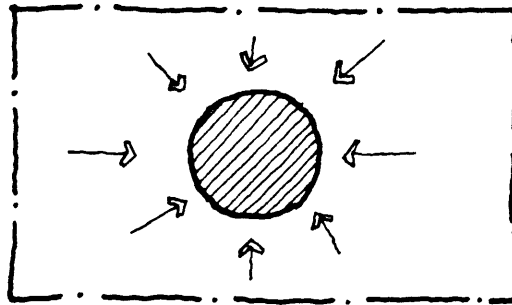
By centralizing service functions in one area,
diverse and active activities and interactions among
campus community members can take place there, aided by
the access to service facilities. Also, clarity in
campus organization can be easily achieved with a
service core. This however, may not be suitable for a
large or a rapidly expanding campus, because some parts
of the campus may not be within easy reach of a service
core.

b) Multiple Service Nodes

When the size of campus is too large and buildings
are scattered all over, or when a campus needs fast and
efficient services, one service core is not sufficient
to support all the other functions of the campus. In
this case the campus needs several service nodes at
different locations. So, a series of nodes each with a

few service functions can be arranged throughout the
campus, and the whole campus is organized by means of
these node areas.
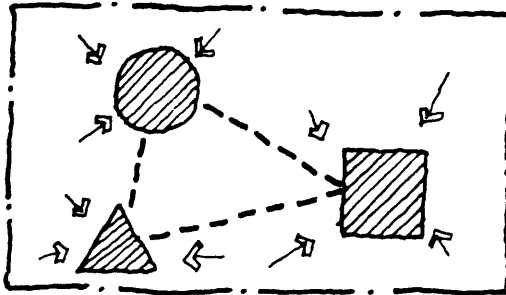
By locating multiple service nodes where needed,
the rest of the functions can get easily served. This
system may have an integration problem, in that service
facilities are dispersed so that all of the necessary
services can not be obtained at one node. This problem
may be overcome by characterizing the nodes with
different features and connecting them by a proper
design.

Under this scheme, clarity in campus organization
may not be easily accomplished unless the relationship
of the service facilities to other service facilities
is successfully established.

c) Disaggregated Service Facilities

Another way of locating service facilities on
campus is to distridute all the service facilities
without grouping them at certain locations. One
service is provided in one building and the building is

kept at a distance from the other buildings with other services.
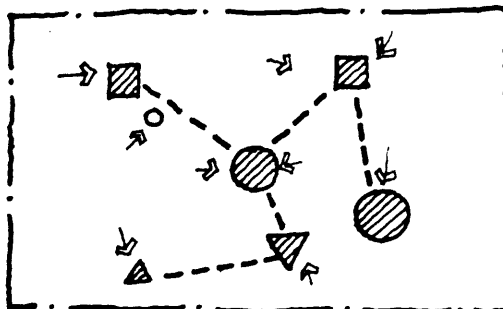
One of the advantages of this type is an easy access to a certain service facility from the surrounding area. However, this pattern differs from the Multiple Service Nodes pattern in that access to different kinds of services is not possible at one service point. It poses a serious problem to campus integration. Because there is no single area of grouped service facilities, the campus as a whole may be lacking in clarity, and little interactions may occur.

MIT
Context
The original M.I.T. campus plan had its service core on the east side of the main complex: sports facilities, dining hall and swimming pool. Since M.I.T. purchased the west side of land of Massachusetts Avenue, some of the facilities from the old core had been relocated to the site opposite to the Building 7. And more service facilities have been constructed there, including sports fields, a gymnasium, a student

center, a chapel, and an auditorium.

At present, this area has become a major service core. This core is near and convenient for users from the main complex and for outside users. However, it is too far to reach from both ends the campus, because of the long and narrow shape of the campus.
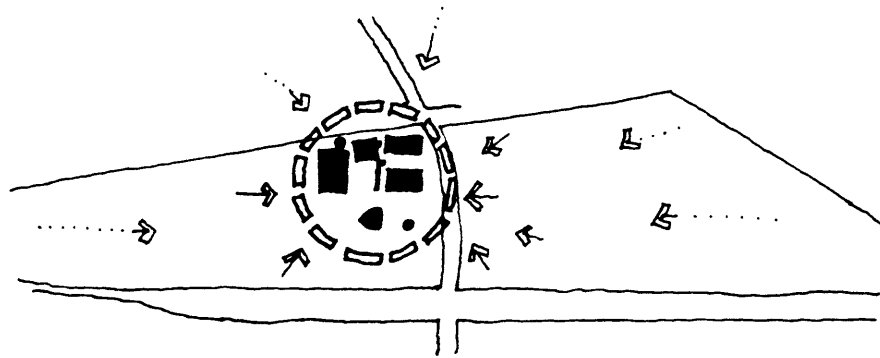
The last remark points out the necessity of having more service cores at the M.I.T. campus. Also, existing facilities of the core are not enough to serve all the social and cultural activities of students, faculty and other users. As potential sites for new service nodes or service buildings, Kendall Square area on East Campus, Westgate parking lot, Alumni Pool area, and Art & Media Technology Building area may be suitable. An addition of a few more service nodes or buildings on those locations could rearrange the framework of campus into a better organizational system.

The Kendall Square are in particular is especially attractive as retail shops, bookstore, restaurants, and

the medical center are already sited there. The M.I.T.

Coop. has recently decided to relocate there. More

recreational, cultural and social facilities can be

accommodated to provide services for users from the

campus or from outside. The idea of a node on this

area would encourage and increase the social contacts

of the M.I.T. community with the outside, by using its

locational merit in the regional context and its

transportational advantage.

3.2.3   Open Space and Development Density

          Once the size of development site is given, the

density of development becomes a critical issue for the

project. The issue of development density should be

considered carefully because it is directly related to

the availability of open space.

          Open space is crucial because of its direct

bearing on the outdoor life on campus, and the

pedestrian circulation. Generic alternatives are a)

horizontal campus, b) vertical campus, and c) mixed

one.

a) Vertical Campus

          Most of the buildings on the campus are high rise

buidings, thus the provision of relatively more open

spaces is possible. On this type of campus, only a

small portion of the site is occupied by buildings to
accommodate the required floor area, and the rest of
the site can be utilized as either open spaces or
outdoor circulation spaces.
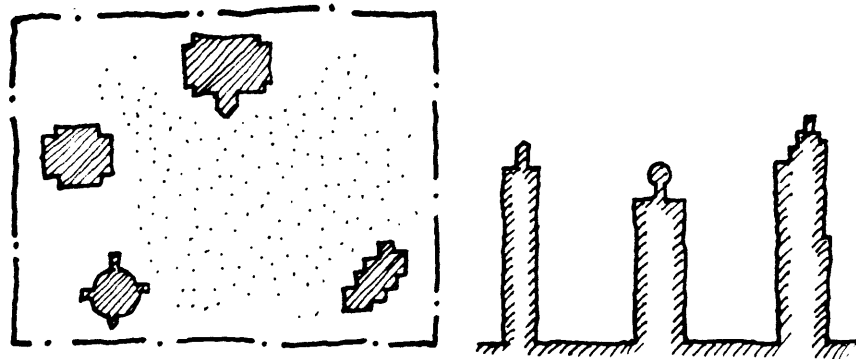
This development concept may require a skillful
designing of buildings and outdoor spaces, to avoid the
risk of having free-standing buildings with a barren
environment.

b) Horizontal Campus

Campus is covered by low rise buildings with
minimum amount of provisions for outdoor space. This
choice excludes unnecessary vertical circulations so
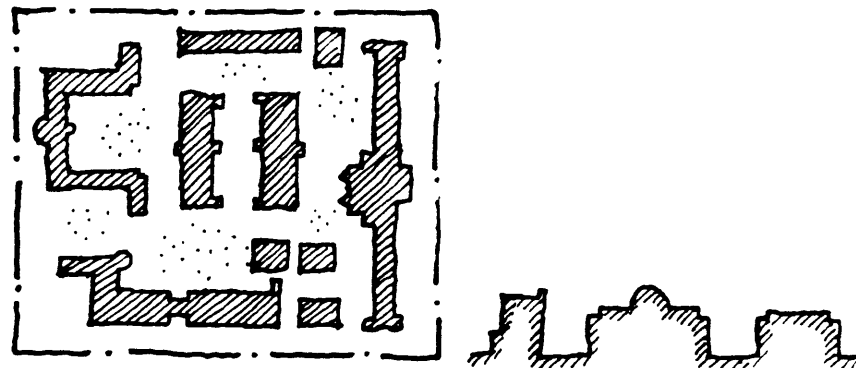
that the horizontal spatial flow through floors is
strenghtened.

It may be more comfortable in the human-scale
environments mainly because of the height of buildings.
However, that benefit is somewhat offset by less open
space.

c) Mixed One

Under this scheme, a campus is usually composed of
many four or five story walk-up buildings and a few
high rise buildings. It is a common design tool to
differentiate the oveall form of campus by giving a
contrast in massing, several visually prominent high
buildings mixed with many low rises.
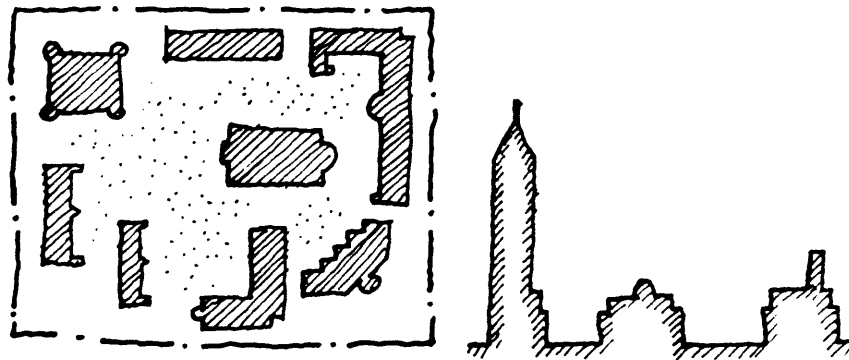
MIT
Context

In the M.I.T.'s original plan, a system of four-
story buildings continuously linked together at all
levels was established. This design concept, together
with limited amount of available open land for
building, has resulted in the campus becoming a dense
physical arrangement, with few open-spaces besides the

main court, Killian Court, and having primarily an
internal pedestrian circulation system. Therefore,
social interactions tend to occur mostly inside the
buildings, and most of the outdoor courtyard spaces are
at present used for parking.

Notable highrise buildings are the 23-story Earth
Science Tower in the middle of campus, Eastgate Tower
at the east end, and Westgate High-rise and Tang Hall
at the west end. It is interesting to note that except
for the Earth Science Tower, the rest of them are
residential towers and located at the fringe areas of
the campus. It indicates that the M.I.T. campus has
kept the horizontal image as a technology and science
school.

Even if M.I.T. acquires vast amount of land for
expansion in the future, at least some of the new
buildings could be high rise buildings for more open
spaces. Also, any potential courtyard system must not
be changed to parking lots as has been done in the
past, and must be well utilized as outdoor open spaces.

Redesigning the existing courtyards occupied by cars is
also desirable. It is one way of improving the
M.I.T.'s physical appearance and encouraging outdoor
activities.

3.2.4   Accessibility

        Historically, the concept of "motion" in
architecture was part of the aesthetic theory developed
at the Bauhaus in the 1920's. It was especially
appropriate to the dynamic and changing nature of the
American university after World War II. In the
following years, both pedestrian and vehicular movement
began to influence campus planning in significant ways,
and inspired a whole new approach to campus design. By
the mid-1960's, many architects and planners were
considering circulation as primary shaper of campus
form.

        Ideally, an urban campus should be easily
accessible from the surrounding street system and urban
environment, and there should be ease of movement for
both pedestrian and vehicular traffic. On the other
hand, internal circulation network of the campus should
provide access to major service facilities and key
places of the university.

        Campus' social interaction to outside usually
occurs at access points, and the degree of interaction

would be highly determined by access patterns. It is

desirable that the pedestrian circulation structure of

the campus should afford a setting for casual as well

as organized social interactions.
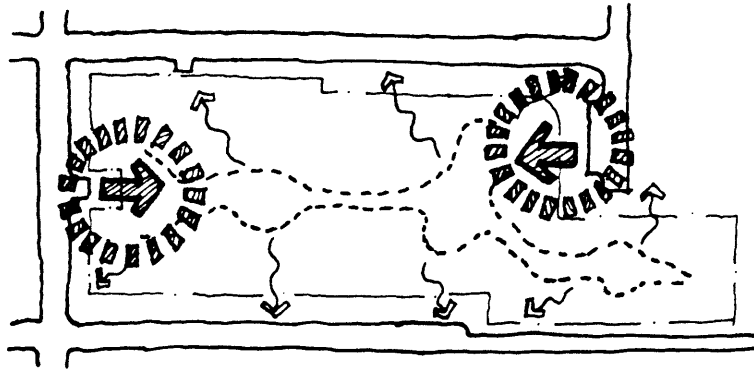
It is difficult to categorize access patterns or

circulation systems by a certain criterion, because

each campus has a unique access pattern and a

circulation system, mostly determined by its context.

Therefore, a variety of solutions for this issue are

possible and the judgement on their merits should be

made in consideration of school's character, its

context, and the school's policy on the degree of

openness to public, and so on.

MIT
Context

At the M.I.T. campus, the access pattern is

generally obscure and visually incongruent. The formal

entrance to the whole campus is obviously the one from

the Killian Court, but it is rather ceremonial and

symbolic. The principal entrance, in terms of traffic

flow, usage and accessibility, is the one at 77

Massachusetts Avenue. It is interesting to note that
the latter is the main entry point to M.I.T. despite of
the visual prominence of the former.

Another important but informal entrance is the one
to Building 1 from Massachusetts Avenue. This entrance
experiences heavy traffic by students from the West
Campus residential area, in spite of its poor physical
environment. Entry to the East Campus from Kendall
Square and Vassar and Main Streets is confusing and not
evident although many commuters and off-campus
residents use it as an entrance to the main realm of
M.I.T. This spot has a great potential to be changed
into a well-defined gateway from outside to the campus.
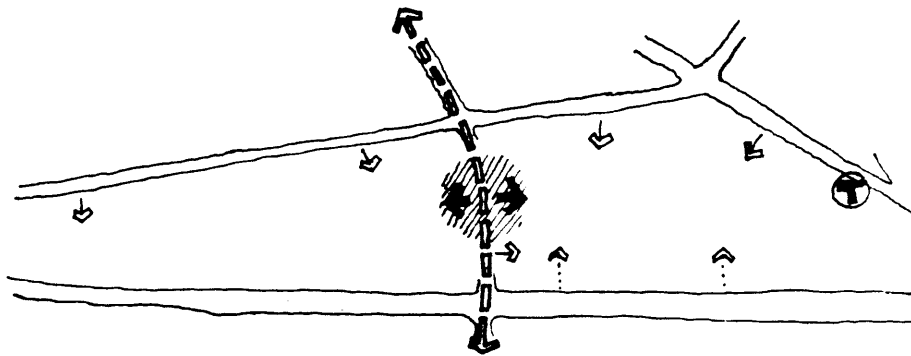
Public accessibility to the campus as well as that
of students can be strengthened by ceratin entry form
with necessary functional facilities around it, in
order to provide a pleasant environment and to
encourage interaction between outside communities and
the M.I.T. community. Since existing major entries
lack clarity, both visually and spatially, access

points need to be clear to perceive and to use,
especially for those who are not familiar with the
campus.

The principal spinal corridor, "infinite
corridor," which runs parallel to the main axis of the
campus and connects building 3, 10, 4 and 8, is a
strong organizing element, but it is not clearly
differentiated from its secondary connectors. Also,
the experience of moving along the internal pedestrian
system is neither pleasant nor interesting, because it
lacks spatial hierarchy and visual connection to the
outside.

A spatial or physical hierarchy can be given to
this corridor system to enhance clarity and social
interaction. In addition, it is desirable that indoor
paths are related to outside paths and activity places,
both visually and spatially. Furthermore, the internal
circulation system is to be connected to major entry
points of the campus, equipped with transitional spaces
for a sequential movement flow.

3.2.5   Symbolism

Symbolism can be defined as system of symbols used
to represent a particular group of ideas and images.
In most cases, a campus possesses its own unique images
and these images are represented by the use of symbols.

However, as with the issue of access pattern, symbolism

can not be grouped into types, because symbols take

different froms, reflecting the school's identity or

academic orientation, campus context, and so on.
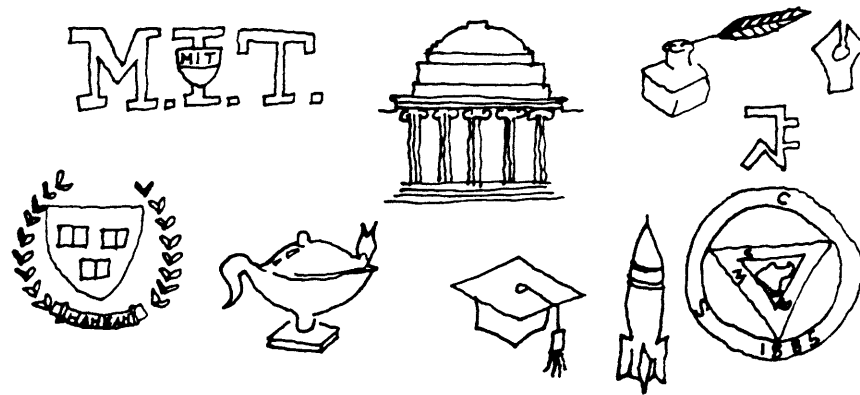
Symbolism is a good tool to clarify the uniqueness

of the campus from the other surrounding physical

environments. In architectural and urban design,

symbolism requires a creative transformation of the

symbolic concept, after the full understanding of the

concept. If a university has a unique symbolism, a

close examination and logical interpretation of that

symbolism is required in the first place. And then,

the decision of how the symbolism should be used, and

where it should go can be made. Unnecessary or

abundant repetition of symbolism may cause a state of

chaos, i.e. non-symbolism.

MIT
Context

One of the great symbols of M.I.T. campus is the

"infinite corridor system" and "interconnected

buildings." By the Bosworth's plan, the buildings were

planned to be connected by one long and continuous
corridor. The idea seems to be based on the monumental
Beaux-Arts classical buildings with extended wings
around major and subsidiary courtyards and with a
central pavilion. The original intention of the
"interconnected" buildings allowed connections between
the various working laboratories and offices or
classrooms along an indoor "corridor" that protected
the students from the harsh climate of Cambridge
winter. This building system, which has become an
M.I.T. symbol, has worked as an excellent example of
the type of flexible and adaptable container which
suites an institution's principal functions.
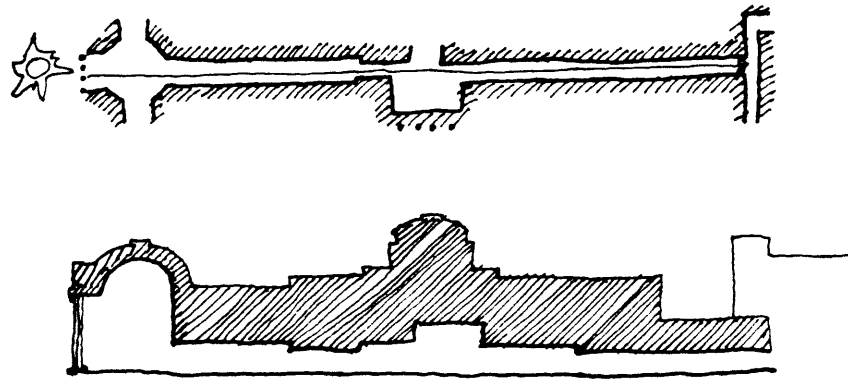
During several decades, more buildings were added
to this building and they were plugged into it and to
each other. The beneficial aspect side of this
expansion is that a similar form of highly
interconnected structures and continuous corridor
resulted in multi-directional growth. The problem
associated with this growth is that all new buildings

have been just connected to the main building complex
when they were needed to be built, by applying the same
symbolism of the old complex. As a result, the
connections have not always been successful, and some
parts of corridor space have very poor spatial and
environmental quality.

One may criticize that the present corridor system
resulted from a simple mimicking of the old symbolism,
with little consideration given to the overall
organization system and context of the campus. There
should have been an interpretation and transformation
process, differentiating the original campus structure
on the old site from the new campus concepts on the
expanded site.

In the future developments, unnecessary repetition
of this "infinite corridor" and "interconnected
buildings" symbol should be avoided, to prevent the
chaotic arrangement of buildings and monotonous indoor
environments lacking hierarchy. Also a great effort is
to be made to search new and fresh symbols of M.I.T.,
and to represent them in appropriate ways.

CHAPTER IV.   NEW DIMENSIONS FOR THE M.I.T. CAMPUS

The main proposal embodied in this chapter, with particular

emphasis on spatial organization and images, is intended to give

directions for the future of the M.I.T. campus. The coordinated

development strategies for the whole campus are summarized in Section

4.1. in which the two major goals and their conceptual guidelines are

translated into a design framework of the campus.

A series of diagrams are presented to show a systematic approach

of integrating conceptual planning ideas with the existing physical

concepts of the campus. However, it must be pointed out that this

design framework only makes suggestions on location and character of

proposed developments, and rough form and massing of new / renovated

buildings. It does not elaborate on detailed building design,

construction methods, building materials, etc.

In Section 4.2, a detailed design for East Campus area is

proposed, which illustrates the location of functional elements and

their main access points, outdoor paths and places, landscaping and

ground surface treatment, and outdoor activities and their images.

4.1   Campus Framework Proposal

                   Based on the two major goals, clarity in physical

                   organization and encouragement of social interaction in

Fig. 4.1   campus environment, the M.I.T. campus is reorganized by

Fig. 4.2   means of locating new functional elements on empty

sites to be obtained by the removal of worn-out

buildings, and by means of reorganizing the existing

internal structure of the campus. Environmental

Fig. 4.3   quality of the campus is expected to improve for the

M.I.T. community and the nearby community from an

academic, social, and cultural standpoint.

It is assumed that all the funds and space

necessary for the changes would be available. Spatial

organization shown in the design framework of the

campus is a result of a systematic synthesis process,

obtained by combining partial solutions for five

organizational issues described in Section 3.2. An

appropriate choice of options for each issue is

selected to best fit the future needs of the M.I.T.

campus, and they are combined and translated into

design ideas and subjective projections on the context.

4.1.1   Multi-Directional Growth and New Boundaries

Multi-directional growth pattern is proposed for

the future expansion of the M.I.T. campus by developing

several fringe areas (Fringe Growth) corresponding

with the urban context, and by locating off-campus

sites (Germ Growth) with proper connections to the

main complex.

Also, the existing boundary is to be changed into
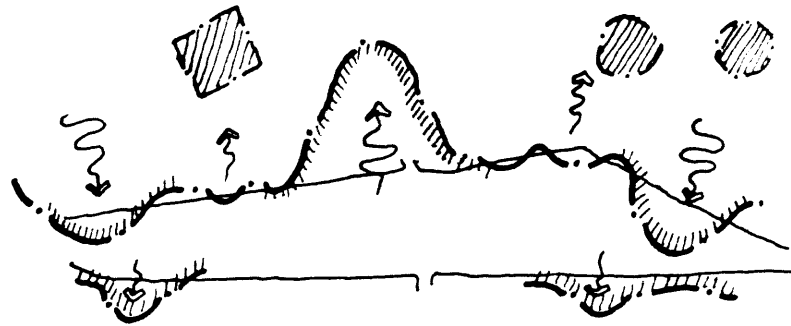
one with jagged edges, resulting from both the outward

expansion of the campus and the inward absorption of

the surrounding environments. At the boundary, the

Institute's functions can be easily mixed with urban

functions in its surrounding areas and multiple

opportunities for social and cultural interactions are

to be provided. This way, the Institute can serve as

useful academic, social and cultural resources for both

the M.I.T. community and the public.

Concepts   1.   In the near future, the East and West Ends are

developed in such a way as to avoid ambiguities and to

give new functional elements for academic, cultural and

social activities.
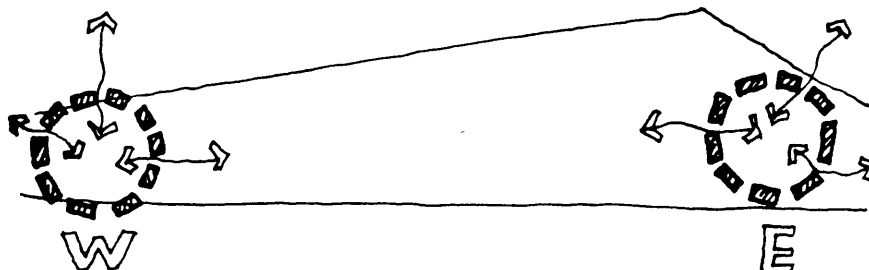
In the proposal, both ends are to be developed
into important service functional nodes where multiple
opportunities for interaction can be gained. Also
vitalizing both ends of the campus is expected to
create a clear sense of boundaries, and to redistribute
campus facilities in a fair and equitable way.

2. According to the Bosworth's original campus plan,
Charles River was to be utilized as a useful open space
in conjunction with the main court (Killian Court),
for example by a series of descending paved terraces
with a flatform at waterlevel. At the present time, a
direct pedestrian connection from the open space on the
campus to water is not possible unless Memorial Drive
is rerouted through an underground passage or an
overbridge.
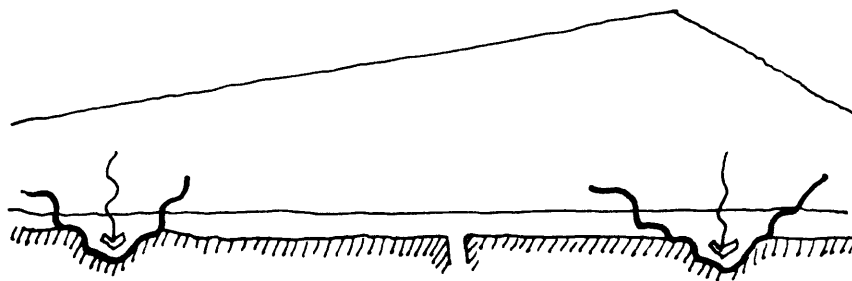
However, in the framework proposal, a little
portion of bank area is utilized into water-related
recreation spaces as an extension from the green or
open space system of the campus. In order to carry out
this idea, certain kinds of devices which reduce and

control the speed of traffic, such as speed bumper or traffic lights, should be installed.

3.   Existing railroad has been a tough barrier for the campus to expand beyond in spite of its light usage. Without this barrier, smoother connection to the existing research laboratory areas outside the main campus can be achieved, and a natural expansion along Massachusetts Avenue is also possible.

As a passive solution, something other than closing off the railroad, to overcome this physical barrier, megastructures over the railroad, with a parking garage, retails stores and residential units along Vassar Street are proposed.
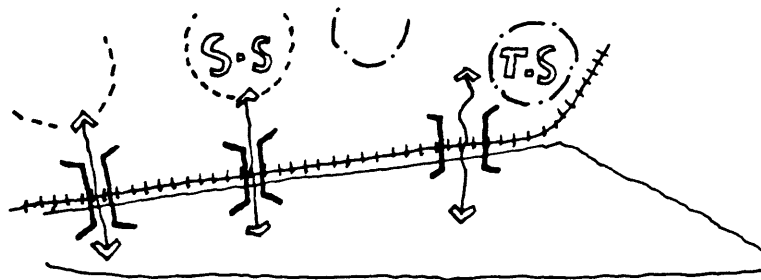
Also, an overbridge connecting the proposed green park at the West End area to a kindergarten site across the railroad is proposed, by using the difference in ground level of the two sides. This passage way would function as a major connecting path to West Cambridge area where convenience stores, an elementary school and other facilities are located. The interaction of West

Campus residents to the surrounding communities is expected to increase in the future because of this connector.

4. Another way of overcoming the detrimental side effect of the railroad on the nearby community is to develop Massachusetts Avenue more densely with better street-responding buildings like retailshops, restaurants, theaters, bookstores, or supply shops, instead of just gas stations.
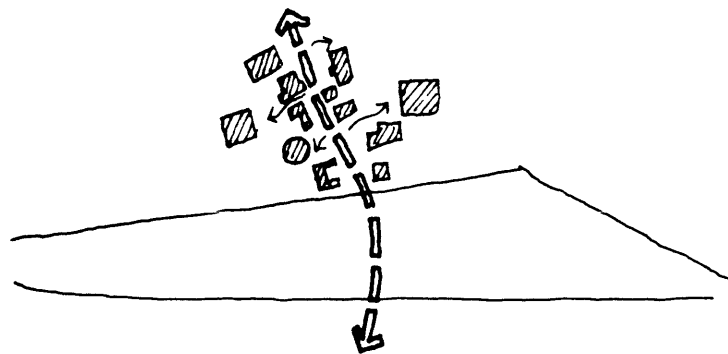
5. Several off-campus areas may be encouraged to be developed in the future as research centers with housing, where students, faculty and the Institute members can coexist.
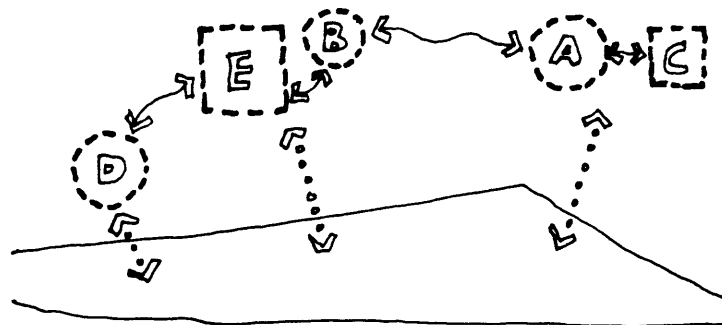
6. In addition to the external growths, adding the
necessary functions on empty sites within the existing
campus are proposed to better utilize the campus land.
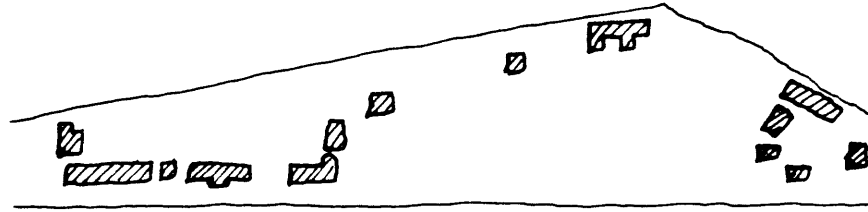
4.1.2   New Service Nodes and Urban Mixture

As reviewed earlier, the existing service core,
grouped service facilities across 77 Massachusetts
Avenue, is far away from East and West Campus. In the
framework proposal, new service nodes are provided to
supplement the existing social and cultural facilities
for the M.I.T. community in general. It is also
expected that the general public would use the
facilities.
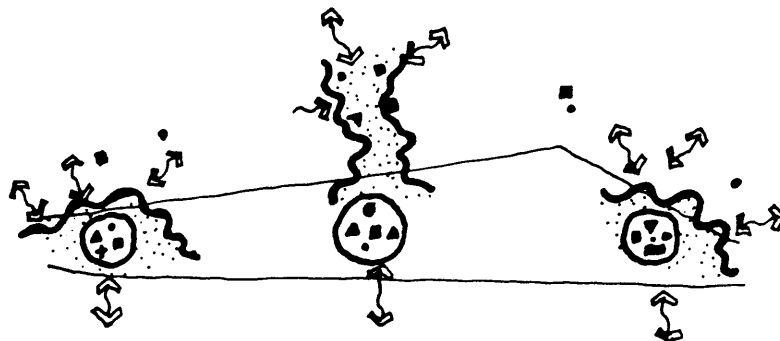
In order to improve the present of campus

environment, which can be summarized as a research

Fig. 4.4   place, mixture of functions is encouraged as much as

possible. The future campus is to be composed of

places where active social and cultural interactions

can be fostered, on top of academic activities.

Concepts   1. Two new service nodes are proposed: One is

composed of housing complex with sufficient underground

parking space, convenience stores, a commercial plaza

with retail shops, a kindergarten, and playgrounds at

the West End area; new Urban Center with a prominent

green space, an art center, theaters, restaurants,

retail shops, faculty club, social space, and some

academic facilities at the East End area.
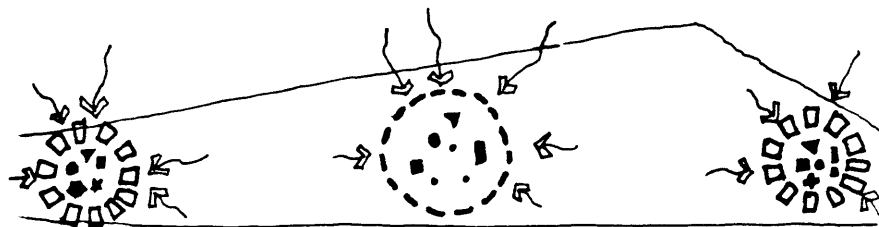
Consequently, a variety of activities at those

nodes, as well as at the reinforced service core near

Massachusetts Avenue in the center of campus, are

intended to take place, each with different characters.

2. Besides aggregating various functions at a few

focal areas, some bold attempts are made for the

purpose of giving urban characters to the campus.

These attempts would include several new buildings with

a lecture hall and social spaces in the middle of

existing housing areas, or small sandwich shops within

academic areas.
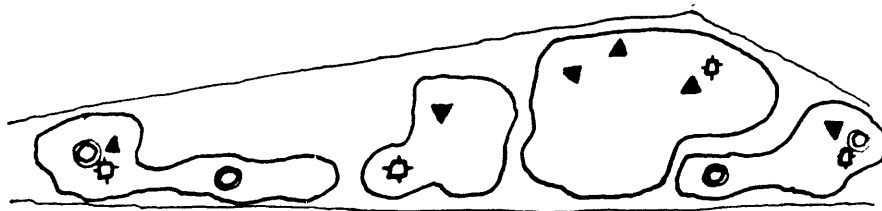
3.   Maximum interaction of people along with mixture

of functions is to be achieved at such communal spaces

as the service nodes, on campus streets, open spaces,

and corridors.
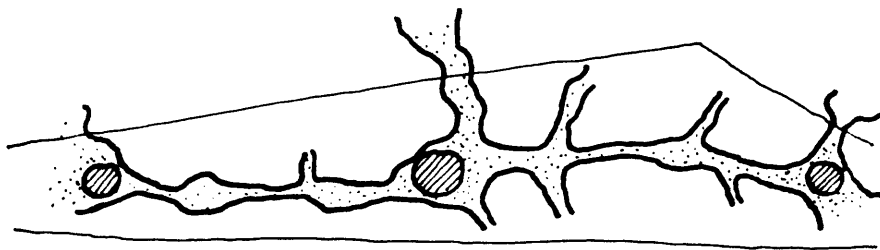
4.1.3   Functional Open Space and New High Rise Buildings

         In the proposal, some of new buildings are

proposed to be built as high rises in light of the

expected future floor space demand, and for the maximum

provision of outdoor space around buildings.
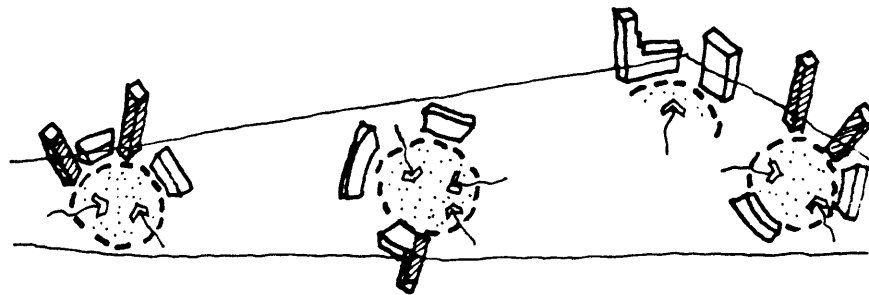
Existing underutilized open spaces are reorganized

so that the characteristics of major open spaces can be

defined clearly. Also new open spaces are added to

enhance outdoor life and social interaction. Open

Fig. 4.5   spaces are connected to each other by means of

pedestrian paths, and they are expected to function as

activity places.

Concepts   1.   East and West Ends of the campus are recommended

to be developed with a few high rise buildings for

housing and research use, with parking spaces

underneath. High rise buildings are expected to be in
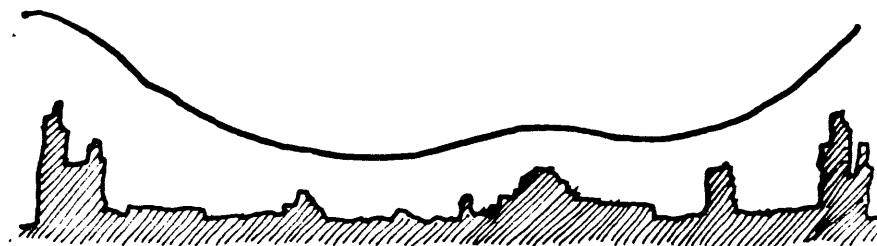
demand in the future, to ensure the acquisition of
required floor area and to save sufficient amount of
outdoor green and activity area.

This development strategy using high rises would
give an accent to the visual character of campus, a
dramatic skyline of lower center and higher ends.

2.   Major open spaces, either reconstructed or newly
added, are defined in terms of the purpose of
activities to be contained therein: Killian Court as a
major ceremonial space for formal events;   enlarged and
better-defined open space in front of Student Center as
a major get-together space and outdoor activities;
atheletic field at the same location with indoor and
outdoor sports facilities on the north side of Vassar
Street; and dispersed small open spaces to be changed
as outdoor greens, successfully connected to each other
and to major open spaces.
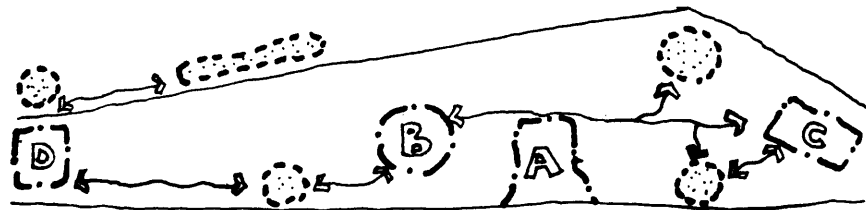
3.   The northern part of Main Campus in particular is
to be reconstructed so as to provide landscaping, and a
plenty of natural light at the activity places. These

outdoor spaces are propoesed to be connected to the existing major indoor circulation through the "infinite corridor," so that easy access to existing movement patterns is ensured for the maximum utilization of campus.
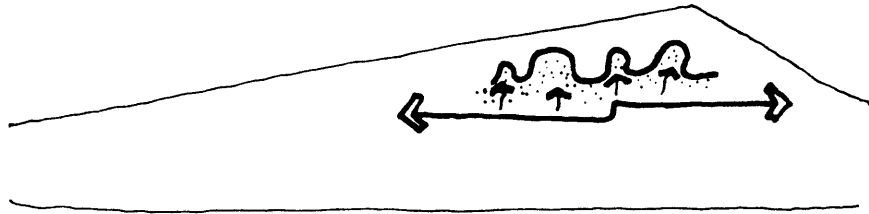
Here are detailed descriptions of the activity places:

Place 1.

At the West End, a commercial plaza is proposed, between the campus and the Cambridge Hyatt Regency Hotel, for convenience of the West Campus residents, the hotel guests, and the public.
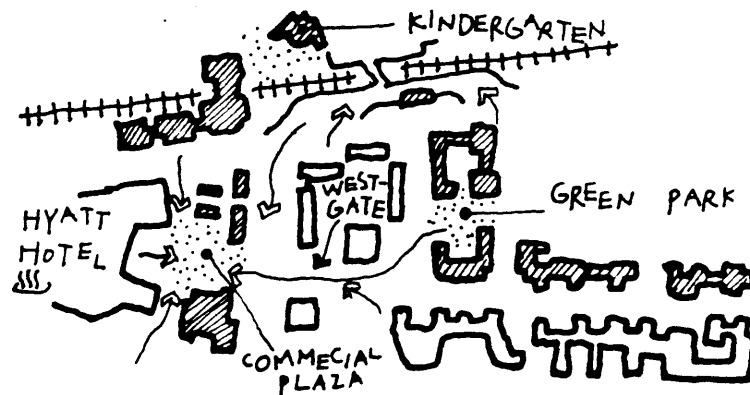

Also, a new neighborhood green park with playgrounds and landscaping is designed. It would be

surrounded by a proposed housing complex on the
existing Westgate parking lot. Also a kindergarten
with playing areas and furnitures is designed across
the railroad and connected by an overbridge.

Place 2.

North side of Vassar street on West Campus is
developed into several tennis courts, outdoor and
indoor sports facilities. These places are to help
improve the existing poor environmental quality of the
area and to increase the degree of utilization along
Vassar Street.
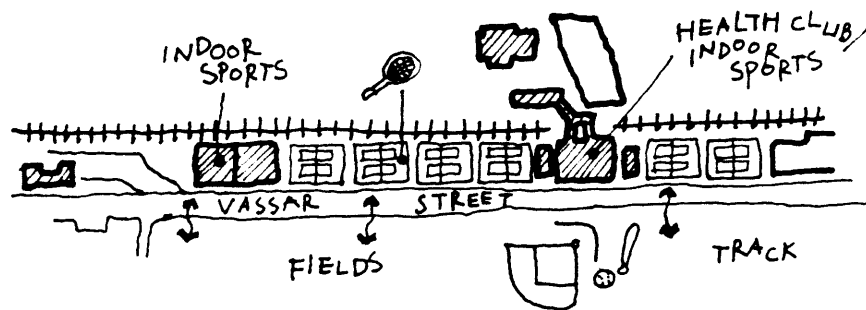
Place 3.

The existing open space in front of Student Center
and Kresge Auditorium is reconstructed. It is enlarged
by revitalizing the rear area of Kresge Auditorium,
which is now underutilized as an open space. Also the
whole open space is changed to be more enclosed by new
buildings around, which would accommodate a variety of
social and cultural functions. The idea is to
encourage outdoor activities in the open place with a

functional connection to inside, and to increase a
sense of place by the edges of built-environment.
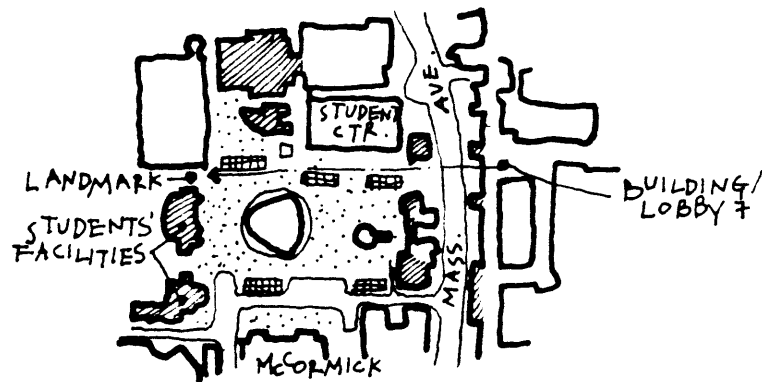
This major open space is spatially connected to
secondary open spaces nearby, such as the one in front
of McCormick Hall, one at the corner of Green Hall, and
a green space in the middle of sports buildings. These
open spaces are recommended to continue functioning as
a primary open space for informal and extracurricular
activities.

Place 4.

A group of open spaces are proposed on the back of
the contiguous buildings on the south side of Vassar
Street, which are parallel and have direct access to
the existing indoor path through the Main Corridor.
They provide another layer of activity places in the
direction of east-west across the main campus leading
to an intersection point at Ames Street in front of Art
& Media Technology Building.

At the intersection point, another major outdoor
space around the Alumni Pool, on the back of new

Biology Center on the old TRW building site, is

proposed with indoor sports facilities and restaurants

around.
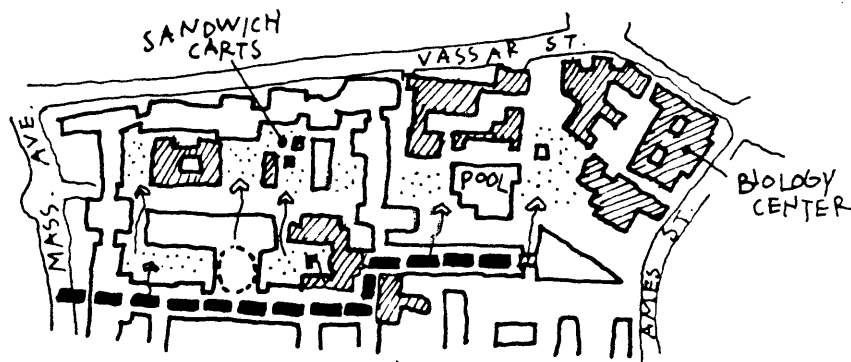
This development strategy requires the demolition

of several worn-out buildings and the construction of

new buildings at strategic locations.

Place 5.

Existing open space in front of Health Service

building is proposed to be kept as it is, connecting

the sequential movement from the main campus to a major

open space to be created behind the Health Services

Building.
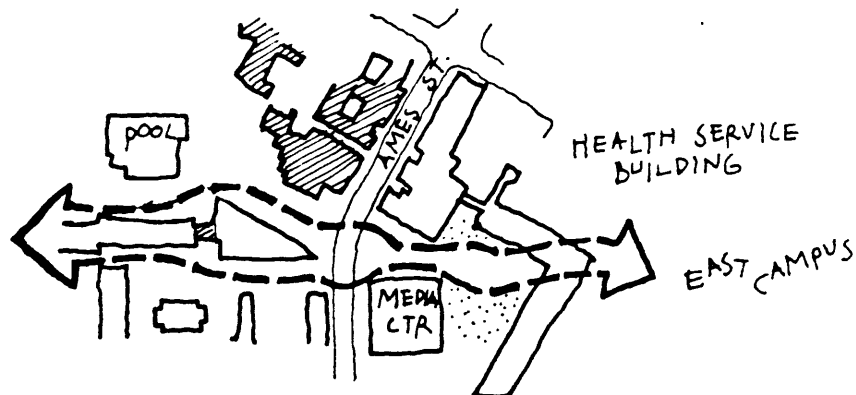
Place 6.

A new major open space is created at the East End

area. It is expected to serve as a cultural and social

center with urban functions and characteristics. This

area is intended to contain the flow of pedestrians

from the main campus and outside, especially from the

Kendall subway station.
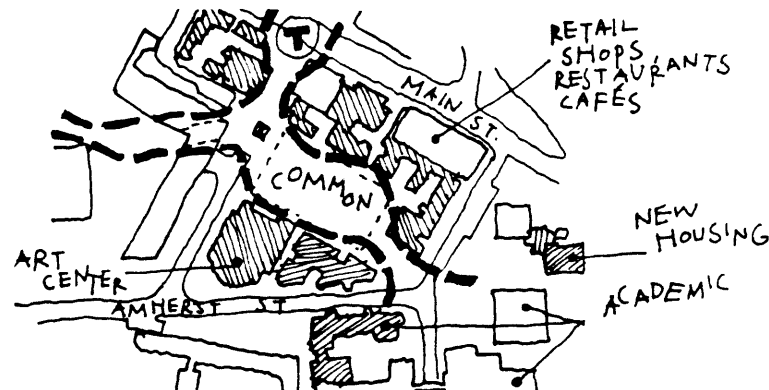
It would also function as a connector between the

Main Campus and the existing and new academic

facilities on the East Campus. Existing facilities,

including Sloan School of Management, are now rather

isolated and vaguely defined in terms of spatial

connection.

Functions around a prominent green area, in the

middle of this Urban Center, include an art center with

an auditorium, art galleries and theaters, small scale

retail shops facing the common green area, outdoor

cafes, restaurants and dining halls, faculty club,

bookstores, social spaces and residential buildings,

and academic facilities. The green area surrounded by

these social and cultural uses would become a focal

point of activities.

4.1.4   Hierarchy of Movement and Network Access

Fig. 4.5   In organizing the campus framework, access

pattern, movement hierarchy and thier relationships to

places are emphasized as critical determinants.

Several principles and concepts are applied to this

issue.
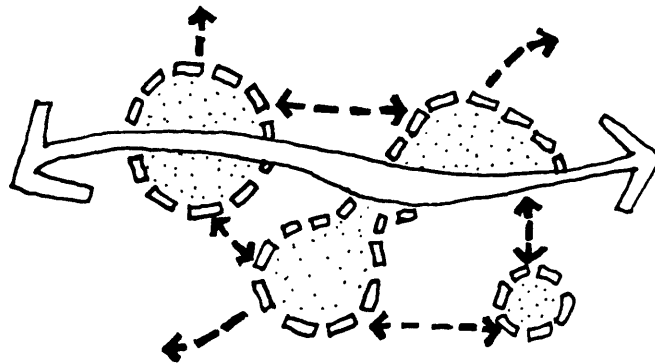
Concepts   1.   Existing pattern of movement is kept and improved,

sustaining the on-going system and improving its order.

Major paths are differentiated according to the

intensity and character of usage.
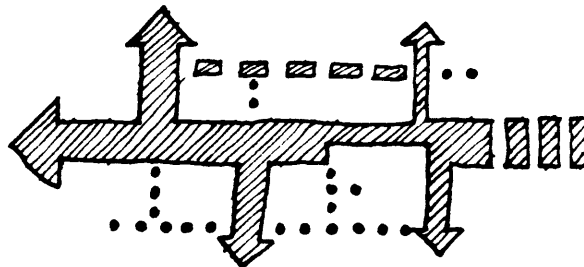
2.   Since the existing paths and places are located

and linked in a linear or a diagonal patterns, the

proposed framework also follows this rule of movement,

rather than using curved or winding patterns. In addition, the principle of "axis" is used as a design tool representing "movement and places," not the arrangement of buildings.
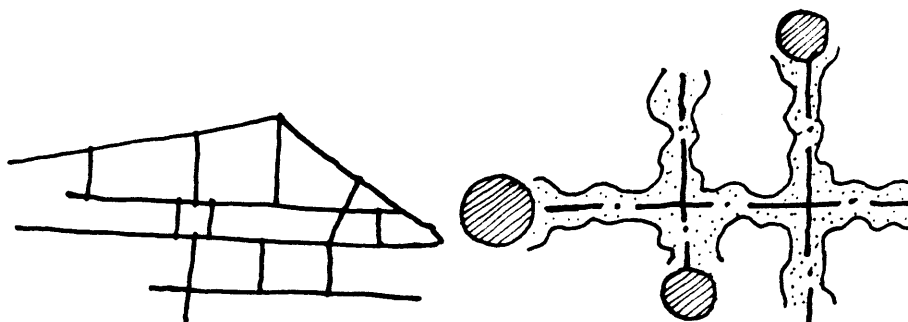

3. The pattern of movement is summarized as a network pattern. The primary path runs through the overall campus, and connecting paths are linked to it at right angles or diagonally. And those connectors are collected by secondary paths of a lesser hierarchy, usually parallel to the main path. Same pattern of movement network repeats until paths meet external service movements.
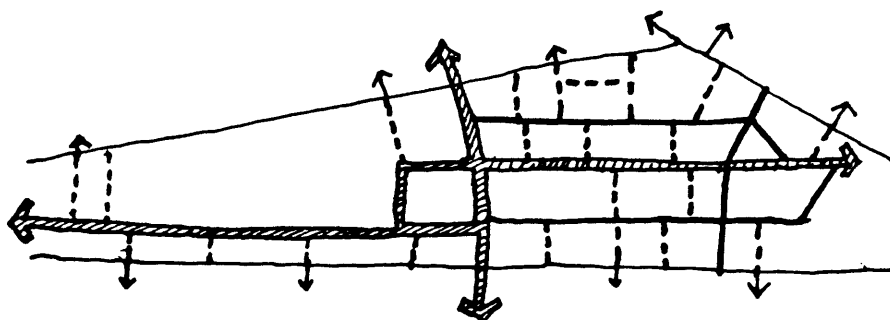
Consequently, there exist many informal access points at the boundary of campus, which enable pedestrians to have easy access to the campus. In

order to feed a long and narrow campus, three major

access points with well defined open spaces are

provided: existing but reconstructed one at the center

of campus on Massachusetts Avenue; proposed one at the

East End of the campus from Kendall Square; and another

proposed one at the West End from West Cambridge.

4.   The concept of movement is intimately related to

"places." Open spaces, "places," are connected by

movement "paths," and the degree of utilization of

those paths corresponds to the importance of connecting

places.   In other words, major places are connected by

major paths, and minor places are linked by less

utilized paths.
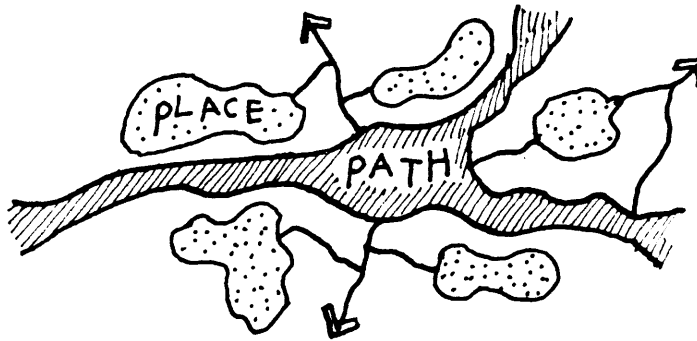
5.   Monotonous environment of the existing linear

movement patterns is to be overcome by locating

activity spaces along movement and "magnets" at

destinations.

The "magnet" concept is a design concept commonly

used in American shopping malls: two major functional

elements which are main attractions, are set at a

distance, and a linear path with supporting functions
on both sides connects those two magnet points.
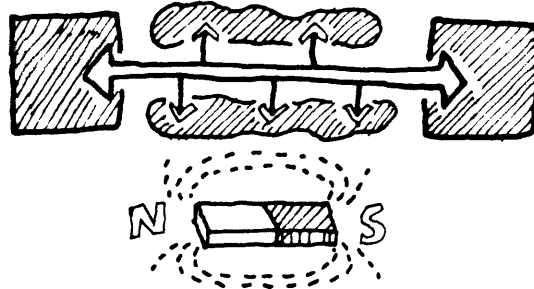
In the proposal, this "magnet concept" is applied
in arranging places and paths in the manner of
connecting major places by active paths. Three magnets
with attractive functions are arranged strategically at
two ends and one in the middle: the West magnet is a
commercial plaza and a kindergarten; the East magnet is
a cultural and social urban center; and the central
magnet is reinforced existing service and sports
facilities.

6. For clarity and interaction, the intersection
points where two or more paths meet are to become
special places. The flow of pedestrian traffic is
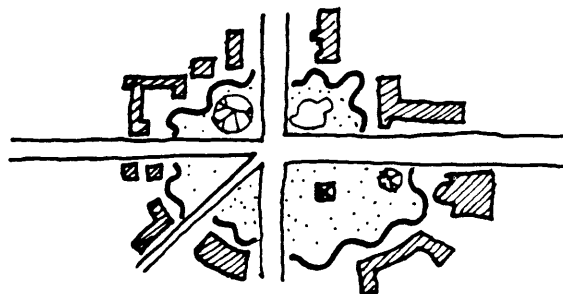
obviously increased at those points, and well defined

spatial form with a pleasant environment should be

provided there to become activity nodes.

7.   M.I.T. Shuttle Bus connecting major places and

access points of the campus is recommended.
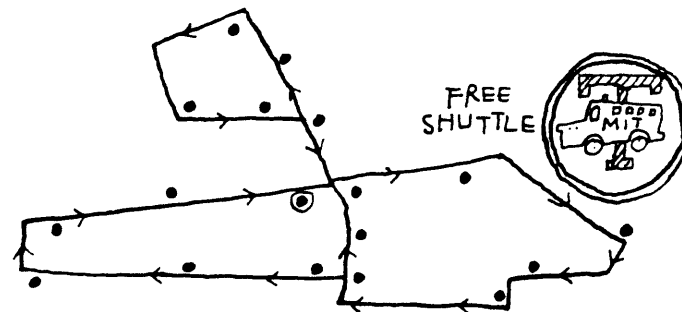
     As described above, a new system of Paths and

Places is established following the concepts and

principles previously outlined. Some of major paths

are defined and characterized here.

Path 1.

     The primary path runs through the campus in east-

west direction, connecting the three major open spaces
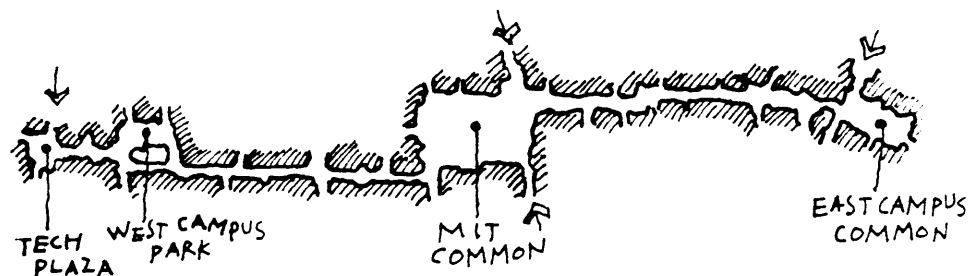
where pedestrian movement starts. And those open

spaces are used as access points from outside to the

campus movement network. As this path is pretty

obvious in the existing campus organization, it can be

reinforced by adding more activity places, and

stretching it out further.

Path 2.

Many connecting paths stem from the primary path,

and continue to secondary paths and places.

Especially, several points along the "infinite

corridor," are opened to north and south directions:

several connectors are newly created and existing

connectors are widened to adequate and comfortable

dimensions, either by removing or remodeling some

portions of existing office spaces along the corridor.
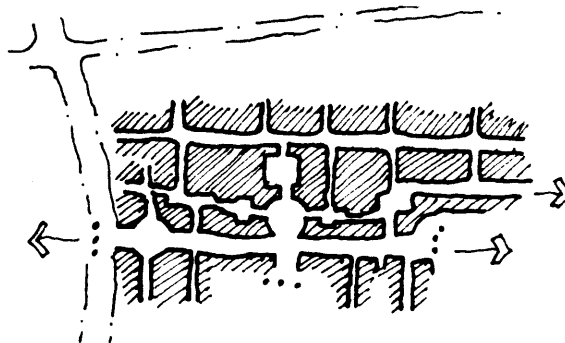
By doing so, scattered open spaces and pedestrian

paths can be easily reached from the primary path,

which alters the simple and monotonous movement along

the east-west direction to an active and multi-

directional movement.

Path 3.

Several informal access paths are designed to provide an easy access to and from the campus. Also a few "overbridges" connecting the both sides of the existing railroad, as mega-structures with parking garage, residential units and retail shops on the ground level are proposed for future expansion of the campus.
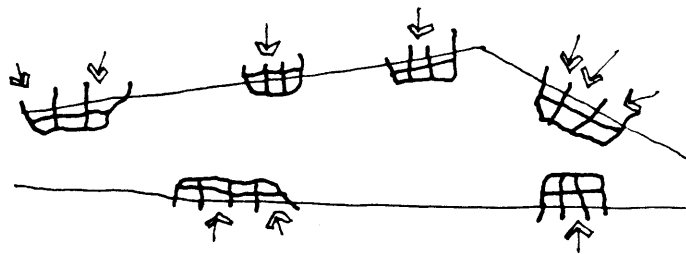

Path 4.

The physical boundary of the south side is partially extended by new terraces and floating decks on the water level of Charles River. This southward movement would be attracted by the provision of water-related facilities. Expanding or remodeling of the existing boathouses, and landscaping the surrounding areas are recommmended.

CHARLES   RIVER   EAST CAMPUS
WEST CAMPUS   DOCK
    DOCK
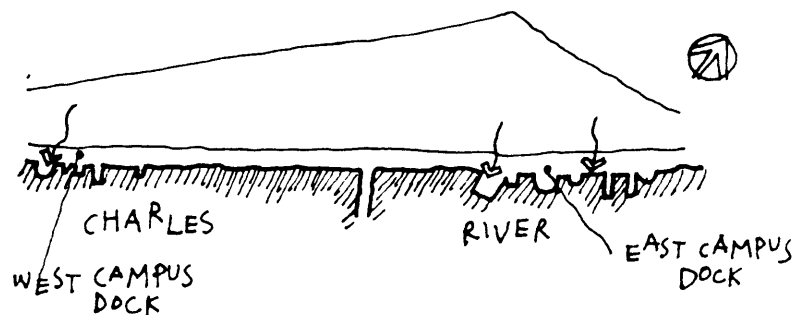
Path 5.

Massachusetts Avenue, which is presently the main

service road, is conceived as a major axis of northward

expansion in the near future. It is desirable to

develop Massachusetts Avenue more densely with better

street-related uses. In other words, Massachusetts

Avenue is proposed to be changed to become an active

street with retail shops, restaurants, theaters, and

green parks as well as academic facilities.
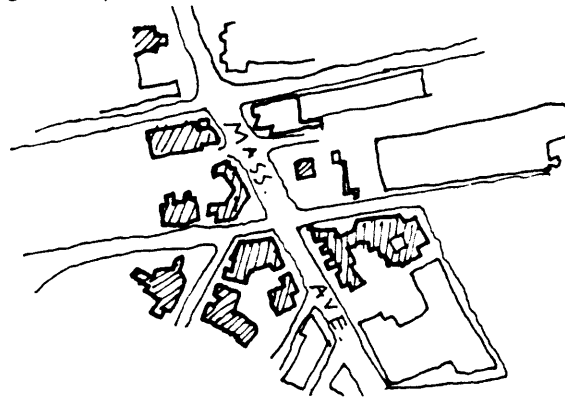
However, some kinds of devices to control the

volume and speed of vehicular traffic on Massachusetts

Avenue are to be installed to ensure safe and pleasant

pedestrian movement.

4.1.5   New Symbols in Campus

As stated in the previous chapter, an effort is

to be made to search new symbols of M.I.T.,

and to represent them in an appropriate way. However,

mimicking without an interpretation process, or an

excessive repetition of old symbolism should be

avoided.

Concepts   1.   The concept of the "infinite corridor and
interconnected buildings" is reinterpreted and changed
to "interrelated buildings" for academic and social
interactions.
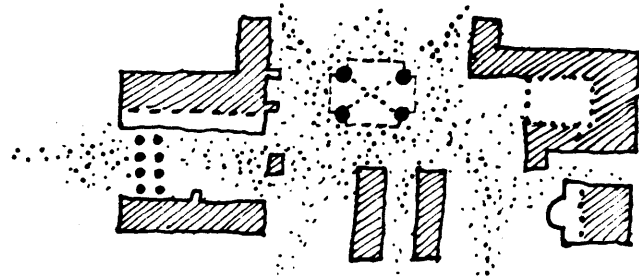
     Instead of attaching new buildings to existing
ones by awkward and tight connections, it is
recommended that the connecting movement between
buildings and encouragement of interaction be done via
social spaces, either indoor or outdoor, such as
comfortable outdoor path, covered gallery, or spacious
hall in the building.

    2.   Curved forms and circles may be used as symbols.

The circle or curved forms can be found from the shapes
of the dorms in the old campus. Examples of buildings
with these symbols are Kresge Auditorium and M.I.T.
Chapel.
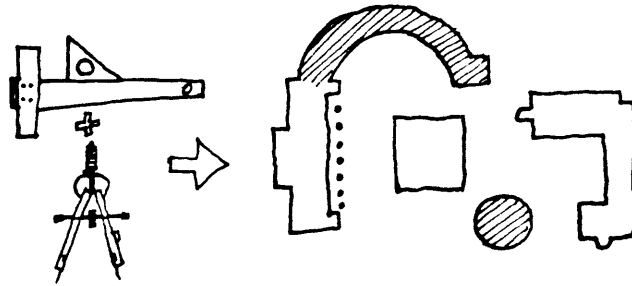
Moderate amount of curved or circular forms can
ease the rigid layout of the campus that is
geometrically composed of straight lines.

3.   Existing artworks and architectures on campus
should be better publicized. Even some of the M.I.T.
students do not know of their existences, even though
some of those pieces are masterpieces by world-famous
artists and architects.
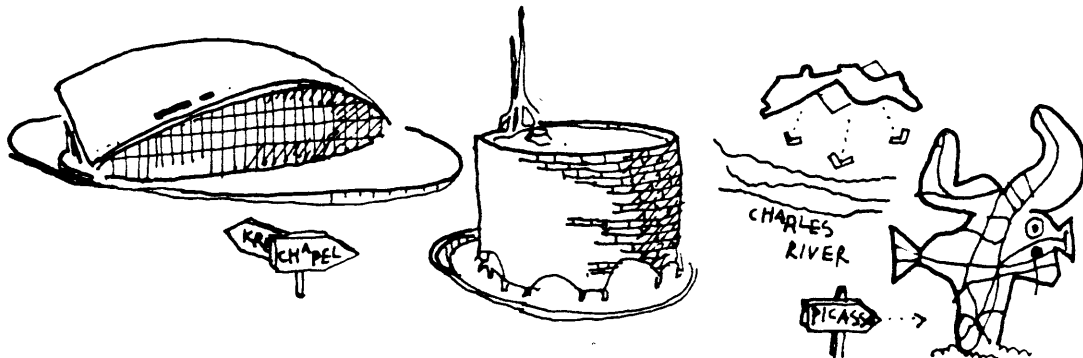
Considering their value and preciousness, those
artworks and architectures can be treated as symbols of

M.I.T. Pedestrian paths leading to the areas of art works and architectures are highly desirable, and partially presented in the proposal.

4. Cambridge city symbols, if any, might be placed on the campus to reflect the attitude that the Institute is not an isolated entity, but an integral part of Cambridge.
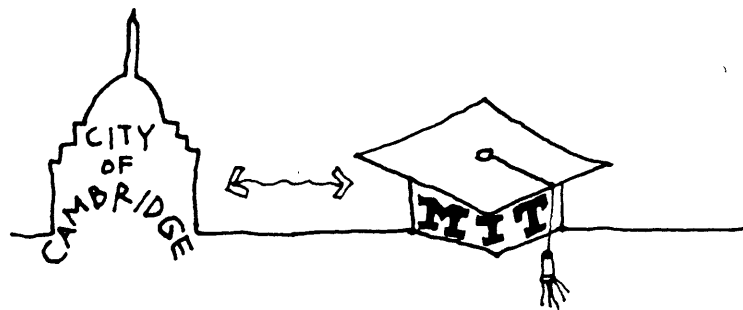
4.2   New Urban Center: A Design Proposal for East Campus

Fig. 4.6

The development concepts and design proposal in this section attempt to establish a focus and a hierarchical organization for the East Campus, providing an orientation with respect to the rest of the M.I.T. campus. Within the framework of future M.I.T. campus, presented in Section 4.1, a development alternative is selected from several ideas representing a comprehensive range of feasible options.

Included in this study are: consideration of vehicular and pedestrian circulation, public

transportation, potential building sites and building

mass, relationship of pedestrian circulation to open

spaces, access points to buildings, and a system of

green spaces.

4.2.1   Development Concepts

The scenario for the development of an "Urban

Center" on East Campus strives to achieve several

purposes.

1.   Create a diverse and active environment, with

multiple opportunities for social and cultural

interactions, and optimal conditions for learning and

research.

2.   Attract the participation of the Cambridge

community through provision of functional mixture:

work, recreational, residential, shopping, performing

arts, and learning opportunities.

3.   Give the East Campus an identity as a social and

cultural urban center and create a clear definition of

the eastern boundary of the M.I.T. campus.

These purposes are consistent with M.I.T.'s

commitment to developing the Simplex Site as an self-

sufficient urban subcommunity. In view of current criticism of its expansion policies and the environmental quality of developments, M.I.T. should attempt fundamental experiments in the area of East Campus.

Fig. 4.7   Distribution of activities and functions at the East Campus are should be based on the following principles:

1.   Paths and places, from the main campus to subway / Kendall Square, Sloan School and Eastgate area should attract more people throughout the evening by having small retail shops, theaters, coffee houses, restaurants, and an art center for learning and socializing.

2.   A performing art center would house performing theaters, workshop spaces and social club spaces to give intensity and focus. Exhibition spaces and art galleries occupy a major entrance area and corridor spaces.

3.   Residential units in building complex would be interdispersed with other functional units, such as faculty club, dining hall, academic facilities, and social spaces.

4.   Vehicular traffic on the streets within the site

should be reduced to promote active outdoor lives.

Parking space for future needs would be provided either

below the ground level or off-site.

4.2.2   Design Proposal

Fig. 4.8

A matter of great importance in this design

proposal is the relationship and distribution of open

spaces relative to circulation patterns. In other

words, the primary form-giver for this proposal is

determined from considering pedestrian paths and

activity places through the site and connections made

to its surroundings.

Existing system of the open spaces and sequence of

pedestrian circulation of the campus are related to the

new paths and open spaces. At the same time, clear and

convenient access points and gateways from outside are

provided.

The design itself is highly centralized, focusing

on a major public green space (East Campus Common).

This public space would serve as a activity center,

bolstered by public pedestrian movement, diverse

mixture of urban functions, and pleasant and

comfortable environment with proper landscaping and

furnitures.

Generally, higher buildings are in the northern

part of the site while lower buildings are in the southern part. This would allow sunlight to penetrate of sunlight all the year round into the outdoor space. Winter winds will be generally shielded from the main open space by the taller structures in the northern part.

Here are some of the design features of the proposal:

a)   East Campus Common

The proposal has a central public open space approximately 175 feet by 300 feet in dimension, as its focus and a major organizing element. The space is composed of a main green area in rectangular form, pathways and arcades around it with hard surface treatment, a fountain, play lots, gazebos, and several artworks and bulletin boards.

Providing continuity to the main campus, the east-west path spine changes its direction diagonally at Carleton Street; it is the "activity axis" of East Campus Common, which is parallel to Main Street. The idea is that the Common would integrate movements from the main campus towards Kendall Square and the Sloan School, and vice versa. This activity axis has several direct paths from Main Street including subway "gateways," and from Amherst Street.

Pedestrian paths around and adjacent to the Common

would serve as various outdoor activity spaces, aided
by surrounding social and cultural functions,
commercial retail shops, outdoor cafes, and public
event opportunities. Underground parking might be
necessary in some parts of this area.

b) Main Street

Under this proposal, Broadway would absorb most of
the vehicular traffic while Main Street, with the
elongated subway station, would become the principal
focus for commercial activities. An intensive
development of consumer services and shops would occur
along Main Street, especially at near the ground level.
One example is the M.I.T. Coop which will occupy the
ground floor space of the recently built Marriott
Hotel.

A broken but continuous edge of buildings with
wide sidewalk along Main Street would offer various
commercial services at levels near the ground, with
frequent opportunities for pedestrian access into the
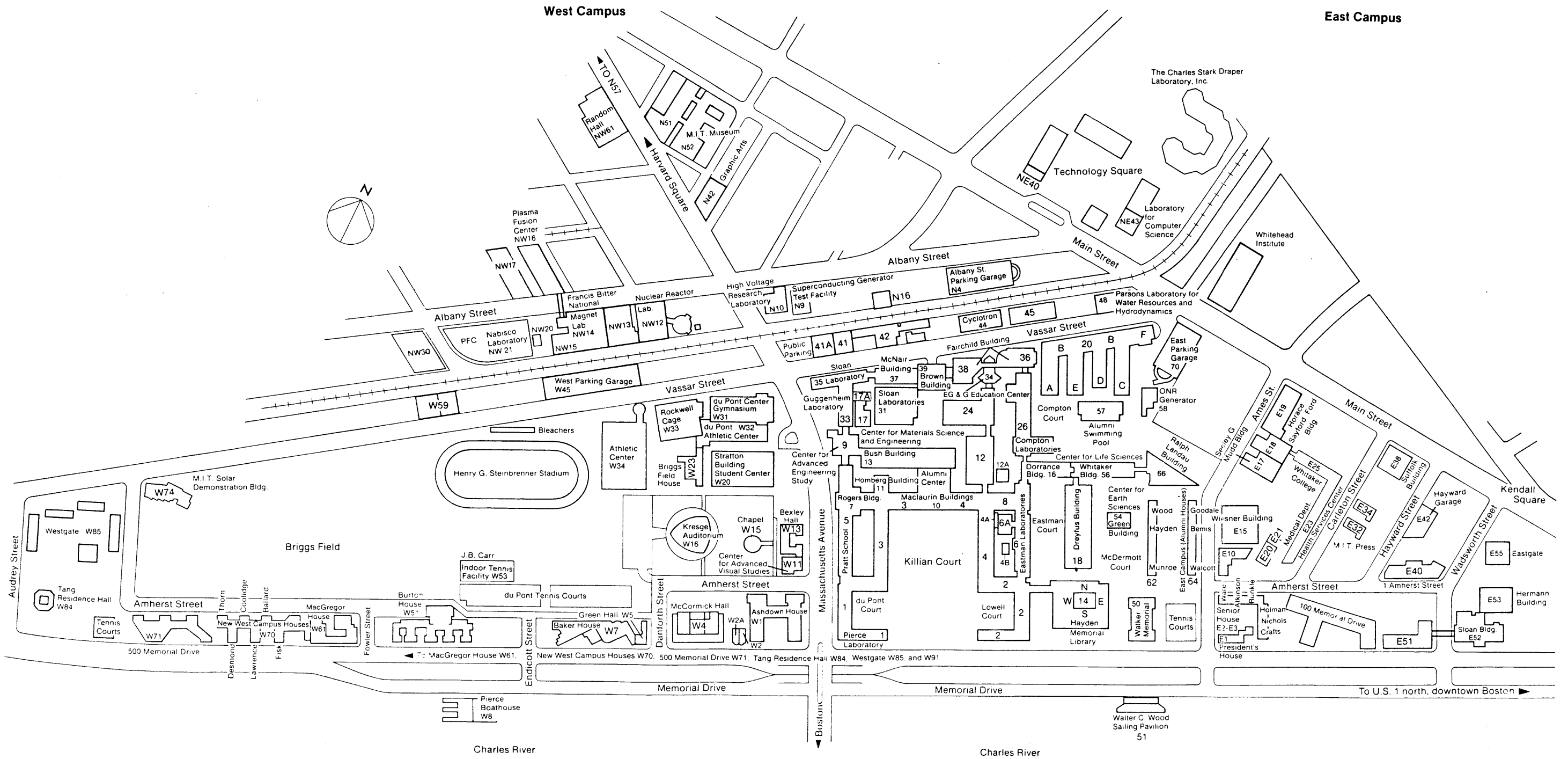campus.

c) Amherst Street

Amherst Street now has more or less poor
environment in terms of its appearance and road
conditions, but its role is of considerable importance
considering that it connects the main campus to the

East Campus. Number of car lanes could be reduced to two with the elimination of curb parking. The widest portion of the pedestrian way would occur on the north side of the street.

This street would be improved by on-street activities, inside and outside the buildings. Improvements include pedestrian path protected by trees and arcades, stepped green terrace, and street furnitures.
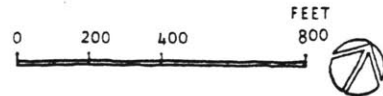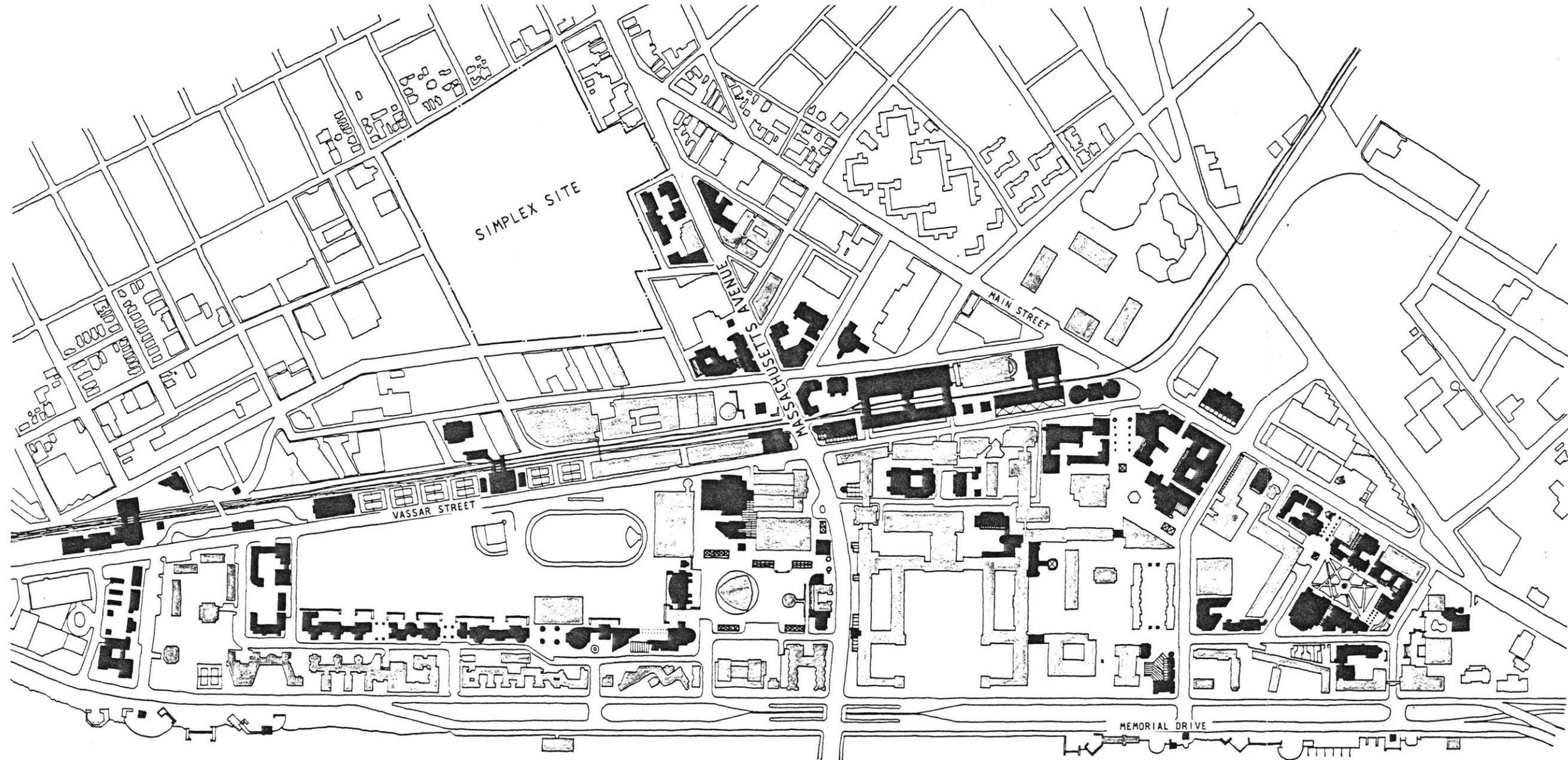
At the intersection of Amherst and Wadsworth Streets, a fountain, a renovated deck in front of the Dewey Library, a new courtyard, and a green area with the famous Picasso's sculpture (Figure decoupee) are arranged. This area would serve as a convenient connecting point to Kendall Square, to water-related recreation area on Charles River bank, and to Eastgate residential area.
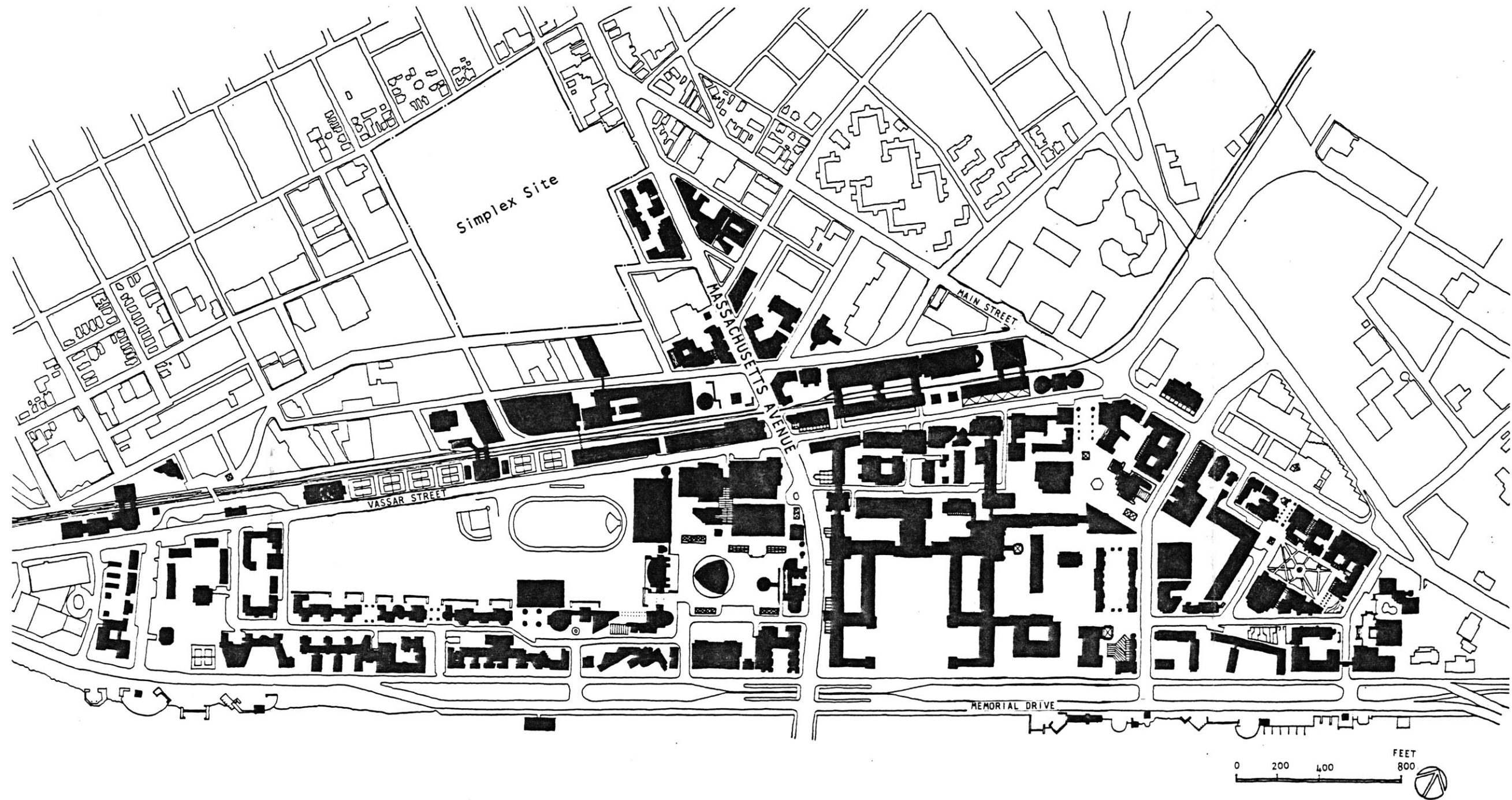
Fig. 4.1

EXISTING CAMPUS

Fig. 4.2

SIMPLEX SITE

MASSACHUSETTS AVENUE

MAIN STREET

VASSAR STREET

MEMORIAL DRIVE

FEET
0   200   400   800

EXISTING & NEW BUILDINGS

: EXISTING BUILDINGS
: NEW BUILDINGS

Fig. 4.3

M.I.TOMORROW CAMPUS ?

Fig. 4.4

SIMPLEX SITE

MASSACHUSETTS AVENUE

MAIN STREET

VASSAR STREET

MEMORIAL DRIVE

0   200   400   FEET 800
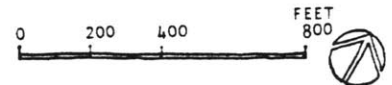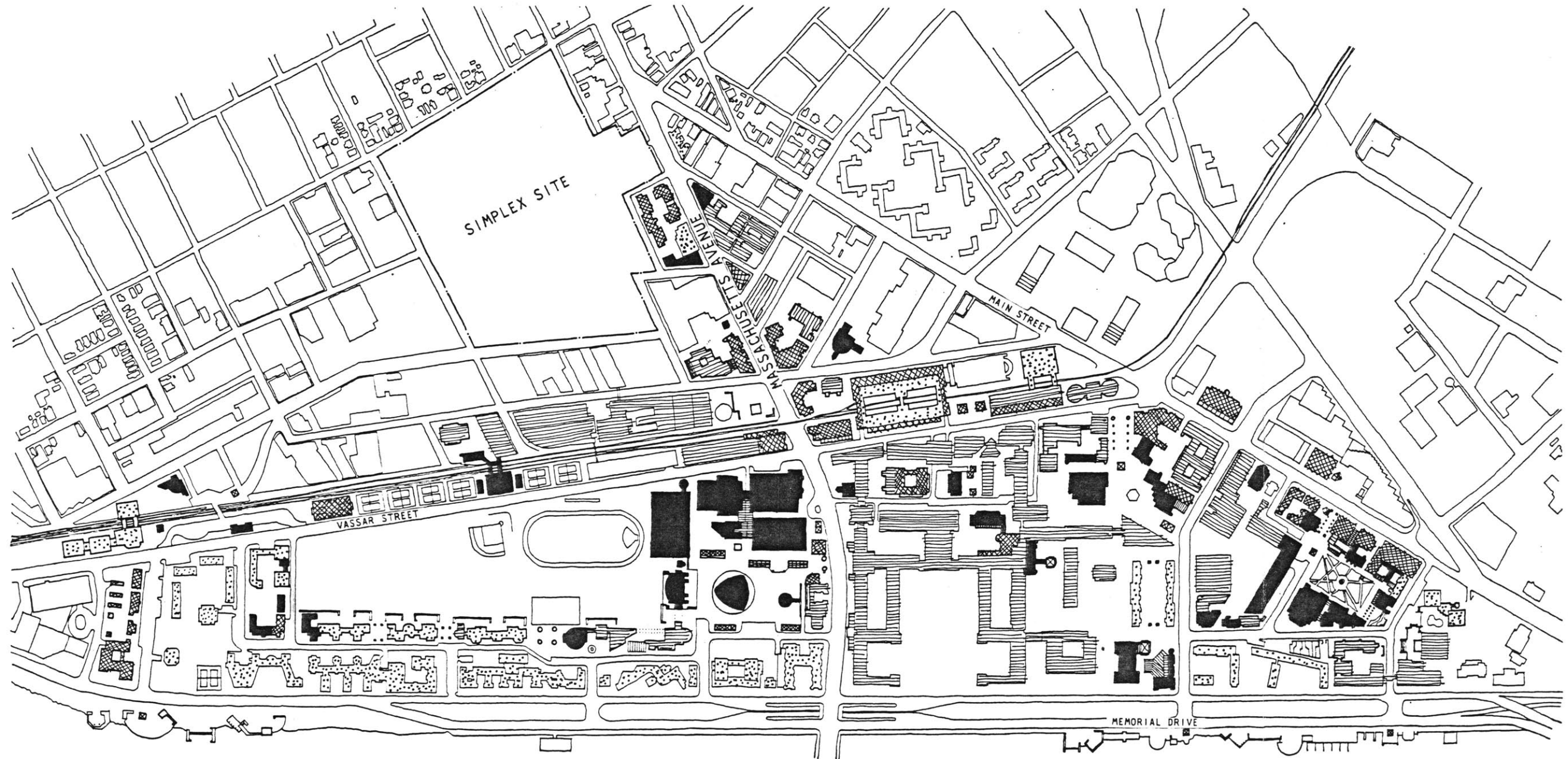
URBAN MIXTURE

🌲🌲🌲 : STUDENTS' FACILITIES
✎ : ACADEMIC / ADM.
⌂ : HOUSING
◉ 14 : COMMERCIAL

Fig. 4.5

SIMPLEX SITE

FEET
0   200   400   800

PATHS / PLACES

Fig. 4.6

SIXTH STREET

THIRD STREET

BROADWAY

MAIN STREET

AMES STREET

WADSWORTH STREET

AMHERST STREET

MEMORIAL DRIVE

0 100 200 FEET 400

NEW URBAN CENTER

Fig. 4.7

SIXTH STREET

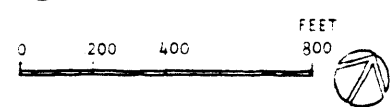THIRD STREET

the coop

Taxis

BROADWAY

Shopping

RACQUETBALL

Squash courts

Bowling

Theatre

MAIN STREET

T

MBTA

HOTEL

Lab

Stationery

Dance

AMES STREET

Hospital

Information

MIT Press
Bookstore

Pizzeria

Bars

APTS.

Au Bon Pain

BANK

NEWSPAPER

Cafe

Coffeehouse

Banks

FLORIST

Graphic Arts

Day Care

Donut Stand

Common

PARK

Frisbee

Dormitory Banks

WADSWORTH STREET

Dormitories

Language Lab

Center for the Arts

Student Union

APARTMENTS

Parking

Art Association

Gallery

Dramashop

Museum

Concert Jazz

Hobby Shop

Faculty Club

Library

AMHERST STREET

Residence Hall

Lecture

Lecture

Cafeteria

A la carte

SYMPHONY

Jogging

MEMORIAL DRIVE

MIT Sailing Pavilion

FEET

0   100   200   400

Canoeing

ACTIVITY PLACES

Fig. 4.8

AXONOMETRIC VIEW

Anderson, Lawrence B, ed. APSS 1969. Cambridge, MA. n.p., 1970.

Bawne, Michael, ed. University Planning and Design. London: Lund
    Humphries, 1967.

Bunting, Bainbridge, and Robert H. Nylander. Survey of Architectural
    History in Cambridge - Report Four: Old Cambridge. Cambridge,
    MA: MIT Press, 1973.

Catanese, Anthony J, and James C. Snyder, ed. Introduction to Urban
    Planning. New York: McGraw-Hill Book Company, 1979.

Cowen, Peter. The Future of Planning. London: Heinemann Educational
    Books Ltd., 1973.

Dober, Richard P. Campus Planning. New York: Reinhold, 1963.

    The New Campus in Britain. New York: Educational Facilities
    Laboratories, 1965.

Educational Facilities Laboratories. A College in the City: An
    Alternative. n.p., n.d.

Fallon, Paul E. Architecture that Affords Play. Master of
    Architecture Thesis, MIT, 1981.

Forrester, Robert A. Planning for the Visual Form of M.I.T. Master
    in City Planning Thesis, MIT, 1965.

Gruzen & Partners and Mitchell Giurgola. East Campus Master Plan
    Massachusetts Institute of Technology. Camdridge, MA. n.p., n.d.

Harvard University Publication. The University and the City. n.p.,
    n.d.

Jones, Gwenyth A. Cooperative Housing for M.I.T. Master of
    Architecture Thesis, MIT, 1975.

Larson, Jens F. and Archie McInnes Parlmer. Architectural Planning of
    the American College. New York: McGraw-Hill Book Company, 1933.

Ledgerwood, Joseph G. Social Perception of the Campus Planning
    Process. Master in City Planning Thesis, MIT, 1970.

Lynch, Kevin. Site Planning. Cambridge, MA: MIT Press, 1962.

    The Image of the City. Cambridge, MA: MIT Press, 1960

M.I.T. Publication. Art and Architecture at M.I.T: A Walking Tour of
    the Campus. Cambridge, MA. n.p., 1982.

Rasmussen, Steen E. Towns and Buildings. Cambridge, MA: MIT Press,
    1949.

Rivkin Malcom D. Planning for M.I.T. 1956-1970. Master in City
    Planning Thesis, MIT, 1956.

Rork, John B, and Leslie F. Robbins. Casebook on Campus Planning and
    Institutional Development. Washington: U.S. Government Printing
    Office, 1962.

Schirvani, Hamid. Urban Design Review: A Guide for Planner. Chicage,
    Illinois: Planners Press, American Planning Association, 1981.

Schwartz, Paul D. Municipal Role in the Determination of Land Use.
    Master of Architecture Thesis, MIT, 1976.

Schwartz, Robert S. Managing Form: Studies in Corridor and Concession
    Areas at MIT and their Implications for City Design. Master in
    City Planning Thesis, MIT, 1968.

Shalom, Steve, and Bob Shapiro. Two, Three, Many Tech Squares:
    M.I.T.'s role in the transformation of Cambridge. n.p., n.d.

Sitte, Camillo. The Art of Building Cities. New York: Reinhold,
    1945.

Turnbull, Adrienne A.G. A Contextual Vocabulary: Harvard Square Art
    Center. Master of Architecture Thesis, MIT, 1978.

Turner, Paul V. Campus. Cambridge, MA: MIT Press, 1984.

Wilund, Brittmari. Amusement Parks - A Relevant Form of Public
    Recreation. Master of Architecture Thesis, MIT, 1976.

Wheeler, Karen V. Exploring the Prepositions: At Approach to the
    Design of Public-Private Edges. Master of Architecture Thesis,
    MIT, 1974.