M.I. Tomorrow:
Visions for East Campus

by

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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.

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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

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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.
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 one 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

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 colleges, 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 Harvard's "Yard" system and William and Mary's baroque "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

![Diagram of Linear Campus]

Fig. 1.6 Yale College in 1717 and 1803

![Diagram of Yale College in the 1780s]

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.

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.

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
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.

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 concept are: Standford University masterplan, University of Chicago, and Columbia University. 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.
Fig. 1.10 Masterplan of Stanford University, 1888, by Olmsted and Coolidge

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

Fig. 1.12 Masterplan of Columbia University, 1894

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

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.
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
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 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 integral 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 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 which may prevent the full enjoyment of the benefits of an urban civilization.

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.
Another related role of an urban university should 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.

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 strengthen its 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

M.I.T., founded in 1860, built its first building 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 in Boston was very typical of technical schools in that it was 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

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.

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 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

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 structure. The idea was that four story buildings would be continuously 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.

This main complex had been filled out and balanced 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.

The north side of the main complex and Vassar 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 naturally 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

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 students' life were stressed in organizing the campus, resulting in provision of extensive housing and recreational facilities, and the development of athletic 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.

![M.I.T. Campus in 1946](image)

Postwar constructions have focused mainly on student housing and recreation facilities, chiefly on the west side of Massachusetts Avenue. These
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 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 has increased from 43 acres in 1911 to about 200 acres in 1982.
In this section, I will discuss two major organizational problems of the M.I.T. campus, based on study of the campus history.

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 Interaction

The second organizational problem of the campus is 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, overall 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 cooperation 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.
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 Organization

First, clarity in spatial organization should be 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 of Social Interaction

Secondly, social interactions should be encouraged 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.

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
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."

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 distribute 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.

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 area 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 buildings, 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 strengthened.

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 overall form of campus by giving a contrast in massing, several visually prominent high buildings mixed with many low rises.

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.

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 forms, 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.

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.
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 campus environment, the M.I.T. campus is reorganized by
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 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, retail 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 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
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 ceremonious space for formal events; enlarged and better-defined open space in front of Student Center as a major get-together space and outdoor activities; athletic 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 proposed 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.

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

In organizing the campus framework, access pattern, movement hierarchy and their relationships to places are emphasized as critical determinants. Several principles and concepts are applied to this issue.

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 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 recommended.
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.

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

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 area 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

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 furnishings.

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.
M. I. Tomorrow Campus ?
Fig. 4.6

NEW URBAN CENTER
Fig. 4.7

ACTIVITY PLACES
AXONOMETRIC VIEW

Fig. 4.6


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


