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**AN EVALUATION OF THE SETTLEMENT  
PATTERNS IN CAMPUS PLANNING WITH  
REGARD TO THE CRITERIA OF  
ACCESSIBILITY**

**A Thesis Submitted to the  
Graduate School of Natural and Applied Sciences of  
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In Partial Fullfillment of the Requirements for  
The Degree of Doctor of Philosophy in Architecture, Building Design Program**

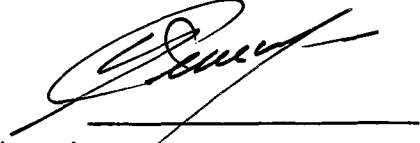
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İZMİR**

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**Ph.D THESIS EXAMINATION RESULT FORM**

We certify that we have read this thesis and that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Doctor of Philosophy.



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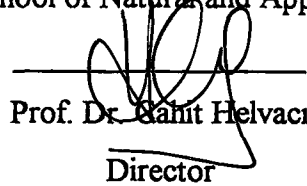
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## ABSTRACT

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Higher Education Councils are the most efficient institutions for the rapid progress of nations on international platforms. They are the leading institutions on development of the countries on science and technology. Turkish Higher Education Council, which give service on different parts of the country since the establishment of Turkish Government is supported by the new changes on the laws after 1992. Following that year there has been a definite increase on the numbers of established universities and by 1998 their numbers have increased up to 72. Due to this rapid increase there has been inflation on university planning process.

Consequently during this re-construction period of Turkish Higher Education System some problems are met by the user groups of the newly built university campuses. The most comeaccrossed problem on campus planning in the recent years seems that the universities do not perform a definite unity in their campus settlements. Instead of collecting all the academic programs of a certain university under a major campus site, most of the universities have distributed their academic programs into minor campuses that are separated from each other.

Besides that, when the major groups of functions such as resting-feeding-socializing and learning are not designed under a major campus site and they are separated from each other, then the basis of the 24-hour university concept cannot be obtained. Because of this situation the present trend on establishing scattered campuses for a proposed university should be investigated from the beginning and alternative university models should be developed for these problematic universities.

On the contrary, among the existing Turkish Universities that are established under a major campus site most of them, either related to their selected campus

pattern or to the largeness of the selected campus site, are not used effectively as it is desired by the students. Generally these university campuses' development schemes are planned above the average walking distances of pedestrians. So, in most of their land-use plans the accessibility distances between the major groups of functions and between the relative academic spaces usually exceed the defined average walking standards for pedestrians. As a result students have difficulties on the perception and orientation of the campus spaces. They cannot share information with others easily, social unification does not occur and students lack of their social identities on belonging to a certain community.

On behalf of these discussions made, it is required to analyze the design process of campus settlements in relation with the requirements of the campus users. It is tried to analyze the alternative models of various land-use plans on the basis of the accessibility criteria in order to create livable campus environments.

## ÖZET

Yükseköğretim kurumları toplumların bilinçlenmesi açısından uluslararası platformlardaki en önemli müesseselerdir. Ülkemizde yükseköğretime verilen değer özellikle 1992 yılında yasalarda yapılan yeni düzenlemelerle artmıştır. Üniversitelerimizin sayılarında kısa sürede belirgin bir artış olmuştur ve 1998 yılı itibarıyla sayıları 72'e yükselmiştir. Dolayısıyla bu sürede ciddi bir üniversite enflasyonu yaşanmıştır. Bu yapılanma döneminde tasarlanan üniversite kampüslerinde kullanıcılar tarafından bir takım sorunlarla karşılaşmıştır. Buradaki en önemli problem özellikle son yıllarda tasarlanan üniversite kampüslerinde belirgin bir bütünlük görülmemesidir. Aynı üniversiteye ait akademik mekanların farklı bölgelerdeki kampüslere dağılmış olması üniversite öğrencilerini belirli bir kampüse dolayısıyla, sosyal kimliğe sahip olma duygusundan yoksun bırakmaktadır.

Öte yanda bir üniversitede bulunması gereken ana fonksiyon gruplarının bir başka deyişle yeme-uyuma-öğrenme-sosyokültürel ilişkileri geliştirme imkanlarının tek bir kampüs içinde çözülememiş olması öğrencilerin ihtiyacı olan 24-saatlik üniversite ortamını sağlayamamaktadır. Bu açıdan var olan bu dağınık kampüsleşme eğilimleri tekrar gözden geçirilmeli ve bu tür yaklaşımlara alternatif tasarım önerileri getirilmelidir.

Bir ana kampüs alanı içinde tasarlanmış olan üniversitelerimizin çoğunluğunda ise gerek seçilen kampüs tipolojisinden gerekse uygulanan kampüsün büyüklüğünden kaynaklanan problemlerden dolayı bu kampüsler istenildiği gibi etkin kullanılmamaktadır. Genellikle bu üniversite kampüslerinin gelişim şemaları yayaların ideal yürüme standartlarının çok üstünde planlanmışlardır. Dolayısıyla kampüs binalarının organizasyonunda fakültelerarası ve ana fonksiyon grupları arasındaki mesafelerin ortalama yürüme standartlarına göre uzak olması akademik

birimler arasında diyalog kopukluęu oluřturmaktadır. Kampüs alanları kullanıcılar tarafından kolay algılanabilir veya tanımlanabilir olamamaktadır. Böylelikle bir akademik çevrede paylaşılması gereken bilgi iletişimi ve sosyal bütünleşme istenilen düzeyde gerçekleştirilememektedir.

Sonuç olarak yukarıda açıklanan tartışmalar ışığında, bu tez çalışmasında kampüs mekanlarının kullanıcıların ihtiyaçlarına baęlı olarak nasıl bir dağılım şeması ile biraraya gelebileceğini, ve bunların hangi ulaşılabilirlik kriterlerine göre konumlanabileceğini arařtırmak gereęi duyulmuřtur.



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## CHAPTER ONE

# INTRODUCTION

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### 1. A General Framework.

Higher-education associations differ from other education systems by directing the individual on one of the branches of science, art and literature. It has a process of giving specialization on the selected profession. University concept considers an organizational structure, which varies according to the education program of the country. Ideally, universities formulate their academic curriculum in parallel with the new technological improvements and they become the initiators of other national institutions in their country. "Universities are the institutions which train qualified intellectuals which produce information and technology on higher levels, direct nations and mankind by trying to solve the technological and scientific problems of the country" (YÖK. 1996 p 34.)

#### 1.1. Aim of the Study.

Universities are the institutions, which give students a social identity on behalf of teaching and training purposes on different branches of academic programs. Consequently planning and design of university settlements which form the physical structure of campus environments play important part on nourishing the relationships between knowledge and socialization among the university students. However in many campus settlements it is come acrossed with a situation that accessibility from one edge to the farthest edge of the campus becomes almost impossible due to the congestion in the organization of the campus schemes. On the other hand a campus inhabitant becomes tried to reach to one of the major groups of functions from the center of the settlement by her average walking speed. In such scattered campus

settlements with no architectural discipline in their land-use organizations, optimum standards on the needs of pedestrians are not taken into consideration.

Unfortunately the same thing often occurs among the previously and recently planned Turkish Universities. Most of their developed plans exceed the ideal accessibility standards for pedestrians, which walk with average walking speeds. At such conditions as the accessibility distances between major groups of functions and between the center to the farthest edge of the campus increase, the problem of orientation and perception of space occurs. When the campus inhabitants lose their sense of direction in their congested campus sites then they cannot be in contact with the surrounding facilities. In other words they cannot be aware of what is going on around them. They cannot have the socialization environment and they cannot improve their academic relations with the students from other academic faculties.

This affects the development of interdisciplinary relations between the academic programs of relative faculties, undergraduate schools and institutes which may be followed commonly. In large distances they may not share these common academic spaces such as seminar rooms, and laboratories. As a result the required university environment can not be obtained. All these problems, that are frequently come acrossed in university settlements, show that university and campus planning concept should be interrogated for the present conditions. Since there is already a problem on following the campus planning process. Then for effective, livable and identifiable campus settlements this problem should be analyzed and alternative solutions should be proposed for each step of this process. According to do them, the main determinant criteria of campus planning concept should be identified.

First of all campus planning and design criteria should be determined. In addition to them accessibility criteria for the campus user groups in relation with their optimum standards of the pedestrians should be determined. They should be based on the average walking speeds of pedestrians in urban networks. Because campus settlements act like small urban networks. By taking the above criteria into

consideration ideal development schemes for the new structure on the land-use plan of major groups of functions should be developed.

Another important problem for campus planning is that both in the world and in Turkey there are various types of campus patterns applied on the existing university campuses. Only some types of campus patterns provide the ideal accessibility circumstances on the applied campuses. In the others however specific characteristics of the selected campus pattern and the applied campus sites with large sq. meters altogether create problems on defining identifiable campus settlements. So these defined campus patterns should be redeveloped for ideal accessibility conditions of pedestrians by the help of the alternative design schemes.

## **1.2. Method of the Study.**

This thesis aims to evaluate the campus settlements with regard to the accessibility criteria. The existing problems of the campus settlements, and the alternative solutions for these problems are explained under six main chapters as the following.

First chapter mainly involves with the aims of education and defines the higher education system in general meaning. It deals with different steps of higher education process. It analyzes the historical evolution of university education in the World and in Turkey. Here it compares the faculty mode of organization and departmental mode of organization in relation with their effects on campus planning concept. Then it explains the three steps to be followed in the methodology of university planning. It gives the requirements for theoretical scale , planning scale and design scale on campus planning.

Second Chapter on the other hand defines the main determinants of campus planning concept. These determinant criteria are collected under three headings as: planning criteria, design criteria and thirdly the backbone of this thesis the accessibility criteria. Planning criteria mainly considers the decisions taken at the theoretical scale of campus planning, such as the location of the site, the relations of the site with the region, the city and the industries. After defining the ideal conditions



for planning criteria then the major design criteria which determine the user groups, the major zones the primary and the interdisciplinary relations of the major zones within the campus are evaluated. Then the accessibility criteria that form the basis of the evaluation of campus settlements in this thesis are analyzed. Here optimum standards on the needs of pedestrians and on the visual perception of spaces by pedestrians are investigated in relation with the ideal accessibility circumstances. As a result four major accessibility criteria that are based on the average walking distances of pedestrians are proposed.

Third Chapter mainly classifies the existing or proposed campus patterns in relation with their corresponding city models. The aim of relating them with the city models is that the campus settlements act like small urban settlements. So both of them share the same types of design concepts and design problems. Besides that it is not a coincidence that in most campus settlements various types of city models are imitated. Following this process ideal accessibility circumstances for each campus pattern are evaluated in alternative schemes according to the four accessibility criteria which were determined previously. In addition to that university examples from each defined campus pattern are analyzed.

After the assumptions made on four major accessibility criteria for ideal campus settlements and the classifications on different types of patterns, in the Fourth chapter all the determined data are measured on Turkish Universities by the help of a survey study. The aim of this survey study is both to evaluate the higher education system in Turkey, to put out the present conditions of Turkish universities and to measure their degree of success on performing ideal campus settlements. This survey study is comprised of 14 questions. It is followed on the 59 Turkish universities that are established by 1997. In addition to the survey questions each university were asked to send photocopies of their existing or proposed campus plans in a scale of 1/2000 or 1/1000. Then the findings on the student and academic staff population ratios, the number of academic programs and the selected campus pattern for each university are compared in separate tables. Then in order to provide

accessible and functional space organizations in campuses alternative solutions on selecting the most suitable campus pattern for a given sq meter are proposed.

Fifth Chapter is based on the findings of the survey study that are given in the Fourth Chapter. In other words it is the extension of the previous chapter. It takes one of the Turkish universities as a case study example from the ones, which have not provided the previously determined accessibility criteria in their campuses. It is decided to select a university from our immediate environment. So Aegean University is selected as a case study example and a redevelopment project is proposed for the existing campus site. In this redevelopment project alternative solutions are proposed to the existing problems of the university. First of all a new circulation system with loop networks, pedestrian bridges and new pedestrian axes designed for the campus. Then a conversion of the academic programs is proposed between the academic programs that were not placed at the proper locations on the existing campus site. Finally an idealized scheme with a linear type of expansion as the dominant campus pattern is developed for the academic programs with their proper locations in the existing campus site.

Sixth Chapter, which considers the conclusions for this thesis, summarizes the primary assumptions accepted to be applied as the standards for idealized campus settlements. It collects them under four main headings. After explaining each primary assumption that are needed to ensure accessible campus settlements, it results with the ideal development schemes in arial and linear solutions for campus patterns that are given schematically.

### **1.3. Definition of University Education.**

Education in may be defined as a life-long social process of directed learning, which enables both the individual, and the society in using past's cultural inheritance and future's idealism to operate the institutions of the present effectively. It is a process of give and take from generation to generation. It aims to develop the technological and intellectual circumstances and life standards of a country by

training communities. The first flourishing of education as a system can be absorbed right after the transition from nomadic to settled life of mankind. Since antiquity, various changes in education systems have occurred. Today it is identified as a system made up of three stages as elementary school, high school, and university education.

*The basic principles of contemporary education are defined by the two outcomes of the developments in the twentieth century. One of these outcomes is that the nations are forced to keep in step with the rapid changes on social and technological fields, to survive among the other nations. The other outcome is that the education process at each stage has gained acceleration due to the blow of information in various fields of study. It can be stated that contemporary education is the completion of politics, organizations, and methods which direct the societies towards producing science and technology. (Özüekren, Y. 1982 p 86.)*

In the establishment of a university every society accepts a university concept related to its social and economic structure. It is an economic output of social and cultural forces. According to the chosen concept, it is necessary to decide on the principles of distribution pattern, university pattern and educational pattern. Relations between the university and the community describe the formulation of the tasks of the university.

*“For the twenty first century societies with advanced technologies, contemporary university models of higher-education systems may be defined by the following keywords; mass education, continual educational, elite education, inter-disciplinary flexible programs, standardization-accreditation, advanced educational technologies and directed and organized basic researches” (Sevük, S. 1996. pp. 218).*

### **1.3.1. Mass Education:**

“Among the nations, which have provided in higher education to masses the percentages are 60% in U.S.A. and 30.35% in European countries” (Sevük, S. 1996. p 219.) This ratio is only 16% in our country, which is far below the mean. It seems that only the countries, which can guarantee these means, will be sufficient among the others in the 21st century.

### **1.3.2. Continual Education**

The findings of a research on higher education, in the U.S.A. shows that almost half of the information given during university education loose its validity in the next six years. In other words, university education cannot catch up the new technological improvements as required in their academic programs. As a precaution, a new educational program, named as continual education was developed to keep up with the rapidly changing technologies. It emphasized education after graduation from university. It is applied already to scientists working in technical institutions to improve their knowledge on the latest findings and discoveries of their topics. Continual education aims to give small courses and seminars to specialized group of people periodically in the technical institutions.

### **1.3.3. Elite Education**

Elite education, which aims to train a limited but qualified group of students on advanced technologies, should be supported in parallel with mass training education. This is because higher education institutions need diversification both on structural and functional means. By the help of this multi-system most of the universities may consider undergraduate and graduate education and increase the ratios of mass training in the country. On the other hand a small percentage of universities which may be five or less in a country, may follow elite education on undergraduate and graduate level. These universities may train students on the advanced technologies.

#### **1.3.4. Interdisciplinary Flexible Programs**

Today it is believed that, the present higher education programs, applied sciences, social sciences, health sciences and engineering branches will be unified with more generic academic curriculum in the 21st century. According to that, interdisciplinary flexible programs should provide commitment and motivation, which are one of the most fundamental skills of education. In addition to that, must courses should be decreased and elective courses should be increased to move the interest of students on interdisciplinary programs. In U.S.A. must courses are already below 50% on applied sciences and below 30% on social sciences.

#### **1.3.5. Standardization Accreditation**

“In the recent years a new educational program called **Study Abroad** was developed in American universities to provide international integration in the 21st century.” (Sevük. S. 1996.p 220.)The project aimed to train at least 25% of university students from each member of ECU for at least one academic year in one of these countries’ universities. This education system aims to bring globalization in other words standardization and accreditation among university students.

#### **1.3.6. Advanced Technologies / Remote Education**

This computer Aided Instruction and Video Aided Instruction have been started to be used in higher education systems of the developed countries since 1980’s. This type of an educational policy has not started in our country. They seem as executive academic programs. However studies on developing intellectual tutoring systems for higher education are continuing for the future programs.

#### **1.3.7. Directed and Organized Basic Researches**

Basic research programs form the most fundamental institutions of a country to be powerful in the twenty first century. Universities are the most appropriate

places for basic research programs whereas industrial institutions called “AR-GE” research and development institutions are most appropriate on advanced technological researches. These two institutions can work in cooperation with each other under the elite education programs. The help of the federal support and private foundations can these programs can be followed in specific universities and Federal Contract Research Laboratories.

Above all these alternative models for higher education, continuity of the contemporary education from the lowest to the upper level of education system, should be maintained by minimizing the coordination problems between these levels. This means that if it is desired to follow advanced programs on technological researches then it is needed to give the principles of research methods starting from the elementary school up to university education during this continuous process.

#### **1.4. Historical Evolution of University Education in the World.**

Education in any notion is the product of a number of forces prevailing in the community. The general economic situation, the basic beliefs, traditions and political background determine the direction in which a nation’s educational system will develop. Education is the major process of the social information and only higher education will maintain specially trained human resource.

The beginning of university institution in history goes back to the theological formations in the Middle Ages. “The Latin word ‘universitas’ meant a corporation in the medieval period. This corporation became the sole authority for granting licenses to teach.”(Ordu, K. 1990. p.26.) In the 12<sup>th</sup> century, church was the sole authority in controlling education, which was shown as a necessity in order to control the minds of men. The activities of university were limited within the borders of the church. A monastery life was brought to pupils of the church. Theology was the only interest of the university system such as in The Cathedral of Notre Dame. Same similarities were noticed in the Ottoman Kulliyes. Kulliye of Sultan Bey and the second was built in mid 1400s was a complex of buildings that was isolated from the city life. It

was defined as a contemporary campus of the century with its mosque, hospital, medicine school and food halls.

Basic characteristics of the university patterns in the late medieval period were as the religious centers scattered throughout the cities. Physical formation of the universities during the renaissance period had changed towards training “homo universale” which means universally concerned students rather than training religious men. In achieving this idea and in preventing the religious pressures of the community, the university was moved outside the city. It concentrated on a hierarchical complexity, which could follow scientific studies more independently. On the other hand the physical alienation and isolation of the universities outside the city was much more related to the self sufficient phenomena and the withdrawal of functions which defined the physical characteristics of the “bourgeois city”. The fundamental feature, which characterized the university settlement in the Renaissance period, was the segregation that cut it from the city. The liberty of culture, of teaching and of science, the desire to keep new ideas out of the reach of the contamination of the world were in turn of the causes of this fundamental tendency for isolating the university from the rest of the city. Building typology of university was formed by the modular repetition of semi-open rectangular buildings both in the Medieval and Renaissance periods.

University system of the 18<sup>th</sup> century with few exceptions followed the tradition of medieval scholarship. Instructors taught Aristotelism as a dominant philosophy. Ancient past and theological disputations were the main subjects of study. As a result, an attempt was made to reorganize the structure of the university to fight against the dispersion of isolation from the city. An effort was started to integrate the structure of the university and that of the state and classes in power of academic cooperation. Universities of the 18<sup>th</sup> century had a problem of flexibility on macro and micro scale developments of their campus settlements within the limited spaces of the city centers. University of İstanbul, Durham, and Sussex were the typical developments of the century. Kaiser-Wilhem University in Strausbourg designed by

Eggerth and Warth in 1878 was shown as the first university campus of the period, where a group of buildings defining a rectangular composition in a green park site.

During this time the American campus settlements had developed a little different from their European counterparts. They had arisen independently from the philosophical controversies by the influences of English models and by its own origin. The campus constituted a decisive turning point in the history of university site, which would later be extended without disturbing the basic plan. "Mainly the Roman Age "Castrum" camps were imitated in the first examples of American universities as in the University of Virginia 1826." (Dober, R.H. 1963. p.112.) The buildings were designed side by side in a compositional order. Rectangular sites were the basic plan typologies again and the most important uses of campuses were designed on the shorter sides of the rectangular sites. 19<sup>th</sup> century American campus defined itself as a group of neoclassical type of buildings where the central area became shut in by successive rings of these developments.

By the industrial revolution period on the other hand international movements like Bauhaus had been born in Europe. They emphasized on modulation and standardization in architecture which were effective on the construction of the campus plan. University of Reading, Nottingham, Southampton and Hull are the specific examples. Expansion on scientific knowledge during the century made necessary a reform of the curriculum leaving the English College system behind. A new concept of university including professional preparation in every field was developed. This had led the system into a great educational complex under one broad administration.

"This ideology of independent university system moved the universities outside the city by the 1930s." (Dober, R.H. 1963.p.128.) Universities that were once located in the suburbs found themselves enveloped in the city. Their development became a negative impact on local traffic housing costs and services. City planners demanded that campus administrations provided statements of their intentions and abided by the same rules imposed on other large property owners. Pressures on



preserving the campus setting and limiting expansion into the community have led institutions to limit certain activities off campus, it had limited growth and created satellite campuses. University of Rome and London were their examples.

Basic planning principles of the ideology were flexibility on interdisciplinary uses and macro growth of the campus. On the design of new universities most marked difference probably occurred in the reality of complex situations where no single element or function could become the determining agent. Neither structure nor functional analysis of user requirements nor a new technology were enough. Primitive functionalism, which had been the militant force of the pre-war years, had carried architecture through the post-war reconstruction and it proved to be illusory by the late fifties.

By the 1960s universities that were designed outside the city had social isolation problems. Discussions about the location of a university produced two theoretical university patterns in the historical evolution of the university settlements. One of them was the city- university where the structure of the city was adapted. It was in close relations with cities. Second one was the university- city which was the outcome of the English Colleges where it formed a self-sufficient society. It was outside or inside the borders of the city. These university patterns started the planners to think about centralization and decentralization concepts. According to the planners centralization meant the policy of having universities in metropolitan centers and decentralization in regional centers. In other words, universities could be located first in metropolitan centers and eventually when the demand increases, new universities would be established in regional centers. Universities could no longer be located in metropolitan centers if the demand could be increased. Universities then could only be decentralized when the demand for qualified teaching staff is solved. Decentralization of universities would increase the knowledge about their environments and changes in the structure of the university but it might become a segregated community.

The rise on contemporary scientific developments and the cause of environmental problems in the 20<sup>th</sup> century have directed the planners and scientists towards same common goals. The rapid increase on few fields of sciences on the other hand forced their interdisciplinary relationships to become more important in higher education. The contact of different disciplines in education and common uses of same academic spaces had diverted the designers' concentration on new university concepts with new physical formations of space uses within the campus. Primary relations within the campus such as between student A- teacher- student B defined themselves in new patterns by the help of the socialization and recreation spaces.

### **1.5. Effects of CIAM Congress and Team 10 (X) on University Patterns**

With the beginning of industrial revolution, new technological improvements have led the futuristic planners to develop new utopias on the contemporary cities of the modern world. Among these, Tony Garnier had designed a project called "Cite Industrial" in 1904, which brought a new concept with the zoning principle in city planning. In this project, the industrial area was separated from the residential site with a greenbelt and every function of the city was directed in their private zones. These principals of the project later become the main idea of the CIAM Congress in 1933. "Another futuristic architect of the period, Anthonio Sant'Elia in 1908 had defined the modern city as a complex, dynamic machine." (Lynch, K. 1994.p.57.) It has been the starting point of the mega-structural theories of the 1960's followed by Yona Friedman and Renzo Pranoi.

Further on, Le Corbusier, one of the theoreticians of modern architecture, had designed two unique projects in the meaning of contemporary cities. The first one was the project of Salon D'Automme in 1922 designed for a population of three million people in Paris where pedestrian and vehicular traffic was segregated in vertical directions. The other one was the project of La Ville Radiuse in 1930, which brought the principle of zoning within the major functions of the city. All of these projects followed by the early modernist architects have been the main design criteria of the fourth CIAM Congress held in 1933, Athens.

“The CIAM declaration signed by twenty-four architects, representing France (6), Switzerland (6), Germany (3), Holland (3), Italy (2), Spain (2), Austria (1), and Belgium (1)”.(Lynch, K. 1994.p.60.) It emphasized on building rather than architecture as the “elementary activity of man intimately linked with evolution and the development of human life. CIAM declared that urbanization could not be conditioned by the claims of the pre-existent aestheticism.

Its essence was of a functional order. In the conference of CIAM held in 1933, in Athens main the theme was the meaning of functional city which was grouped under five main headings, recreation, work, transportation and historic building. The Athens charter concealed a very narrow conception of both architecture and town planning. It brought rigid functional zoning of city planning with green belt areas reserved to different functions. Also single type of urban housing was expressed in the words of charter as high as widely spaced apartment blocks.

“At the CIAM XI, Aix-en-provence in 1953, a group of architects challenged the four functional categories of Athens Charter. They were called ‘team 10’ or ‘team x’.” (Lynch, K. 1994. p.65). They searched for the structural principles of urban growth and for the next significant unit above the family cell. They responded to the simplistic model of the urban core by positing a more complex pattern that would be more responsive to the need of identity. They thought that belonging was a basic emotional need. Its associations were of the simplest order. From belonging identity was born which in turn became the enriching sense of neighborliness.

Some planners’, like Bakema’s, proposals and deterministic tendencies on the extremely hierarchical form of neighborhood planning was replaced after the CIAM Congress XI. These were mega structures that either cut across topography as in the case of his 1962 entry for Bachum University or alternatively as in Tel Aviv University paralleled the trajectory of a freeway spine running through the city. As a result, the basic difference between the philosophies of two groups were that, while CIAM emphasized the zoning principle of major city functions on the horizontal axis

and the circulation system on the vertical axis, Team 10 was against the idea of zoning within a given site. Both of these ideas on two concepts were directly reflected to the evolution of campus planning chronologically.

### **1.6. Historical Evolution of Higher Education in Turkey**

Historical evolution of higher education in Turkey can be analyzed in two categories as pre-revolution period and revolution period. During the pre-revolution period, which considered mainly the Ottoman Period, education was based on theology. It had great similarities with monasteries in Europe. Higher education on the other hand had started with the westernization process in the 18<sup>th</sup> century.

*It was the outgrowth of the military needs of the system. By the deterioration of religion based education system in the late 18<sup>th</sup> century a higher education Darülfünun was established as an attempt to bring together religious groups. Darülfünun was re-created for several times with various reasons until 1933. The first senate system with a rector who is given the authorities of the whole university was established again in Darülfünunü Şahane. In the Tanzimat Period, two other civil institutions of education namely Mektebi-Mülkiye and Mektebi-Tıbbiye-Mülkiye were started. Then in the Meşrutiyet Period in 1908, some other higher educational schools were planned to be established away from İstanbul in the provincial centers to keep education away from politics. (Özer, H. 1978. Pp .97-106.)*

By the Revolution Period in 1933, theological monarchy left its place to democracy and the university system went through radical changes in their programs. After the revolution period up to the present Turkey, as a developing country, had followed diverse modes of university organization in its higher educational system. Due to the various influences from Germany and United States at different periods of time, Turkish educational thought had developed a system that concerned both of the relative merits of German faculty mode of organization and Anglo-Saxon departmental mode of organization. Generally speaking within a university

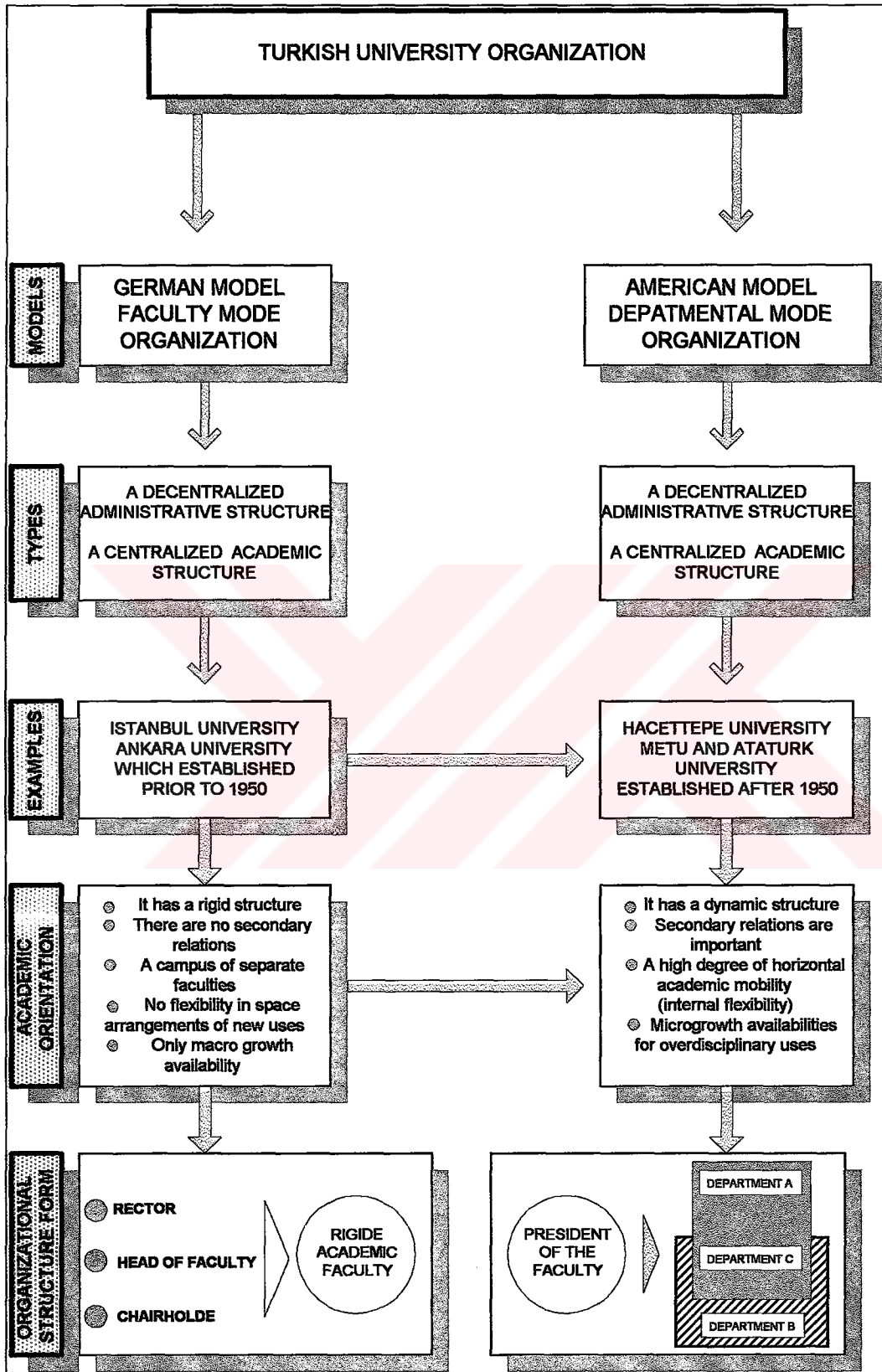
organization, at least two distinct structures could be discerned each with its own authority structure, value system and a set of organizational goals; the administrative structure and the academic structure.

Specifically in the case of Turkish universities, there were significant differences in organizational characteristics between the faculty and developmental mode of university organization, which affected both the autonomy and career mobility of faculty members within different levels of scientific productivity. Faculty mode of organization tended to have a decentralized administrative structure and centralized academic structure while the departmental mode of organization had a centralized administrative structure and a decentralized academic structure. The Table 1.1. gives the Turkish University Organization after the Revolution Period.

*In the early years of revolution period faculty mode of organization, which meant centralization in the academic structure, was applied both to existing and new established universities. As an example, the Ottoman Darülfünûn, which was first changed to Istanbul Darülfünûn in 1924 and to Istanbul University in 1933, was the earliest university example. Then by the reforms of Ministry of Education in 1933 new universities followed this university organization. Istanbul Technical University in 1944 and Ankara University in 1946 were the results of this reform and they reflected this system into their campus planning. (Özinözü, K. & Tinto, V. 1976 .p18)*

Following 1946, new developments occurred on sociological, cultural and political platforms. These led the government to spread higher education to all regions of the country other than the two major cities. The idea of planning regional universities was strengthened by the educators. "Country was divided into three major educational regions." (Özinözü, K. & Tinto, V. 1976. p.20) First region was Istanbul University which was selected to be a classical university, and which considered a radical educational program. It had a typical educational system that was followed in developed countries. Second region was selected to be the capital region with Ankara University at the first phase.

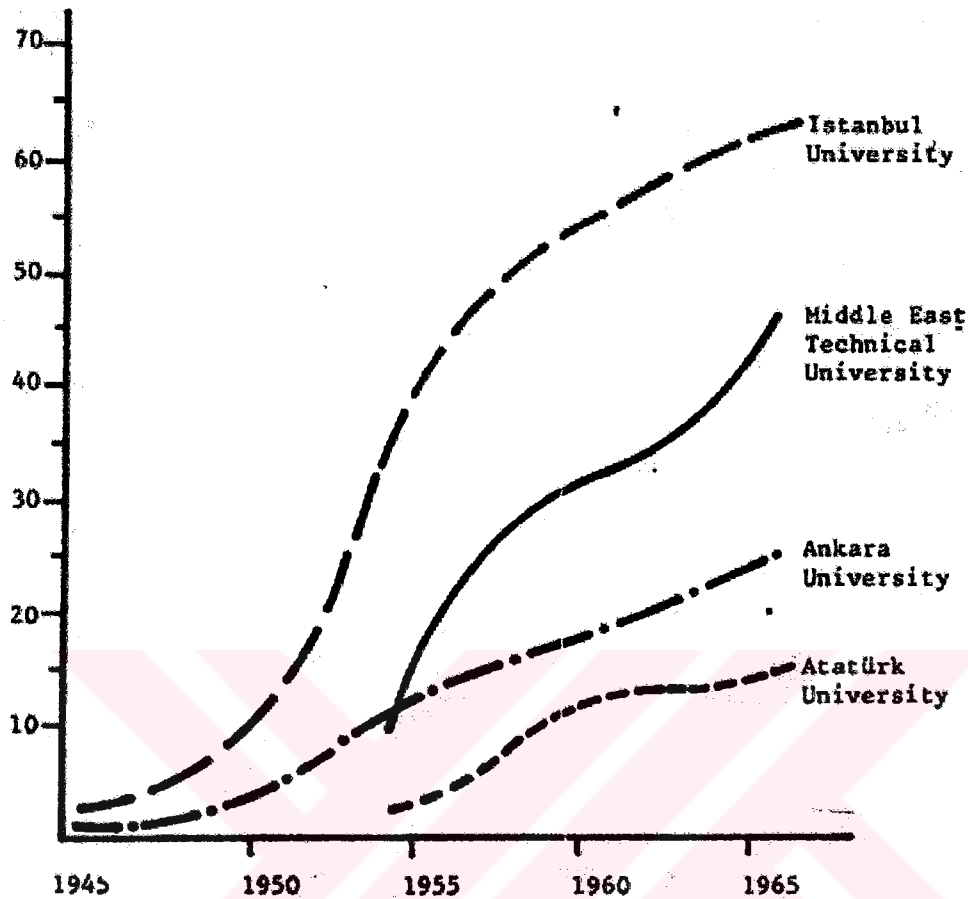
**Table 1.1. Turkish University Organization after the Revolution.**



Then after the 1950s new universities were established according to the departmental mode of organization as a continuation of the new developments. (Özinönü,K. & Tinto,V. 1976.p.21.) As an example in 1956 METU was established as the second university of this region. It considered an international university system with an Anglo-Saxon model, which was not familiar to Turkish universities. Finally third educational region was chosen from the underdeveloped part of Turkey. Atatürk University was established in 1957 in the eastern part of Anatolia. It was designed in American Land Grant System.

On behalf of the theoretical researches, the program was emphasized to improve the traditional occupations of the region. Again departmental mode of organization was applied to the physical plan of the university. Instead of rigid centralization of the academic structure, departmental mode of organization had exhibited a decentralized academic structure with the internal flexibility to differentiate itself in meeting the changing requirements of constantly changing fields of knowledge.

By the end of 1960's the importance of departmental mode of university organization on the orientation of academic units and motivation of the academic staff towards the scientific productivity in Turkish universities was clearly understood. Furthermore, the effectiveness of university organization on scientific productivity was approved statically by the various surveys. For example in a study followed by A.Kemal Özinönü and Vincent Tinto in 1976 growth in the number of papers published in the fields of physics between 1945-1966 on these four universities was analyzed. Figure 1.1 gives the related diagram.



**Figure 1.1. Growth in the Number of Papers Published in the Field of Physics 1945-1966 in Selected Turkish universities with Departmental And Faculty Mode of Organizations.**

This diagram showed that the departmentally organized university, Middle East Technical University provided an organizational setting, which was more conducive to high scientific productivity just after from its establishment year up to 1966 with an accelerating degree. This decentralized academic organization of departmental mode had inspired greater competition among individual faculty members, which was apparently an important factor in the growth of science. Later departmental mode of organization was to be based on the new universities to be established.



Following the decisions on where to establish new universities with what type of an university organization, all the universities were started to be structured and defined by the Law of Universities. In 1956 Aegean University with faculties of Medicine, Agriculture and Applied Sciences were opened. In 1955 Karadeniz Technical University and in 1958 Hacettepe University were opened. The start of five year development plans in the 1960's had stressed the vitality of spreading university system all over the country. Due to the results of the research of State Planning Organization in 1968 university planning principles all around Turkey and the selection of their programs were classified according to three main locational typologies as; provincial universities, sub-regional universities and metropolitan universities or institutes.

### **1.6.1 Provincial Universities**

Redevelopment projects on provincial regions have been proposed during the last 15-20 years. Just like in foreign countries, central and regional administrations of the Turkish government have followed various expedients. All the influenced tools that were used for the growth of these regions were named as regional development policies. Theory of growth pole which was brought up by François Perroux and further developed by others became the essence of the polarized regional policy. Harran University is a good example for new universities, which considers mostly decentralized population growth to redevelop the provincial regions. However it is based on the idea of dominant leading firm, growth pole concept only considers the economic basis of the region.

### **1.6.2 Sub-Regional and Regional Universities**

When we assume Istanbul, İzmir, and Ankara as metropolitan regions then other cities of Turkish government can be considered as urban regions or sub-urban regions. Universities within these regions give service to all of their neighboring settlements. There is a big student demand from the rural parts of these regions. Most of the universities are designed in separate campuses rather than one main campus.

### 1.6.3. Metropolitan Universities

These universities which are located within the city limits of metropolitan settlements mostly come across macro and micro growth problems. They are separated into two or three other campus areas. They lose their campus atmosphere due to these locational problems. The 1980's performed a rapid increase on the establishment of new sub-regional and regional universities related to the foundation of a new higher educational institution, (YÖK).

"YÖK, founded in 1983 was established to perform a new program with rigorous activities." (YÖK, 1993. p.34.) Until that time, each university had followed independent education system with their faculty senate. By the foundation of YÖK all the authority and the responsibility of the academic education united this system under a single institution. This institution created major changes in the university education. For example, a general examination system was started to eliminate the increasing student demand for university application all around Turkish universities. It was a two rank examination, which was thought to be beneficial on rising the expected student quality in universities.

Then by 1998 it is changed to one major examination system. By this system a total of 240,000 students were accepted to university education each year. "In 1983 this number was the 34% of total student applications. Up to 1991 this value decreased to 22,7% accepted students applications." (YÖK, 1993. pp 35-40. )During that period quota of the existing universities became insufficient on answering the increasing student demand.

Therefore in 1992 the government made new changes on establishing new universities. This law had facilitated the construction of these developments by giving financial aid to higher education. Number of the existing universities from 1992 to 1998 had increased to 72 within a very short period. A general investigation on the present circumstances of existing universities will be followed in comparison between their design principles in the further sections.

## **1.7. Methodology of University Planning.**

The process of university planning is subject to “choice mechanism” more than any other type of planning work. The decisions of the university planning at every stage of its working process, are subjects to more than one alternative. The choice of one of these alternatives is influenced by another choice. Before deciding on where and what type of university, a simplified classification and explanation of the various topics of the planning methodology should be emphasized. For the better understanding of the phenomena within a general frame, the methodology can be discussed at theoretical, planning and design scale.

### **1.7.1. Theoretical Scale.**

This scale considers the aims, principles and the limitations corresponding to each in planning the university. Economic situation, beliefs, and traditions, political background and educational thoughts are the main factors that form the basis of theoretical scale; In other words it is the educational policy of a country. The goals and objectives directly relate to the national educational system, which results with the university development plan. They are controlled by the limitations of the country. Three types of constraints are effective in shaping the university patterns.

First one is the balance between economic demands and demonstrations. This balance has been used as a target among many educations planning approaches. Two types of demand concepts can be considered at this scale. First demand concept means the calculation of needed productive effort for the estimated activity and regulating the university standards accordingly. Other demand concept on the other hand identifies the quantity of demand coming from student potential in various branches of education. Here, balance should be maintained both at regional and country levels.

Secondary limiting factors of the theoretical scale is the insufficiency of qualified staff in developing countries. Especially unbalanced levels of developments

between different branches cause difficulties to regional universities in finding qualified and sufficient number of staff. Finally the third constraint can be stated as the insufficient budget allocations of the government.

### **1.7.2. Planning Scale.**

Decisions on the location of university are mainly handled at macro and micro levels of politics and the planning process. They are usually the outcome of university development plan and programs that were obtained earlier at theoretical scale. Decisions on the locational criteria of the universities at macro level can be outlined under four major topics as:

- \*Determining the factors on the decentralization or centralization of the universities.
- \*Determining what type of economic base cities should have on establishing universities through certain periods of time.
- \*Determining what types of effect will the locational criteria have in reducing the imbalance between developing regions.
- \*Setting up the university goals and principles on the choice of a suitable region city and site.

Taking the above criteria into consideration, the planning process in new universities can be explained by the micro level decisions, which are mostly in between urban planning and environmental design. Micro level planning considers three phases to be followed as:

- \*Relationship between the university and its region;
- \*Relationship between the university and its community;
- \*Relationship between the university and its site;

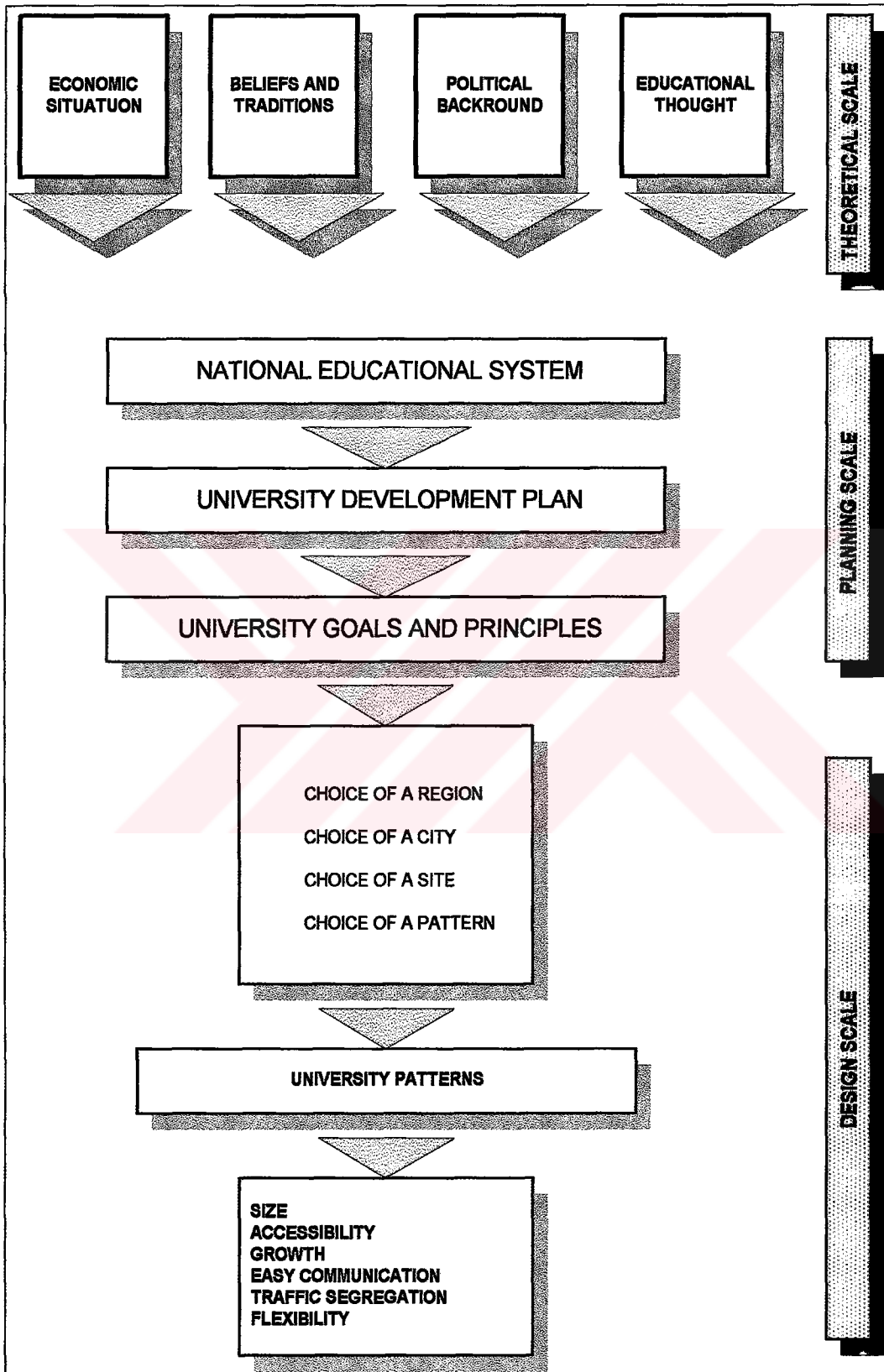
Orientation of the campus pattern towards the activities of the developed region is generally offered. By this way, the cultural and professional standard of the people in an under developed region may reach that of a developed one. Analytic

studies should be made on the financial and administrative matters concerning the administration and academic structure. These studies form the size of the university and the capacity of campus population. The chosen site has to be a kind of place, which will attract good academicians. For example the availability of housing and services, including educational services and transport. Again the availability of lodgings and living places for students should be maintained. Large enough sites should be available to permit long term expansion, without incessant struggles for further land. "Sites of 150 to 200 hectar are the minimum sizes for a growing and developing university." (Dober, R.H. 1992. p 216.)

### **1.7.3. Design Scale**

After the decision taken on theoretical and planning scales, physical planning of the program can be studied. In the model for a new university the choice of the pattern of university is directly related to the outcome of various principles. More realistic course of action in the present circumstances seems to be to devise patterns of organizations. In university pattern, size, flexibility, growth, easy communication, traffic segregation and accessibility are the main design criteria. Since the design scale of university campus planning is the major intent of the thesis, the physical planning of the program will be investigated in detail in further sections. The table 1.2 summarizes the constraints of each scale in university planning schematically.

**Table 1.2. Three Major Scales of University Planning Methodology.**



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## **CHAPTER TWO**

# **DETERMINATION OF PLANNING, DESIGN AND ACCESSIBILITY CRITERIA FOR UNIVERSITY CAMPUSES**

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### **2. Determination of Planning, Design and Accessibility Criteria for University Campuses.**

Having introduced the university concept and its historical development briefly and looked at preliminary considerations this chapter now tries to look at their physical planning criteria, design criteria and accessibility criteria. These criteria investigate the decisions taken from theoretical scale down to design scale. In addition to them specifically accessibility criteria mainly deal with the optimum standards on the needs of the pedestrians to provide ideal university settlements.

#### **2.1 Planning Criteria**

These criteria basically consider the decisions taken by the coordination of the city planners and architects at theoretical and planning scales of campus design concept. There are mainly nine important planning criteria that may effect the design of campus settlements. These are shortly explained as the following.

##### **2.1.1 Locational Aspects**

Locational aspects of a university campus mainly define the potentials of the site like seas, forests, lakes, and mountains. It means the availability of the site for

construction and suitable topography.. It signifies the importance of good orientation in a campus settlement. In a sense the buildings are there to shape space. Every campus has a site limit to identify its outdoor and indoor space uses. This is mainly related to the scale of the campus. An academic village in an appropriate scale suggests both smallness and good orientation by expressing a compact and a coherent layout. Orientation can only be created in campuses when the locational aspects emphasize the sense of place in psychological and perceptual terms. Thus, a sense of place in a campus pattern can be created and animated by carefully positioning key elements in the design structure and by responding to the natural conditions suggested by climate and regional influences. Then it can express the best features of the existing environment.

### **2.1.2 Cultural Aspects.**

In creating a new physical environment cultural aspects of the region which can be defined as the local settlement patterns, architectural notions and typologies are the effective design criteria. Also this specific environment can be designed according to local conditions, life standards of the region, culture, and nature of the area. This is directly related with the compactness or the separation of buildings in the campus. The use of varied density of buildings within the campus may cause psychological problems for the students who come from low-density settlements, especially in horizontally scattered settlements.

### **2.1.3 Financial Potentials.**

Financial potentials of the university are the effective factors on the design of the university. It brings limitations to the selection of suitable site. Investment in the design process can be divided into two as primary and total investment. Primary investment is related with the area of the site, phasing of buildings and infrastructure. Total investment on the other hand is related with the choices in variety of functions, quality standards such as sq mt / students, sq mt / academic staff and the other needs of the campus.



### **2.1.4 Population Criteria**

In finding the average student population of a proposed university campus, primarily social and economic relations between the neighborhood units, site conditions and students demands of the selected region has to be investigated. This is because population criteria of an ideal settlement define the population criteria of an ideal university campus.

During the certain periods of history, there have been various attempts on bringing limitations to population ratios of a proposed neighborhood unit for providing the best circulation conditions. As an example, Hippadamus, known as the first urban planner of the world, had once stated that population of an ideal settlement should be no more than 10,000 people, Eflatun, on the other hand had accepted it between 5,000-10,000 people. Today the average population standard of a new small settlement varies from country to country. It is between 2,000-8,000 people in U.S.A., it's 6,000 people in Germany and it's 5,000 people in England. This 5,000 students population standard in England identifies the ideal circumstances of a settlement situated in max 500 meters radius and 80 hectare area. In relation to this criterion, most of the university campuses in England have a capacity of 5,000 .

This threshold capacity shows divergences according to each country's existing circumstances. "State Planning Organization of Turkish government has defined this threshold as a maximum of 15,000 people." (Tekeli, İ. 1971.pp 16-18.) The finding of the survey of existing universities in Turkey show that among the universities with one major campus, there is a demand on an average student population of 10,000-20,000 people. However this ratio increases to 20,000-45,000 people which is far over this threshold in universities with no major campus.

### **2.1.5 Education System Criteria**

Education system of a country is one of the major design criteria in the formation of a campus plan. It effects the choice of the typology on campus patterns.

In general, university facilities and spaces within the campus are in use of various groups of students from different facilities. This can either be by the use of common lectures or by the use of building facilities. New developments on science and technology cause articulation in all science branches into new positions. As the process goes further on, new facilities exist. Actually some of them share the same origin and have common similarities. For example, a student from Faculty of Dentistry may take courses from Faculty of Medicine to continue his education. Similarly, a student from Faculty of Architecture may take courses from Faculty of Civil Engineering. These examples can be increased by the interrelations between similar disciplines such as; Faculty of Chemistry versus Faculty of Pharmacy, Faculty of Agriculture versus Faculty of Human Nutricine. High feasibility of space and functional site plan can be obtained when these interrelations are taken into consideration.

This may be supported by the common use of building facilities. Distinguishing buildings according to faculty names is sometimes a verbal separation. Some faculties need similar spaces such as lecture rooms, auditoriums and academic staff rooms in relation to their common programs. Therefore they should be located according to their common uses in the campus. Another system of education that effect the campus pattern can be named as Day and Night Education. This program follows two types of academic schedule. First one considers both day and night education under the same academic schedule. Here, it is possible to increase the capacity of student population into twice.

This system gives student the freedom to use all the campus facilities 24 hours a day. Well-organized security system is expected from this pattern. This can only be obtained by ignoring zoning criteria within the campus. A secondary type of this program considers only day and night education in one academic schedule. It is usually obtained to faculties that are lack of enough academic spaces such as laboratories and classrooms. Using the facilities during winter and summer sessions is sometimes the policy of the faculty. The handicap of this system is that students of winter and summer education or day and night education do not unite. There is still a

security problem. Activities are divided into daytime and nighttime periods in the campus. Thus the university cannot continue a 24-hour programme.

### 2.1.6 Traffic Segregation Criteria

A pedestrian's environment is structured by the elements which define his space as the lines of circulation that carry him through it and aesthetic qualities of the surface on which he moves or rests. These elements fill the space and modulate it. The experience of moving through space is charted by registering the principal features along the route and the spatial dimensions of the territory passed through. Since circulation is the act of passing from place to place, design structure can be established by using lines of circulation to give boundaries to environmental areas to make them accessible and, to tie them together.

The desire of separation on pedestrian traffic from vehicular traffic had been recognized since ancient times. "Daily life in ancient Rome was made least hectic when Julius Caesar proscribed heavy, horse drawn vehicles from entering the 'limits of continuous habitation'." (Alexander, C. 1977.p236.) Ideas on separating pedestrian and vehicular circulation have intrigued designers of both utopian and practical bent. In one of his sketchbooks Leonardo Da Vinci had shown a design for multi-level road that had both functional and social purpose. In college and university planning, circulation system serves two distinct elements as the pedestrian and the vehicular traffic segregation. These elements require a system that will make them independent of each other and unify the campus. The system must recognize primary and secondary pedestrian connections between the components of the campus. These connections must direct pedestrians in easily recognizable channels, some of the primary pedestrians walks may possibly be covered. These will facilitate the free flow of large numbers of student at peak hours.

Although each university has its own particular character, the problems caused by the automobile are common to all. Students and faculty are appalled at the conversion of green areas into parking spaces. They expect to park close to their

offices and classrooms. The problems stemming from the automobile will oblige future university campuses in three categories according to their circulatory systems.

- \*Universities relying on a rapid transit system for transport.
- \*Universities relying on an auto-oriented campus.
- \*Universities relying on traffic segregation in vertical directions.

Among the three alternatives, designers do not consider the development of the auto-oriented campus logicas as a set of buildings swim in a sea of asphalt like some suburban shopping centers. They either advocate a campus layout with a ring system for transport which minimizes walking distance, thus reducing student movement by car (as in Radburn plan) or they rather choose to segregate traffic vertically. That is to create distinct environmental zones for various activities and place them one on top of the other. Pedestrian movement can be on the ground level. Utopian and visionary scheme for modern traffic segregation appears both in the work of contemporary architects as Le Corbusier and Ludwing Hilberseimer.

### **2.1.7 Relationship between City and Industries**

A university campus situated near the city can bring the residential potential of the city to the academic staff and students preferring to live outside the campus. Also the socialization centers of the city can be the activity points for the university people at night-hours. Besides that, bringing the new technologies of the industrial firms into university campuses may develop relations between the universities and the industries of these settlements. Industries may be the guidelines of the universities for practical training of students and during catching up the spectacular speed of advancement in today's technology. On the other hand, universities may be able to serve industry with its academic staff, Laboratories and scientific researchers.

### **2.1.8 Flexibility Criteria**

Changes are likely to come about in the pattern of university life because science is transforming not only universities but, also the society as a whole. The

changing ratio of students becomes the determining factor on the nature and the pattern of university life. Besides that, the teaching and research activities of hundred years hence may require room arrangements and patterns of devices radically different from those, which seem appropriate today. Tendency has often been to rely on highly sophisticated systems, but such devices are expensive so universities need to create a flexibility of organization. This flexibility can be maintained both in the design and planning process of the campus. For design process, modular construction systems bring the designer the opportunities of changing and enlarging spaces. By using principle of joker undifferentiated space within areas can be allowed and they can be set aside for specialized activities for sudden expansions. Again principle of courtyard planning can be used in completion, contrasting space to space.

### 2.1.9 Campus Growth Models

Rapid increase on university students due to the necessities of the contemporary societies and its developing technology since the industrial period and new relations on interdisciplinary systems have led the universities to perform a dynamic structure. Mainly flexibility and growth models, which bring the modular construction systems on the site plan of the university, are being emphasized by means of dynamic structure. There are various types of growth models in university campuses as it's given in Table 2.1.

**Table2.1. Types of Campus Growth Models**

<b>Types</b>	<b>Growth Space</b>	<b>Growth Year</b>
Micro Growth Models	Min. 2,000-3,000sqmeters	In 5 years
Macro Growth Models	Min.20,000-30,000sqmeters	In 7 years
Partially Re-settlements	30,000-80,000sqmeters	In 15 years
New Settlements	80,000sqmeters	15years $\geq$ X

\*(Erkman, U.1990, p 58)

Among the planners that brought new definitions to growth models in history, Dober in 1963 had separated the planning systems related to campus growth as

development and design plans, whereas Linde in 1971 had proposed three different planning systems according to their certainty degrees . These are:

*1. Land-use Plan: It considers the decisions taken for over 15 years. It shows the main accessibility systems, main space uses their locations and expansion areas for macro growth models.*

*2. Master Plan: It considers the decisions taken between 7-15 years. It orients the densities of planning, interrelations of functions accessibility axes for micro growth models.*

*3. Zoning Plan: Validity period of this plan is for 5-7 years. It defines the building groups and their attitudes, growth possibilities and accessibility alternatives for micro growth models. (Linde, H. 1971 .pp 146-147)*

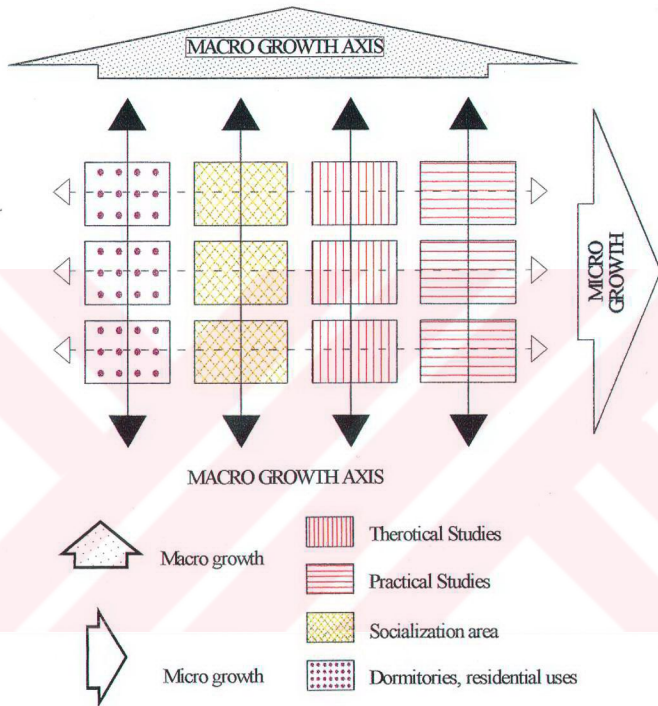
#### **2.1.9.1 Micro Growth Model.**

This model is the outcome of needing more space use within each facility and the insufficiency of their present capacities. It's the addition of space by modular construction systems. Secondary relations within the each campus facility identify the location, the time and the growth rates of the needed expansion.

#### **2.1.9.2 Macro Growth Model.**

It's a model that obtains new spaces for new branches of science in developing scientific and technological circumstances that are not situated in present campus site plan. Interdisciplinary and primary relations between the proposed site and the rest of the campus facilities should be maintained in macro growth models. Also primary relations should be re-organized in the whole campus, because in expansion, each new unit or each new discipline constitutes its own nucleus. Thus several social and cultural centers which are assembled separate from each other emphasize the structural center concept of primary relations and its specialty for macro growth models. On the other hand functional center concept can only direct

micro growth models because the social center which is primary for macro growth cannot be developed or moved to other areas.(See Figure 2.1.)



**Figure 2.1. Degrees of Growth and Standardization between Major Relations.**

In order to conceive a controlled growth plan in a university campus, various types of growth characteristics should be examined according to their densities, axis of expansion, and their design schemes. (See Figure 2.2. and 2.3.)

a) According to their densities: In campus settlements where densities of space uses are overloaded then there becomes a need of expanding the site plan in certain periods of time. This can be obtained by the expansion of the facilities directionally either towards or outside the existing campus settlements. By filling the empty spaces between the existing building units for the same type of uses or by using the reserved empty spaces outside the campus area for new disciplines, the pattern can be solved. These types of scattered expansions that develop in a haphazard way contain micro and macro growth possibilities within them.

b) According to their axis of expansion: The item, axis of expansion, mainly defines the growth of the campus facilities in vertical and horizontal axis. Growth in the vertical axis, which is the addition of new flats on existing buildings, is more practical to apply compared to the expansion in the horizontal axis because its accessibility and infrastructural problems are minimized. On the other hand, in macro growth model of organization divisible spaces for new uses can be obtained both in horizontal and vertical axis of expansion whereas in micro-growth models new spaces can be identified as a whole within the existing building units only in the horizontal axis.

c) According to their design schemes: Finally a third type of growth characteristic is the expansion in relation to various campus forms. These are basically radial, linear, molecular spiral growth characteristics.

\*Radial growth: It is a concentric pattern of growth where the central area is static and it becomes shut in by successive rings of development. Since the primary relations cannot be obtained in expansion, there is only possibility of expansion in secondary relations which direct micro growth uses.

\*Linear growth: This is the structuring of a system about a line usually emphasizes movement open at both ends. For further expansion, micro and macro



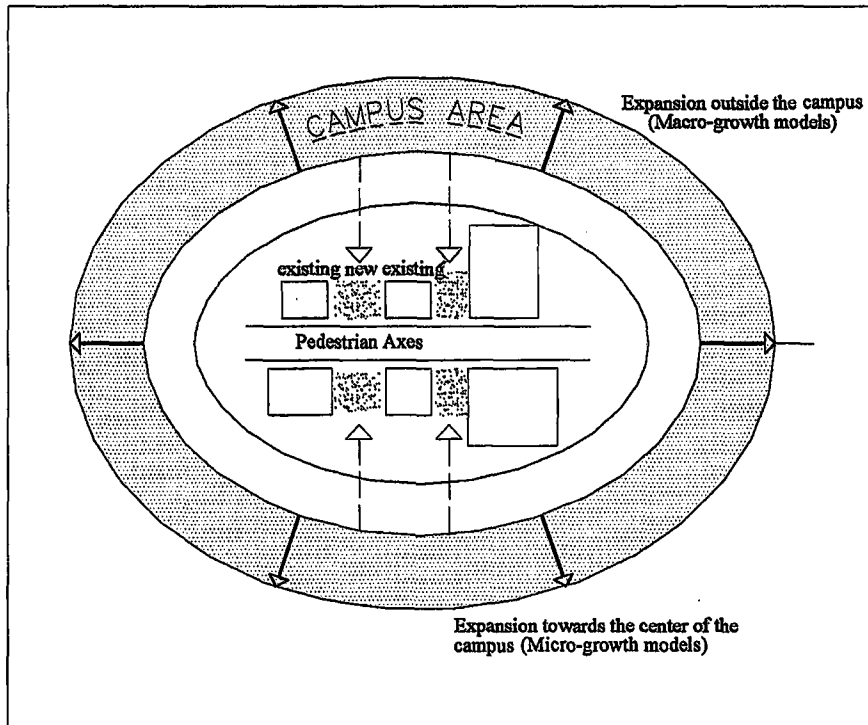


Figure 2.2. Various Figures for Growth Characteristics (Scheme 1)

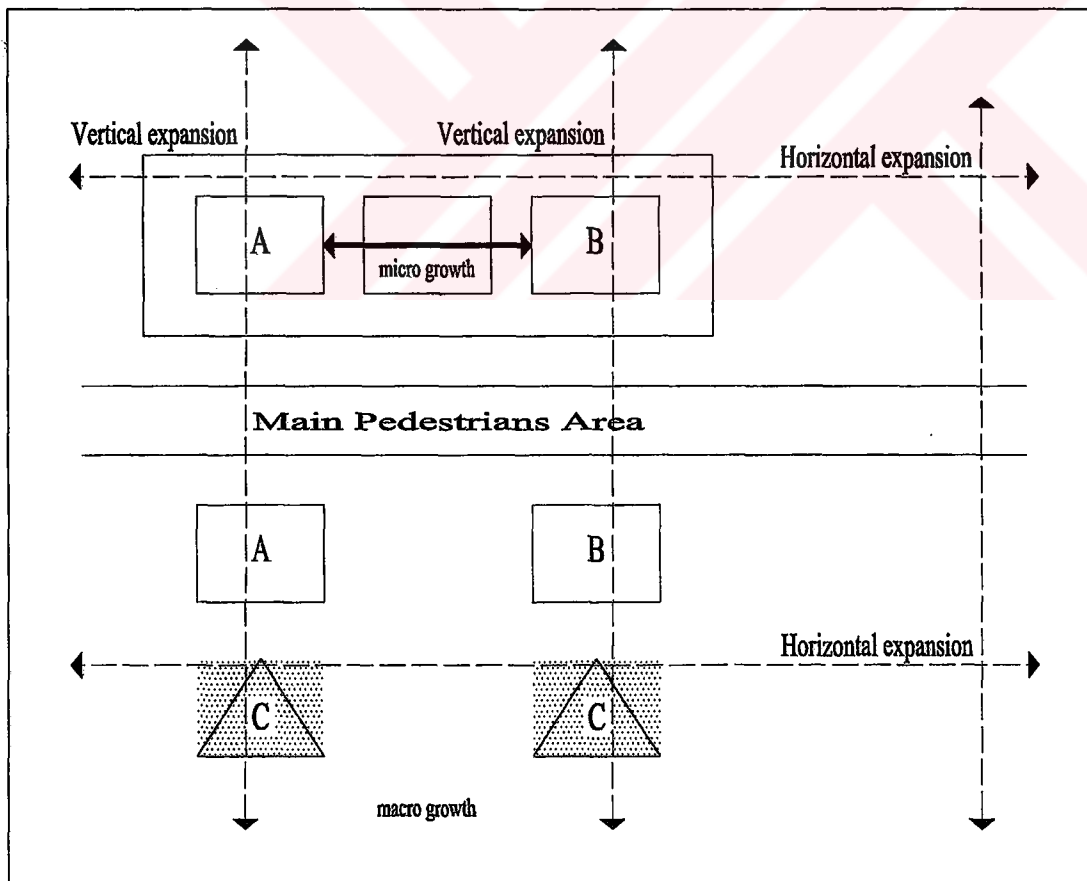


Figure 2.3. Various Figures for Growth Characteristics (Scheme 2)

growth can be obtained by growing outwards from the activities attached to this line at right angles where different uses become parallel to each other.

\* Molecular growth: This pattern of growth brings flexibility to campus facilities by the addition of molecular units each in one way to another which forms a microcosm of the whole system. Pattern is more suitable for a multi-centered than a centralized type development. Since the new molecule is located at the reserved empty spaces within the whole system and it can continue to expand in every direction outwards it is available for micro and macro growth developments.

## **2.2 Design Criteria**

The definition of a certain university can be described by the internal and external relations of the user groups between the major space uses in the campus. An evaluation of the user groups, the major space uses and the internal relations between these various zones is needed on programming the physical plan of university campuses.

### **2.2.1 Determination of User Groups**

The user groups of a campus are the students, the academic staff, and service staff. The academic staff considers both the administrative uses and teaching staff, which establish the pattern of teaching in the campus. Students on the other hand define the majority of the campus population. They appear to generate four types of student sub-cultures as collegiate-academic-vocational and conformist.

\*The collegiate sub-culture defines the recreational uses of students, as the football game and the fraternity weekends.

\*The academic sub-culture among student centers on studies, its symbols are the library, laboratory and seminar rooms.

\*The vocational sub-culture defines the interests in college as the means of gaining skills and certificates that are increasingly prerequisites for good jobs.

\*The non-conformist sub-culture is very small or wholly absent on many campuses. It defines students that can be found best in the liberal arts colleges and in big universities. Some of them act out emotional problems others literature and politics. These changing habits of students bring variations on the relations of open, semi-open and closed space uses.

### **2.2.2 Determination of Major Zones in Campus Settlements.**

Space uses in a university campus has been explained by the zoning criterion since modernisation. According to this criterion there are four main zones of the campus : The academic zone, residential zone, administration zone and recreational zone.

\* Academic Zone: In the planning of the academic units, spatial and structural differentiation can be realized according to their functions. The academic facilities are grouped in three buildings as; academic staff offices, lecture rooms, laboratories, and studios. In the academic pattern, common use of building can be planned. This brings repetition but this repetition of the structural system due to standardization, prefabrication and easy work reduces the costs. It also reduces the construction period and simplifies the growth patterns. A combination of study rooms and accommodation during the daytime and living outside is mostly advised.

\* Administration Zone: The administrative facilities are constituted of the administration building presidency, auditorium, library and the medico social building. They are usually placed on the entrance of the campus. They create a community that constitutes a symbolic element for the whole campus. Diversity and variety are the main components of the administrative center.

\* Residential Zone: Space requirements for residential area should be arranged according to the needs of student dormitories and accommodation for the academic staff. Student dormitories are advised to be close to the social facilities and the academic area. For a better communication between academic staff and

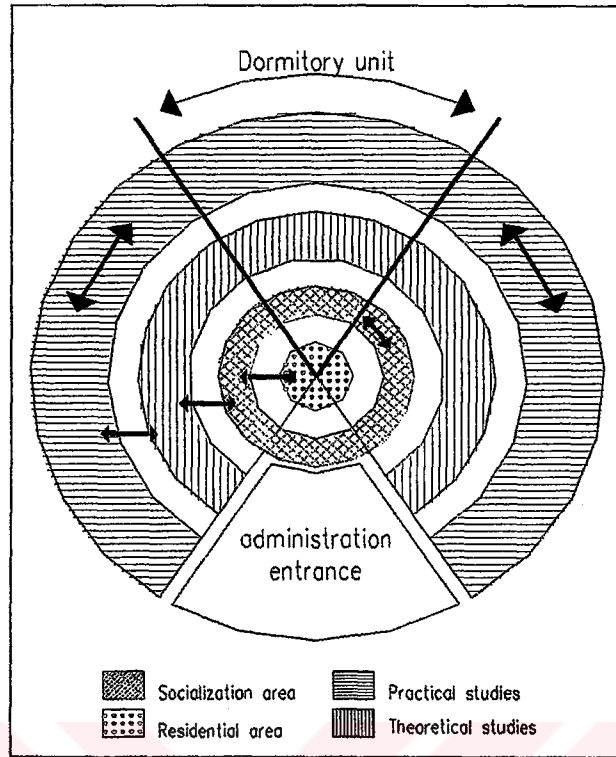
dormitories usually it is advised to leave dormitories private and calm during day and night-time.

\* Recreational Zone: It contains the highest density of population in the campus. Space requirements for recreational uses are usually centered on a main pedestrian route. They are the attraction points that consider social, cultural and sport facilities. Instead of placing all of the recreational uses at one point, scattering activities around the campus in a coherent layout will be appreciated.

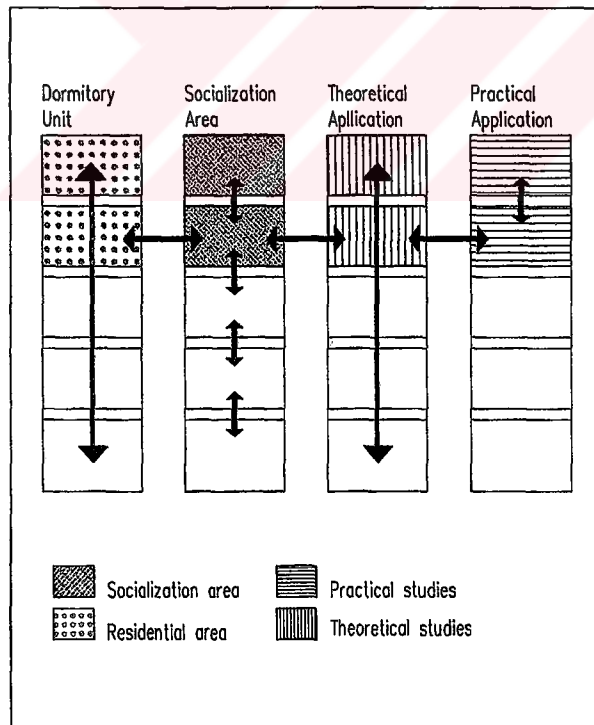
### **2.2.3 Determination of Primary and Interdisciplinary Relations between the Major Zones.**

A physical form that preserves communication and contact between all parts of the institution by allowing external accretion and internal change is the most striking synthesis of a continuous teaching environment. For maintaining maximum performance and good accessibility from the use of campus activities, their internal relations have to be analyzed. Interrelations between the major campus zones depend on the flexibility, growth model and density of space use of the selected system. These internal relations are divided into two categories according to different uses of functions as primary and interdisciplinary relations.

\* Primary Relations: Primary relations consider the frequency of the use of campus activities and the physical energy spent by the campus inhabitants between the major zones. They define the daily route of the campus inhabitants. Socialization areas appear to be in a transitive characteristic between the two other groups of functions that have a unifying feature in the university campus. Divergent alternatives in the locational positions of the major zones of a proposed campus site give its socialization areas new meanings as either a functional center or a structural center. When socialization areas are placed in segments between the clustered residential and academic zones in relation with the planning approach of university then they become a **functional center** for the campus.(See Figure 2.4.and 2.5.)

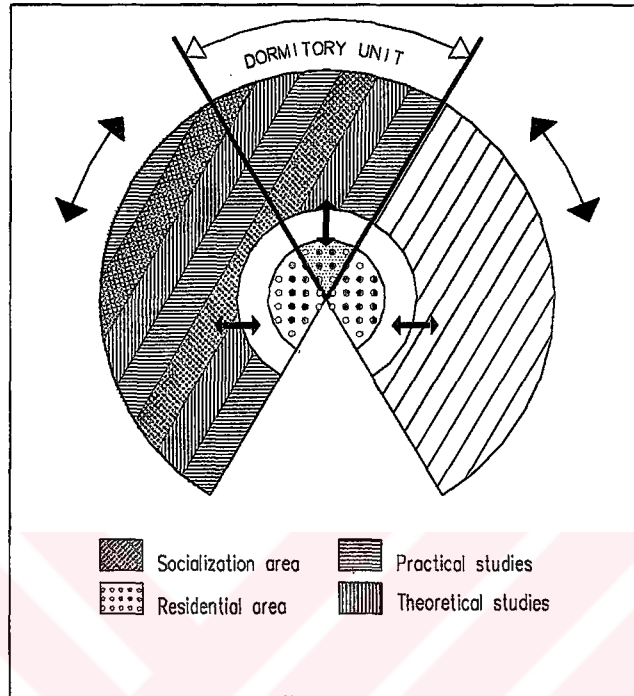


**Figure 2.4. An Aerial Solution for Functional Center Concept.**

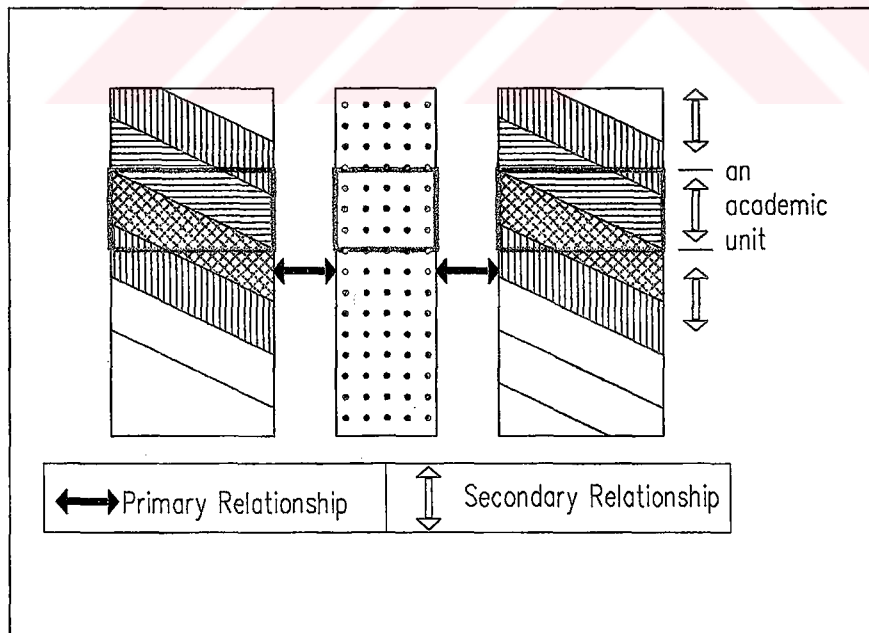


**Figure 2.5. A Linear Solution for Functional Center Concept.**

When the socialization areas are placed as a whole between the academic and residential units that are situated in a haphazard way, then they become a **structural center**, which is not usually appreciated. (See Figures 2.6. and 2.7.)

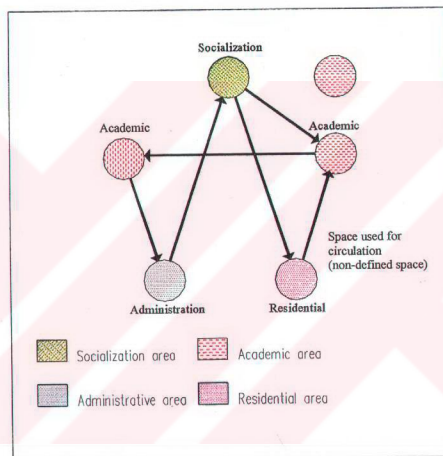


**Figure 2.6. An Aerial Solution for Structural Center Concept.**



**Figure 2.7. A Linear Solution for Structural Center Concept.**

However in campus planning socialization areas designed as functional centers are mostly appreciated in obtaining maximum performance with minimum accessibility of campus facilities. When the socialization area becomes the counterpoint of all facilities placed in slices, then there exists an obligation of adding secondary socialization areas which are called sub-social centers, because the major center cannot give service to all in farther slices, locations. The residential areas situated at the back of the academic areas that do not have sufficient relations with the socialization areas can exemplify this.

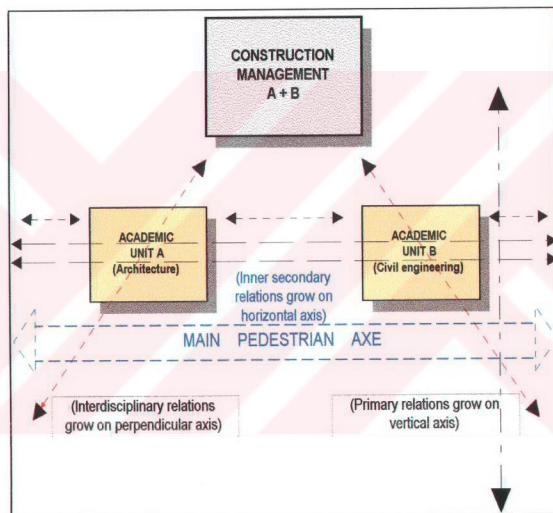


**Figure 2.8.A Socialization Area that Acts A Structural Center.**

\* Interdisciplinary Relations: Interdisciplinary relations differ from the primary relations for they do not shape the daily route of a campus inhabitant, but they rather help in creating new spaces for new uses. They are effective on the flexibility and growth of additional building units and new programs. They act as secondary relations between the relative academic programs. Socialization areas which have primary role and unification identified in the primary relations of the campus are not effective on the improvement of the interdisciplinary relations. Only the specific academic buildings that have common seminar rooms, can laboratories

and theoretical study can manage to develop interdisciplinary relations in the campus site.

As an example, on behalf of situating two basic educational programs at academic units A and B, a potential space between them can be developed for an interdisciplinary use, which may probably be combination of these two branches by the help of interdisciplinary relations. As a result it can be stated that interdisciplinary relations produce secondary relations that obtain the universality and strong communications between various disciplines in higher education system.



**Figure 2.9. Roles of Interdisciplinary and Primary Relations on New Units**

## 2.3 Major Accessibility Criteria

### 2.3.1 The Physical Control of a Campus Settlement

In providing a physical control in campus orientation and in developing an appropriate model for space organization we need to identify the meaning of the word “orientation”. What is significant is, it is of primary importance to main to be

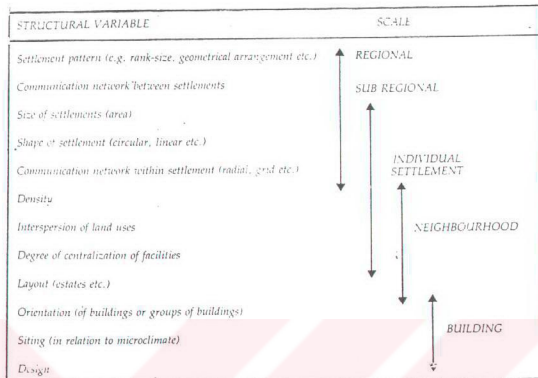


able to orient himself in his surroundings. He must retain and organize his knowledge of his environment in order to act effectively within it. To assist in the task of retaining his experience of the environment, the individual constructs for himself a mental image of his world. This mental image has certain basic elements common to all of us. Kevin Lynch, one of the most popular urban planners of the 20<sup>th</sup> century, has defined three most fundamental elements as **place, path, and domain**

*A place is a contained area which is known and to which we attribute a certain character. **Places** are areas in which significant events of our life occur. The concept of place implies inside and outside. When we go outside a place, we are setting off on a path or route to another place. **Paths** are routes connecting places, whereas primary attribute of a place is only by an imaginary boundary. The linear quality is primary in the case of the path. Paths imply movement and places imply pause or rest. The **domain** is the ground in which places and paths have their existence. The image of the domain is less well defined than that of the path. (Lynch, K. 1988. pp 230-232)*

All these elements indicate environmental orientation. Locational terms of distance and direction on the other hand are the features of the physical environment which affect cognitive and perceptual measures. Distance in many urban settlements refers in terms of travel time and all directions are based on a well-known landmark. They are the aspects of environmental orientation that serve the goal of helping people to locate places and objects. In the case of university settlements it can be assumed that each network consists of a number of places such as academic, social, residential and sportive areas connected by routes. Routes and places need basic circulation systems that are vital linkages in feeding the relations of the activities in the campus. In a certain campus layout, a system of origins and destinations, the accessibility of destinations is the effecting factors on the choice of a certain circulation system. Above all, at any stage of the evaluation of a campus pattern, a student's travel behavior, is related to his destination, the distributed potential activity sites, the main focus points and the configuration of the site. They effect the hierarchy of flow and change of scale from major to minor roads between the various

spaces in a campus network. These structural variables which influence energy requirements for the circulation system at different scales is given in Figure 2.10.



**Figure 2.10. Structural Variables Influencing Energy Requirements at Different Scales (Owens 1994 p 65.)**

As it is understood from the figure, campus planning deals with the design scales and the structural variables from regional to building scale which are effective on determining the most energy efficient patterns and the ideal accessibility criteria for campus settlements. Generally low separation of activities that are achieved by moderately high densities of facilities that emphasize compact nucleated structures seem promising on achieving these accessibility circumstances. Besides it is accepted that the axial organization of space is fundamental whereas the relation between spatial and functional patterns should be simply linear for easy orientation in such big scale projects. In order to explain the necessity of these two determinants on the physical control of a campus design, urban space and form should be considered from the individual subject's point of view, who experiences and uses it. On the first determinant why axial order two kinds of data converge. First one is the effect of desating modern space, especially residential space. Second data is the aspects of stimulated urban form generation. The primary attribute of modern design is the reduction of spatial scale and increase in spatial complexity. It is also true that geometrically ordered designs are appreciated rather than organic layouts. This belief

was the main determining design criteria in ancient settlements. For instance, in Timeaus, Plato had stated that the structure of the universe itself was based on simple geometric forms. “Just like Plato, Descartes had little respect for picturesque irregularity on settlement patterns.” (Alexandar, C. 1977.pp 259) This persuades that the problem of spatial scale in modern design is not the overscaling of space, but it’s radical understanding. It’s interesting that in urban space, axial and convex scales tend to be increased in line in proportion with the scale of the growing object. However, the axial organization of space is less complex than the convex organization of space.

The linearity itself on the other hand starting from space pattern up to functional outcome is not just a phenomenon, but it is built into the urban network as an objective property. Urban networks evolve and grow in such a way as to ensure that natural movement is linearly predictable from spatial patterns. Because the structuring and the predictability of movement is the main purpose of a network. Control of the axial scale is the fundamental means by which the growing urban grid within the principles of a particular culture. When an individual, a student in our case, walks in an urban grid system, which is usually a campus network, he becomes aware of two levels of spatial organization. One of them relates him to the global scale of the grid, the other one relates him to much smaller system of the blocks, the interiors. At both scales the observer sees a constant pattern in which axiality overcomes the tendency for space to become convexity localized. These appear to be a principle of sufficient axiality. The principle of **sufficient axiality** is not a metric constant but a syntactic organizing principle. It’s effect is to maintain constancy between levels of space organization that conserves intelligibility at the scale of the peripatetic subject, the student when the intelligibility would last then loss of axiality occurs. Principle of sufficient axiality proposes a redefinition of the human scale. “The **human scale** means scaling spatial elements upwards to preserve intelligibility and functionality of the system in accordance with the system (the campus pattern) and to keep both within the control of the individual”(Hillier & Penn 1984.p 45). When the association between space configuration and natural movement becomes the main determinant of urban spatial form, indirectly the campus form then it can be

stated that axuality and linearity are the key morphological properties of urban space and function for individuals.

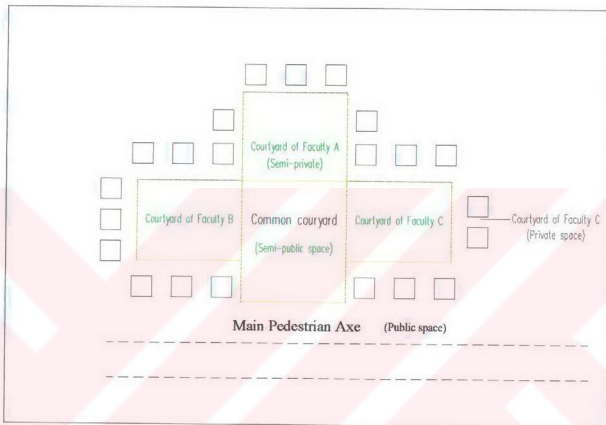
### 2.3.2 The Meaning of Open Spaces for Pedestrians in Campus Settlements

Systematically the relevant context of open space means the needs and activities of urban man as they are expressed in the physical design of his environment. The functions of open spaces in urban terms are defined in two concise but comprehensive classifications of Charles Elliot and Tunnard & Pushkarev. While Charles Elliot sets out a distinction between open space for service and open space for structure, Tunnard & Pushkarev identify the four functions served by open spaces as productive-predictive-ornamental and recreational. (Tunnard & Pushkarev, B. 1963 pp 246-254) Much more from these definitions, open space functions can be determined under basic keywords as;

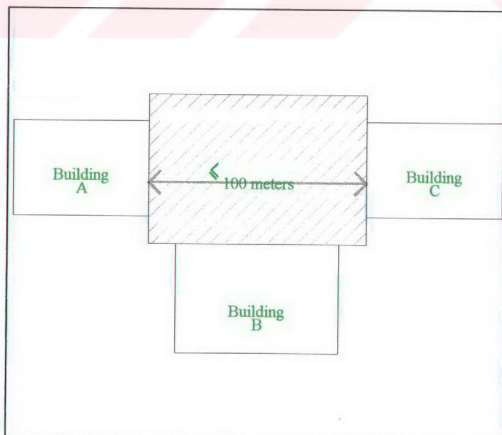
- \*Open space is **used** for the wide range of active and passive recreational activities and for circulation.
- \*Open space is **felt**, it gives privacy, a sense of spaciousness and scale.
- \*Open space **helps shaping the development pattern**, as space between buildings, which channels development, as a land reserve for the future.

On the other hand open space design finds its meaning in a campus settlement by the composition of the accessibility elements and building blocks that characterize it. Large building projects like university campuses need more elements with a more differentiated structure that includes major and minor pedestrian axes, primary and secondary squares and the courtyards. In each scale of the design, these accessibility elements require degrees of privacy as well as degrees of social distances to form a hierarchical order between the various open spaces at each scale of the design. Degrees of privacy consider the scale between public and private open spaces. The establishment of a social structure and corresponding physical structure with communal spaces at various levels permits movement from small groups and spaces toward larger ones and from the more private to the gradually more public spaces. It gives a feeling of security and a stronger sense of belonging to the areas outside the

private residence. This chain of public, semi-public, semi-private, and private open spaces can be adapted to an ideal campus design as a chain of main pedestrian axes, common courtyards of at least two or three faculties, courtyards of each faculty and department blocks of each faculty.



**Figure 2.11. Degrees of Privacy between Public and Private Open spaces.**



**Figure 2.12. Social field of Vision on An Open Space.**

**Table 4.9. Relationships between Total Spaces and Selected Campus Patterns on Providing the Ideal Accessibility Criteria.**

Universities which have one major existing or proposed campuses	Total space of the existing or proposed campuses	Their selected campus patterns	Density of the Settlement	Radius of the campus is less than 10-15min accessibility distance.
Mimar Sinan University	7421 m <sup>2</sup>	Scattered type	Compact	Yes
Fatih University	140,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Karadeniz Technical University	1,000,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Celal Bayar University	1,200,000 m <sup>2</sup>	Linear type	Compact	Yes
GaziOsmanPaşa University	1,200,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Kırıkkale University	1,400,000 m <sup>2</sup>	Linear type	Compact	Yes
Sakarya University	2,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Başkent University	2,200,000 m <sup>2</sup>	Scattered type	Loose	No
Fırat University	2,198,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Niğde University	2,272,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Abant İzzet Baysal University	2,700,00 m <sup>2</sup>	Linear type	Compact	Yes
Muğla University	2,464,000 m <sup>2</sup>	Linear type	Loose	No
Mersin University	3,250,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Kocaeli University	3,300,000 m <sup>2</sup>	Linear type	Compact	Yes
Balıkesir University	3,500,000 m <sup>2</sup>	Scattered type	Loose	No
Kafkas Technology Institute	3,750,000 m <sup>2</sup>	Scattered type	Loose	No
Gebze Technology Institute	4,000,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Ondokuz Mayıs University	4,000,000 m <sup>2</sup>	Horizontal zoning	Loose	Yes
İzmir Technology Institute	4,400,000 m <sup>2</sup>	Horizontal zoning	Loose	No
İnönü University	7,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Yüzüncü Yıl University	8,000,000 m <sup>2</sup>	Scattered type	Loose	No
Selçuk University	10,000,000 m <sup>2</sup>	Horizontal + grid type	Loose	No
Cumhuriyet University	12,000,000 m <sup>2</sup>	Scattered type	Loose	No
Kahramanmaraş University	13,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Uludağ University	16,000,000 m <sup>2</sup>	Horizontal + linear type	Compact	Yes
Ege University	19,000,000 m <sup>2</sup>	Scattered type	Loose	No
Çukurova University	20,000,000 m <sup>2</sup>	Scattered type	Loose	No
Pamukkale University	22,000,000 m <sup>2</sup>	Linear type + Horizontal zoning	Compact	Yes
Harran University	27,000,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Atatürk University	32,900,000 m <sup>2</sup>	Scattered type	Loose	No
M.E.T.Ü.	41,000,000 m <sup>2</sup>	Linear type + Horizontal zoning	Compact	Yes
Erciyes University	45,000,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Gaziantep University	*	*	*	*
Boğaziçi University	*	Scattered type	Compact	Yes
Galatasaray University	*	*Scattered type	Compact	Yes
Bilkent University	*	Scattered type	Loose	No
Koç University	*	Scattered type	*	*
Bilgi University	*	Scattered type	*	*

The columns colored in yellow represent the campuses that provide 10-15 min accessibility distance in a development radius.  
 \* The required data of these universities are not provided from the survey study.

In this hierarchical order, common courtyards act like small squares, which gather the students of the three or four relative faculties. The maximum distance of a common courtyard should be less than 100 meters distance on both directions. This is because, people can only identify the physical characteristics of another person in less than 100 meters distance. This distance is called **the social field of vision**, in other words it may be called **the public distance**. Open spaces designed at these given measures help students to socialize more easily with the students of the relative faculties who share the same courtyards.(See Figure 2.12.)

Again the height to width ratios of common courtyards and small squares that are located between the academic buildings are important on the determination of these open spaces more effectively. A common observation about these open spaces is that, students tend to experience the whole space as a sequence of smaller spaces divided by street furniture and people rather than in large horizontal dimensions. In addition to that the ratio of 1 to 2 is given as the ideal ratio of height to width for providing sufficient spatial containment in open spaces.

The other primary elements of open spaces in campus settlements are the pedestrian routes and the squares, the gathering places that may be established throughout the campuses. Usually pedestrian routes are defined as the backbones of a campus settlement where all the socialization and recreational facilities must occur on these axis. Like in urban settlements, physical characteristics of pedestrian routes on in campus settlements should be determined from the natural movement of pedestrians. Natural movement of pedestrians are predominantly limited to horizontal motion at a speed of 5 kilometers per hour and sensory apparatus finely adapts to this condition, besides that essentially the senses are frontally oriented. Therefore the best developed sense of sight for a pedestrian is distinctly horizontal and all the activities must take place in front of viewer and on the same level to be perceived more effectively. There are some hints for planning success for pedestrian routes.

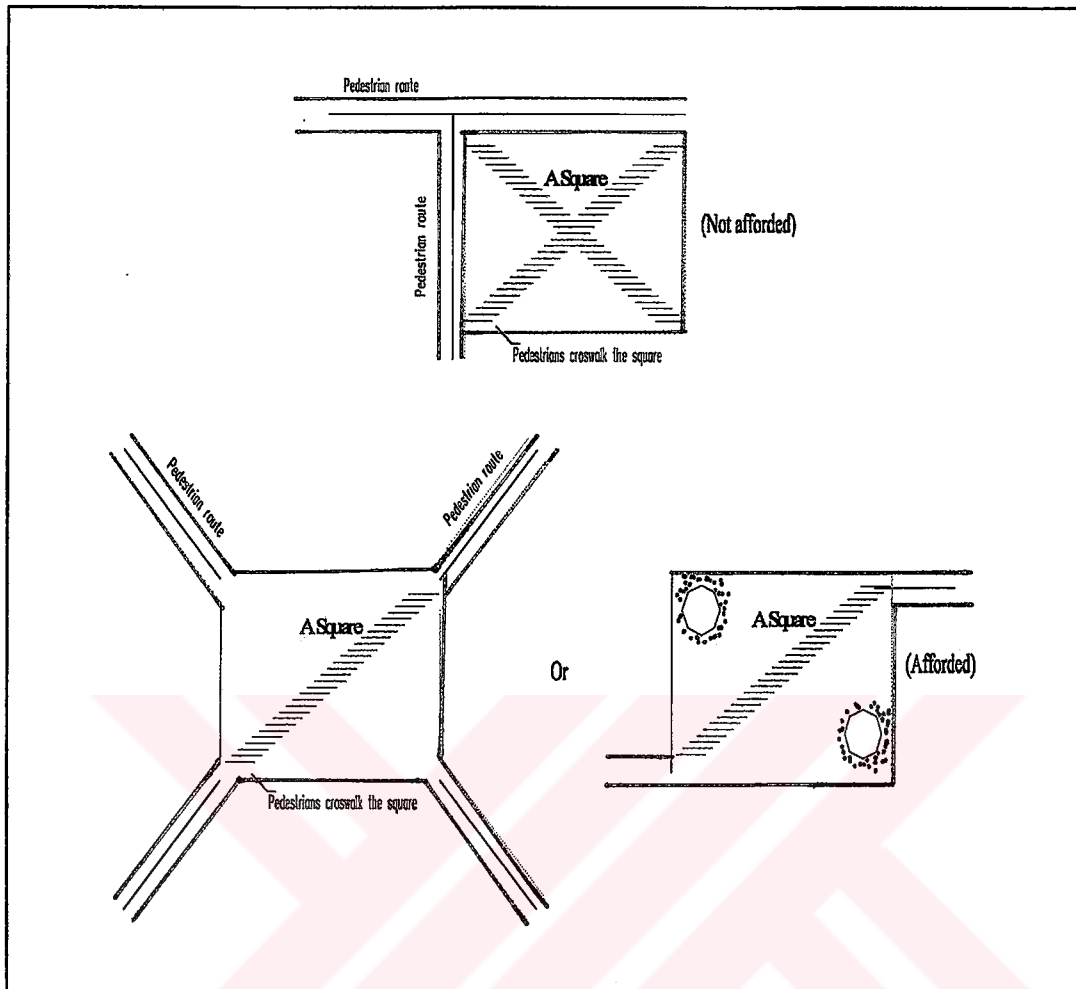
- \* Planning of long and straight pedestrian routes should be avoided.
- \* Windings pedestrian routes are better than straight ones to reduce any wind disturbance.
- \* It can be tiring to walk when the entire distance to a far destination is in sight. It's still more tiring and unacceptable to be forced to use routes other than the direct one when the destination is in sight.
- \* When the destination is in sight, direct routes over short distances should be supplemented.
- \* When the destination is not in view, primary direction toward the destination should be maintained.

A walking network with alternative street spaces and small squares often will have the psychological effect of making the walking distances to seem shorter. When some sections of the route are narrow, it is also easier to create worthwhile spatial contrasts. When the pedestrian routes is 3 meters wide, a 20 meters wide space in contrast will appear to be a square.

In a main square most of the pedestrians usually walk directly across the main square. The preference for right angles, which are commonly pursued by urban planning, are not shared by the pedestrians in anyway. They crosswalk to shorten their trip. So, the position of a main square (between the two pedestrian axes) on a pedestrian axe should be appropriate for the entrance from the corner points.

On the other hand, activities grow from the edge toward the middle in the squares and centers. Therefore it's more effective to put the basic street furniture and kiosks that are related with the square towards the edges of the main square in campus settlements. (See Figure 2.13.)



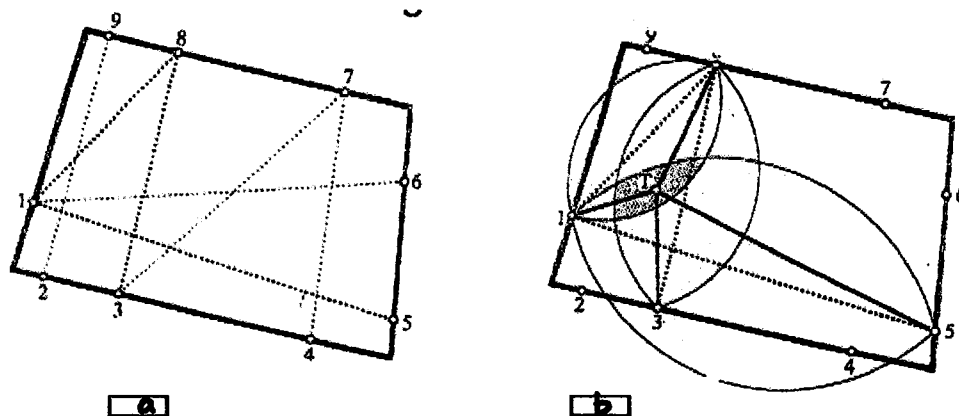


**Figure 2.13. Various Connections of Pedestrian Axes to A Proposed Square.**

### 2.3.3. Determination of Primary Pedestrian Axis of a Given Site

In a context of design network of footpaths and streets for pedestrian traffic, two particular design concepts, concentration of pedestrians and smoothness of walking lines should be analyzed. They help the logical modeling of soft architectural design knowledge on the design networks of pedestrian traffic in campus settlements. **Concentration of pedestrians** emphasizes that now here in a network when two major pedestrian streams are led along the lines that are close to each other, parallel and nearly parallel, then one of them should be cancelled to direct the concentration of the pedestrians' on only one axe. This concept aims to create socially lively outdoor spaces; for example for access to residential area in a campus. **Smooth walking lines** emphasizes that by following a network, pedestrians move smoothly along lines without unacceptably being annoyed or tempted to walk where it is not intended. These two principles are accepted as universal and they are not limited to any particular type of site plan.

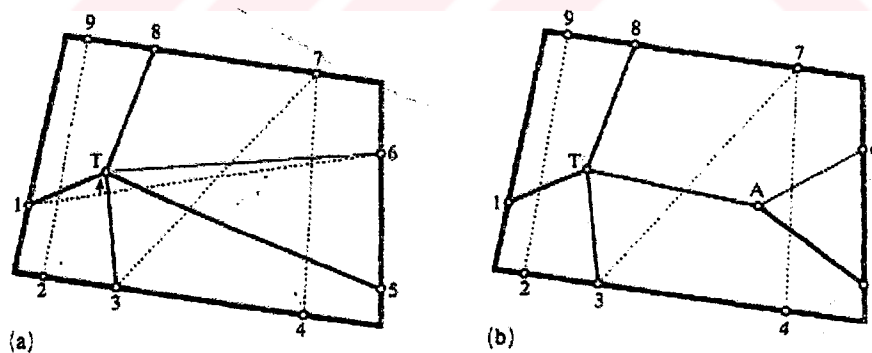
By using these principles in one of their studies in 1992, Galle and Kovacs have developed a formula on finding the primary pedestrian axis and in relation with this the socialization centers of a given site. This formula can be explained as the following: Let us assume a quadrangular site (about 250 by 400 meters) is given, and that we are to design a net of pedestrian routes on it, at given access points along its boundary, which link the site to existing streets.



**Figure 2.14. Quadrangular Site with Nine Pedestrian Entry Zones a) and Merging Primary Walking Lines b).**

According to principle 1 (concentration of pedestrians) we should avoid lines that are parallel, nearly parallel and close to each other. Let us take this to mean that two lines forming a **V-shape** should be merged so as to share a common segment, thereby forming an **Y-shape**. Figure 1 gives us the **V-shapes** formed by the primary direct lines 5-1-8 and 1-8-3. Then a common branching point, **T**, could be found. Then the resulting **Y-shapes** would be **1-T-5**, **1-T-8** lines. They now become the merging primary walking lines.

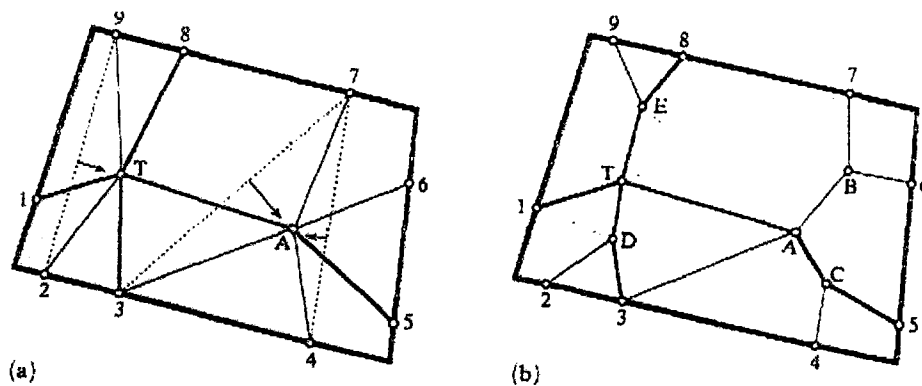
A simple interpretation of principle 2 (**smoothness**) would be by avoiding large detours and by imposing a lower bound, say  $120^\circ$ , on any angle defined by two consecutive segments of a walking line. By applying this idea to our example, we can determine certain constants of possible locations of point **T**, the locus of all points such that line 1-5 subtends an angle 1-T-5 of at most  $120^\circ$ . It is the “boat-shaped” area delimited by the two circular arcs played symmetrically around line 1-5. The intersection of three boat shapes is the area in FIGURE 2.14.b. That is the locus of the **T** point such that these three main walking lines are smooth in the sense as explained above. Then by introducing the secondary lines and applying **merging by attraction** which changes the line 1-6 to 1-T-6, and the resulting V-shape 5-T-6 into the Y-shape, its branching point, can be found.



**Figure 2.15. Secondary lines Merged by Attraction a) by V-Y Merging b)**

After finding the branching points for the primary lines and secondary lines, we can put a connecting line between the two. This **A-T** line, which was formed by **merging by attraction**, later helps the designer in placing the main pedestrian axe and the creation of the plazas with one or more main streams of pedestrians through

this axe. In studying general conceptual tools which can be used for design of entry nets and similar systems of walking lines. Concentration of pedestrians and smooth walking lines could be applied together to create fairly complex networks like university campuses and small settlements.



**Figure 2.16. Merging Further Secondary Lines a) Dotted Lines Added for Random Traffic.b).**

### 2.3.4 The Meaning of Accessibility Criteria on Campus Design

The accessibility criteria on campus design mainly define the process of showing maximum performance in using the campus facilities within a limited period of time. This is mostly related to the configuration of the site, the campus pattern and the promotion of strong linkages between various activity sites and the buildings to support the academic life as well as intellectual life or encourage private and distant lives of the campus inhabitants. In order to provide the ideal accessibility circumstances in a proposed campus settlement, first of all the relations between students, academic staff, the activity points and the buildings should be taken into consideration. These relations are evaluated under three headings according to their importance on accessibility criteria.

#### 2.3.4.1 Accessibility Criteria for Students.

Campuses are amalgamations of successive building campaigns. Often they are governed by a master plan that seamed together overtime by the students who inhabit the campus. By studying student's paths and points of congregation,

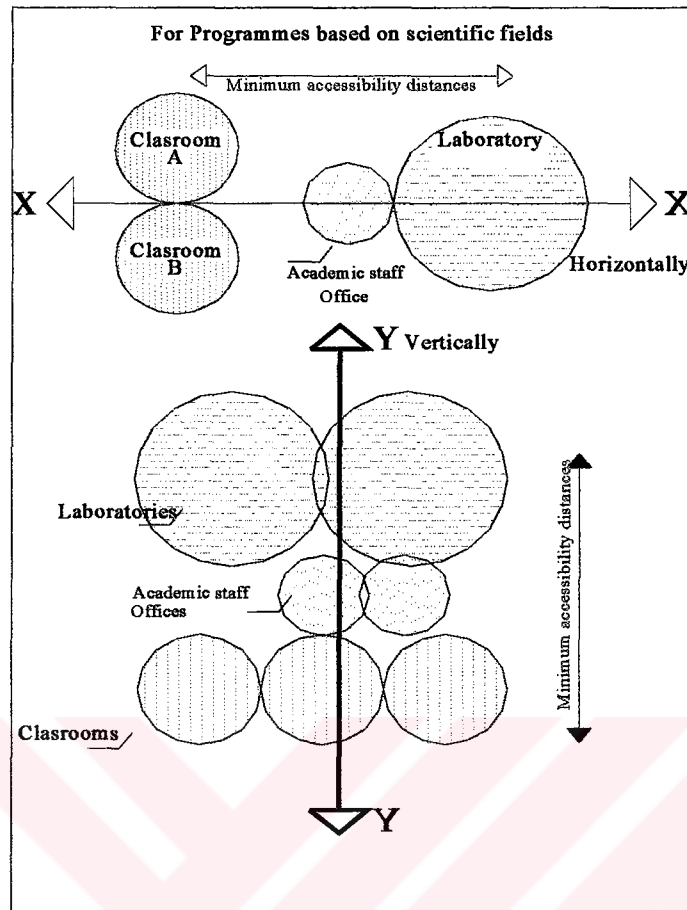
architects can find implicit structures that link campus buildings. Students' movement paths in the campus start from the main entry to the academic area then to socialization areas and finally to dormitories and libraries. The main entry of the campus constitutes a critical transition space for casual meeting, socializing and study. It's the principal entry point for students approaching on foot. It should be lack of vehicular entry in creating a highly used and imaginable gateway.

The pattern in some degree has to be dominant. Students should have a physical sense of the pattern as a pattern. The capacity to perceive an intellectual pattern is linked to a very high order of intelligence. It implies a great concern with teaching and problems of student-staff relations. There is a need of academic flexibility to modify the pattern on the basis of teaching experience and to the changing intellectual pattern of social life. A sense of stability should be given to the student within the changing pattern. This stability should provide intellectual focus centers, which reflect the preoccupations of the moment.

On the other hand, close attention should be paid to the edges of the buildings so that patterns created by students are minimized. Edge conditions are important on campuses, because they are intricately layered places. Few other sites offer architects such rich patterns that bring identification to the campus. Another critical aspect is that more independent student dormitories and classrooms are preferred to be used for private study and leisure time.

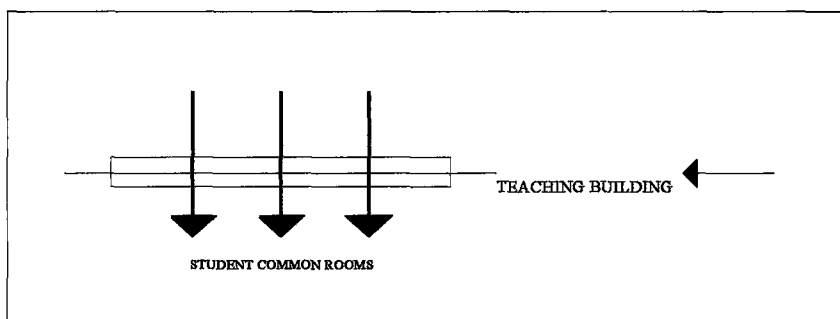
#### **2.3.4.2 Accessibility Criteria for Academic Staff**

Architectural problems of a university campus seem to arise from the academic facts of life. For the academic staff, different habits of work and different physical accommodation appropriate to the teaching of science and teaching of fine arts make totally two different patterns of accessibility criteria. For academic programs based on scientific fields there is a need of placing academic staff offices between classes and laboratories either on vertical or horizontal direction to minimize the accessibility of teachers. (See Figure 2.17.)

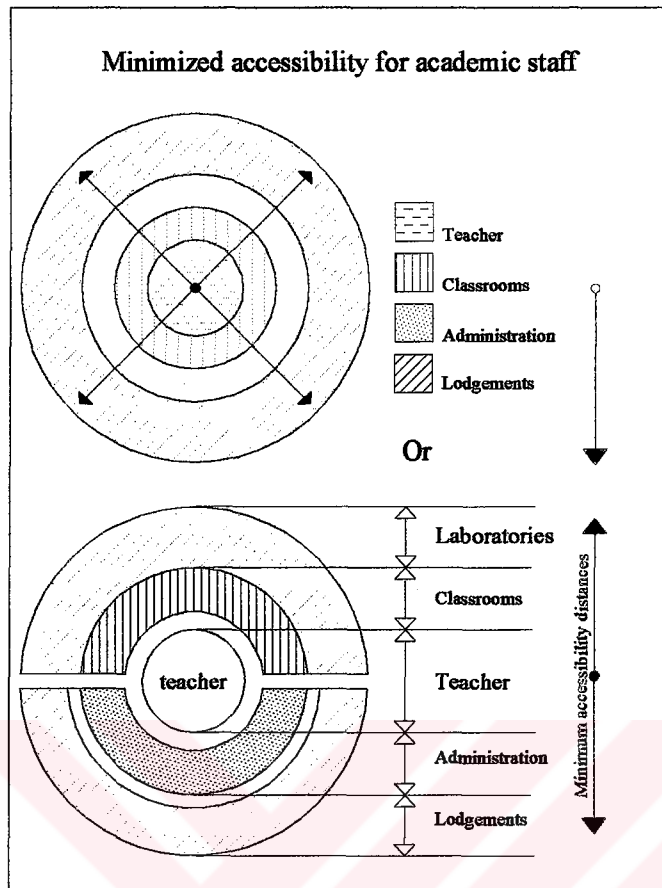


**Figure 2.17. Accessibility Conditions for Academic Staff Offices for Programs Based on Scientific Fields.**

As for the fields of fine arts, students do not necessarily share more than five hours per day with their teachers so they have the opportunity of choosing independent study, thus their academic offices can be located away from the classrooms.



**Figure 2.18. Accessibility between Student Clubs and Academic Buildings.**



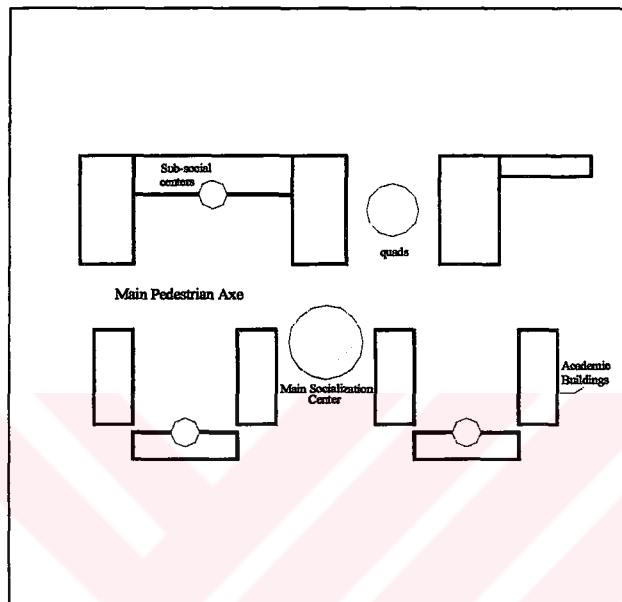
**Figure 2.19. Minimized Accessibility for Academic Staff.**

Administrational buildings and their services on the other hand should be close to the academic staff offices. They can either be situated on the same axis or located within the same faculty building.

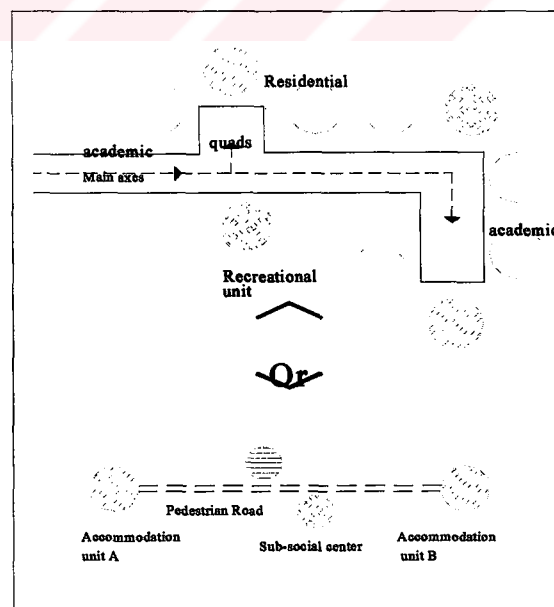
#### **2.3.4.3 Accessibility Criteria for Recreational Facilities**

Recreational facilities of a university campus can be identified as the outdoors and indoor space uses. Indoor space uses consider mainly student socialization centers, dormitories and food halls that act as the focus points throughout the campus. Outdoor spaces on the other hand consider the semi-open, open sport centers, green parks, artificial ponds, main pedestrian routes and the quads of the buildings. They are important for bringing aesthetic pleasure and study relaxation. Accessibility to recreational facilities can be maintained by a physical design that spreads activity points (meeting places) throughout the campus rather

than concentrating them in one place. The attitude towards communality appears even in schemes where it is not possible to disperse activities. Meeting of recreational uses must be provided by the greatest possible number of intersections on the way to the classrooms and the dormitories. It should be impossible to go from one unit of accommodation to a similar one without coming into contact with at least one of different academic or social character on the way.



**Figure 2.20. Various Locations of the Recreational Facilities on A Main Pedestrian Axe.(Scheme 1)**



**Figure 2.21. Various Locations of the Recreational Facilities on A Main Pedestrian Axe.(Scheme 2)**



It is necessary to discover the characteristic forms and relationships of buildings in their settings, which correspond to the academic and social ideals of the university. For good accessibility there should be no rigid demarcation between the places. Each specialization must be enriched by new contacts. This can be gained by designing sub-social centers between the quads of major faculties. Campus planning for the 21<sup>st</sup> century is ought to combine a pastoral heritage with the science focus that now dominates. It ought to be able to go beyond the green quad and beyond the building as an object. Since the word campus is field in Latin language it has come to denote all college grounds in the past, there becomes a particular irony when landscape strategies are bypassed in the design process. Campus should strike a balance between architecture and landscape, just as a good accessibility of recreational facilities.

#### **2.3.5. Four Major Accessibility Criteria on Campus Design**

The ideal accessibility circumstances on a proposed campus settlement depend on the degree of minimizing the time spent during circulation between various groups of functions. There are mainly two important factors, which effect the timing of pedestrians and the maximum locational distances of the campus facilities to each other. These are the optimum standards for pedestrians in urban space and the class breaks periods between the academic hours. Each one of these effecting factors determines two of the four major accessibility criteria for ideal campus settlements.

The first effecting factor, which considers the optimum standards for pedestrians in urban space, is important on defining the average walking distance for pedestrians. Since pedestrians are the main dominant elements that characterize the campus life, campus space organization should be made according to the pedestrians' ideal accessibility measures. "In a study followed in Downtown Washington D.C. by Littleton Mc Dorman the average walking distance was calculated for diverse sex and age combinations in 1975". (Carmen, H.K.1990. p 86). Pedestrian speeds for all groups who walked without a pause was found to be 524meters. It varied from a low of 379meters for females and to a high of 623meters for males. (See Table 2.2.)

**Table 2.2: Walking distance by age and sex in a small community.**

\*It shows mainly the age group defining the university students.

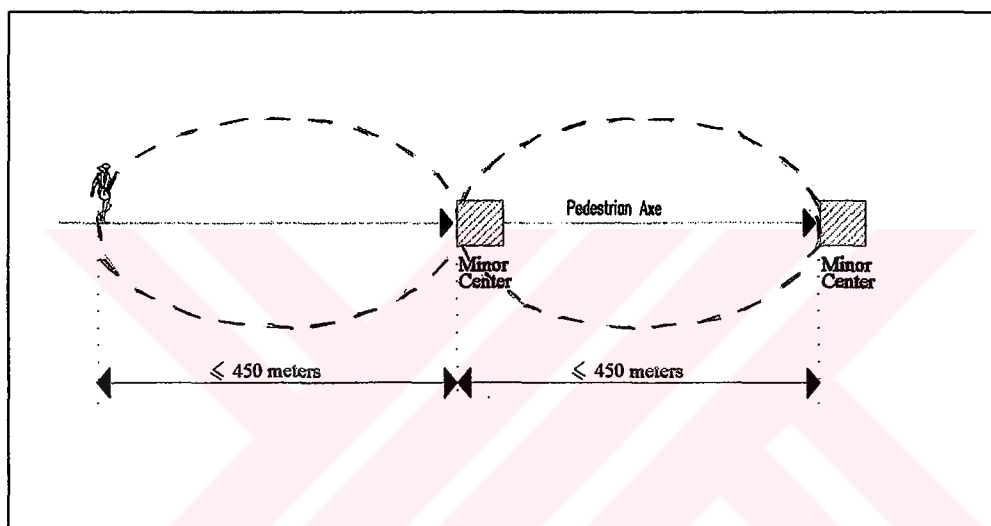
GROUP/AGE	% TRIPS	AVERAGE WALKING DISTANCE (METERS)	ESTIMATED AV. NET WALKING TIME/MIN
Males under 25	10.2	458 meters	4.70min
Males in 25-50	35.1	623 meters	6.83min
Males over 50	6.5	522 meters	6.50min
Females under 25	28.8	490 meters	5.80min
Females 25-50	14.6	440 meters	5.47min
Females over 50	4.8	379 meters	5.59min
All Females	48.2	463 meters	5.67min
All Males	51.2	579 meters	6.37min
total	100	524 meters	6.03min

Source: Regional Plan Association 1975.pg46

This study which was given as a reference to be followed in Pushkarev&Zupan's book of "Urban Space for Pedestrians" in 1975, shows that characteristics of Trips, trip purposes and mode of travel are the factors effective on walking distance. The table gives the average walking distance as the sum of all distances divided by the number of trips. The table explains that a pedestrian needs to take a short break after these given average-walking periods. This short break on a continuous pedestrian route might either be defined as a square, a socialization area, or a kiosk. Usually these types of places act like gathering places for pedestrians. These may be called the minor centers of the campus.

In the case of university settlements, the dominant pedestrian group is the university students between the ages of 17-25. According to Table 2.2, males under the age of 25 walk at 458 meters in a time of 4,70 minutes. This is approximately 97,5 meters per minute. Females under the age of 25 walk 490 meters in a time of 5,80 minutes. This is approximately 84 meters per minute. Therefore the average walking speed for all pedestrians under the age of 25 in other words the university

students, is found as 90,75 meters per minute. The average walking time of the university students who walked without a pause or a break is calculated as 5,2 minutes from the table. This period corresponds to 450 meters distance in horizontal direction for students between the ages of 17-25. **This means that in less than every 450 meters distance a minor center, which may consider either a socialization area, a square or a kiosk, should be repeated on a pedestrian route that connects the campus facilities to each other.** This distance explains one of the two accessibility criteria of ideal campus settlements determined from the optimum standards for pedestrians in urban space.



**Figure 2.22. Max. Walking Distance of a Student to the Farthest Minor Center (Socialization Center.)**

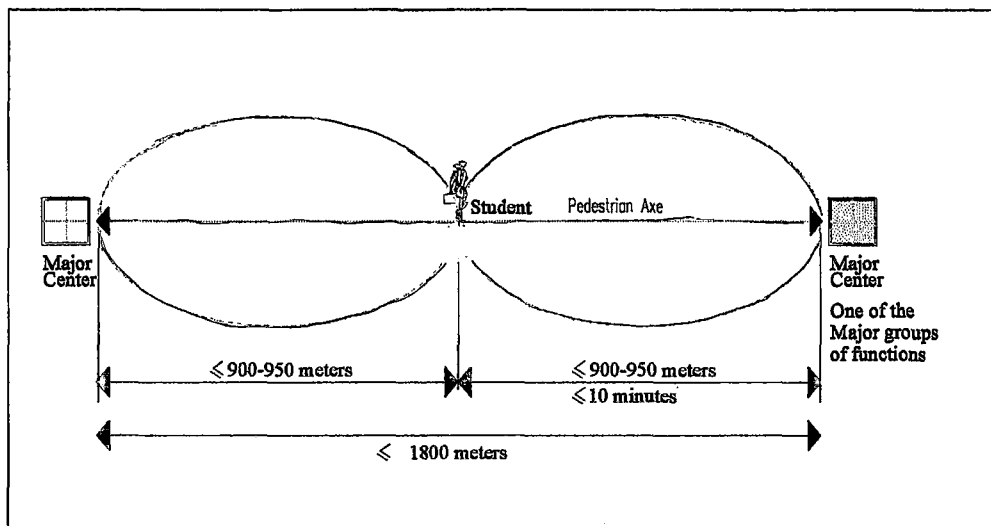
Another optimum standard on average walking distances for pedestrians in urban space is given as the following by Enis Kortan:

*When a pedestrian route is established on a horizontal line, one can see others and perceive that there are people standing there at a distance of  $\frac{1}{2}$  km-1km. This distance is defined as identifiable and perceptible space for pedestrians. However, when a pedestrian walks more than 10 minutes time on an open space designed on a horizontal axe, it becomes monotonous and tiring for her. She cannot concentrate any more on walking to her destination area even if she takes short breaks during her route. (Kortan.K.1978,)(Smithson.P.,& Smithson.A. 1969)*

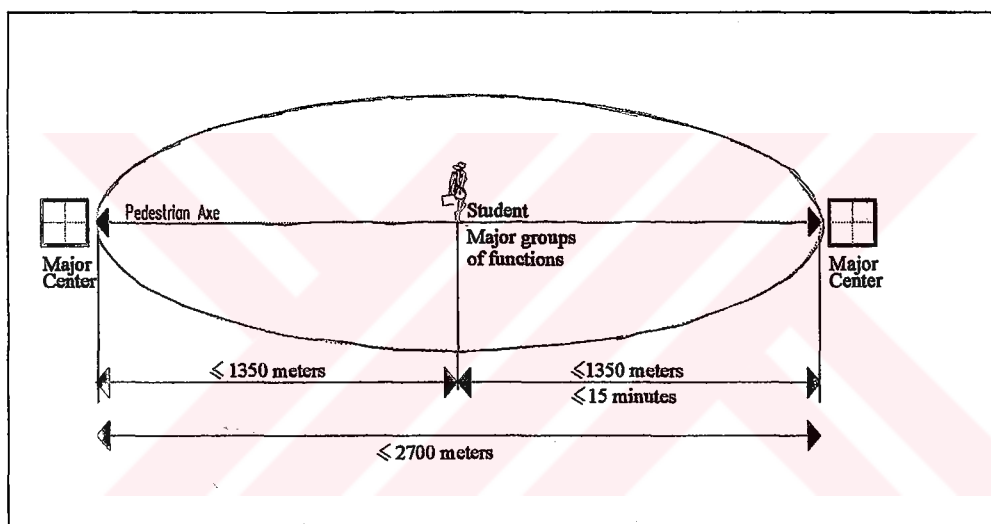
This given walking period is valid for open spaces, which have traffic segregation. This period increases to max of 15 minutes for open spaces that have no traffic segregation within the settlements. This 10 minutes average walking period had been accepted as the ideal accessibility distance from the center to the farthest points of the ancient city settlements. Therefore, if this standard distance for pedestrians is adapted to the campus settlements, it should be pointed out that the maximum locational distances between the center point of the campus and the major groups of functions (dormitories, administration buildings, library buildings, academic units and socialization areas,) should be less than this given 10 minutes or 15 minutes walking period in relation with the traffic network in the campus. This means that students should be able each of one of the major groups of functions from her origin point within the 10 minutes or 15 minutes walking period of time. Since students move 90,75 meters per minute with an average walking speed this corresponds to max 900-950 meters distance in case of traffic separation or max 1350-1400 meters distance in case of no traffic segregation.

These average walking distances also define the frequency of repeating each new development circle for reserved spaces in campus settlements. For example when a student stands at a specific location in the campus, the maximum locational distance of a new major center or one of the major groups of functions should be less than in a radius of either 900 meters or 1350 meters distance from her origin point. When the two radii that go in opposite from her origin point are added to each other, maximum diameter of a new development circle can be calculated as 1800 and 2700 meters.

Then it can be stated that each new development circle, which may either consider the area between two major centers or the area between the next major groups of functions, should be repeated in every 1800 meters distance in campuses with traffic segregation and in every 2700 meters distance in campuses with no traffic segregation. This is the second accessibility criterion determined from the optimum needs of pedestrians in urban space.



**Figure 2.23. Max. Walk. Dist. On the Frequency of Repeating the Major Groups of Functions in Case of Traffic Separation on Campus Design.**



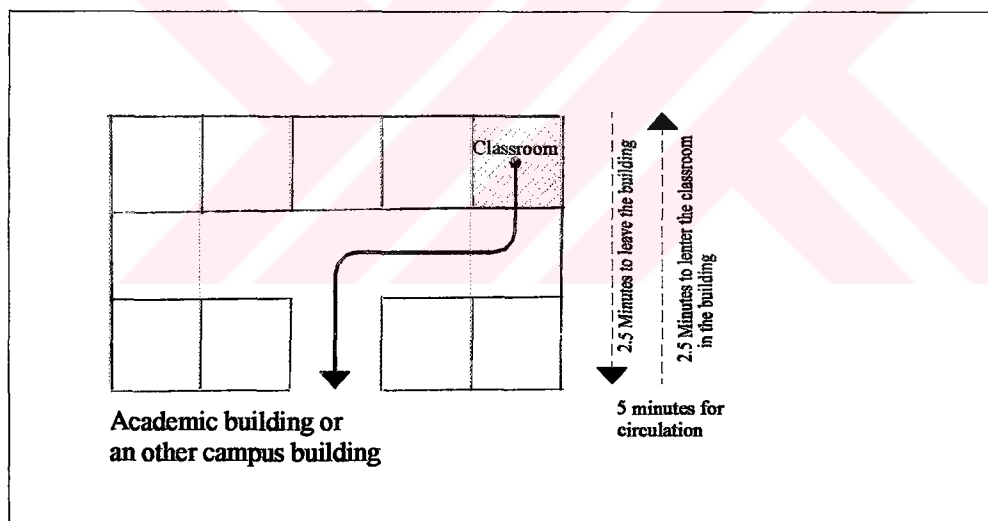
**Figure 2.24. In Case of No Traffic Separation on Campus Design.**

The second effecting factor which emphasizes on the 15 minutes class break period during the academic hours on the other hand, is also important for determining the maximum locational distance between the student classrooms and the specific campus facilities. This 15 minutes period effects both the limitation of spread and concentration of the campus facilities on the configuration of the campus site.

There are mainly two types of activities in other words, destinations, students follow on using their 15 minutes class break outside their faculty building. Primarily they may use this time to reach to another academic unit located in another building

of the campus. This may either be an interdisciplinary course taken from another faculty or the laboratories, the seminar halls and the courses of another department of the same faculty that are located outside their primary academic building. It is accepted that a student, who uses this class break only to reach on academic unit and enter a new course there, does not turn back to her primary classroom during the same class break. Then the maximum distance of her destination point between her classroom and the other academic unit in horizontal axis can be measured.

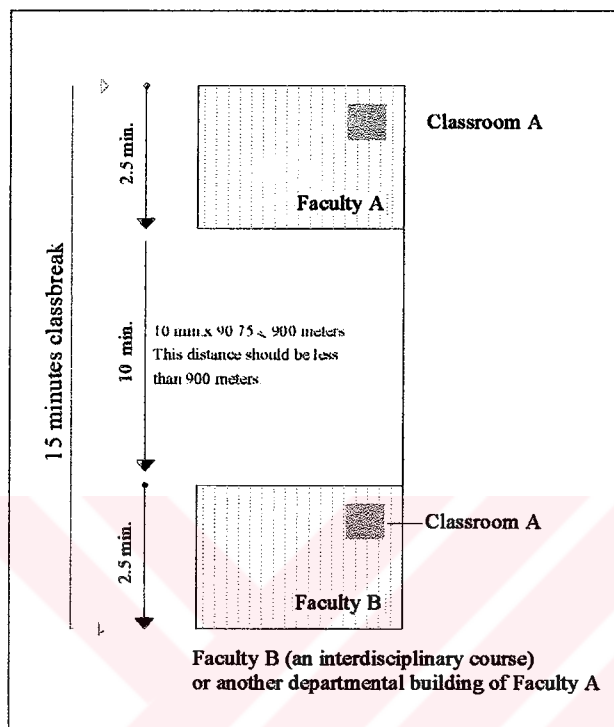
In the ideal circumstances it is accepted that it takes two and a half minutes for students between the ages of 15-25, to leave the primary classroom and again it takes another two and a half minutes to enter another academic unit. (Dober.R.H.1992.) This academic unit may be an interdisciplinary course, a common laboratory or a common seminar hall; a total of 5 minutes time is already spent for the circulation within the buildings.



**Figure 2.25. The Time Spent for Circulation During Entering and Leaving a Classroom.**

Then students can only use the left 10 minutes for accessibility outside the two buildings. It can be stated that maximum locational closeness of that relative academic unit should be less than 10 minutes distance, which corresponds to 900meters distance in horizontal direction. Unless that, a student walking with an average speed of 90,75meters per minute cannot enter that classroom and be ready

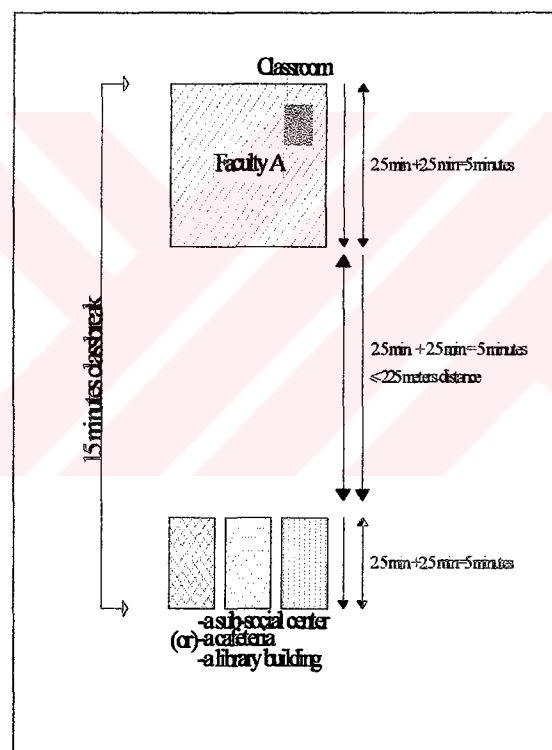
for the new course in faculty B. These conditions are also current on the location of a major faculty that is established in separate building units within the campus. This means that relative faculties should be replaced in less than every 900 meters distance.



**Figure 2.26. Max Walk. Distance between Two Interdisciplinary Programs**

The second group of activities that students follow outside their main faculty building during their 15 minutes class break consider the basic needs of students such as feeding, socializing and reading. These facilities should be located close to their academic building so that a student can turn back to her classroom after reaching that facility within the same class break period. In order to find the ideal locational distances between these buildings and the academic buildings, first of all the net time spent during the circulation within the origin and destination buildings should be calculated. As it is mentioned before it takes five minutes to get in and to get out of a building here students repeat this process when they turn back from the relative academic unit to their primary academic unit. Then the time spent during the circulation within their origin building and within the destination building adds up to 10 minutes period. When this total period is decreased from the fifteen minutes class break period, only a 5 minutes walking period is left for the accessibility between

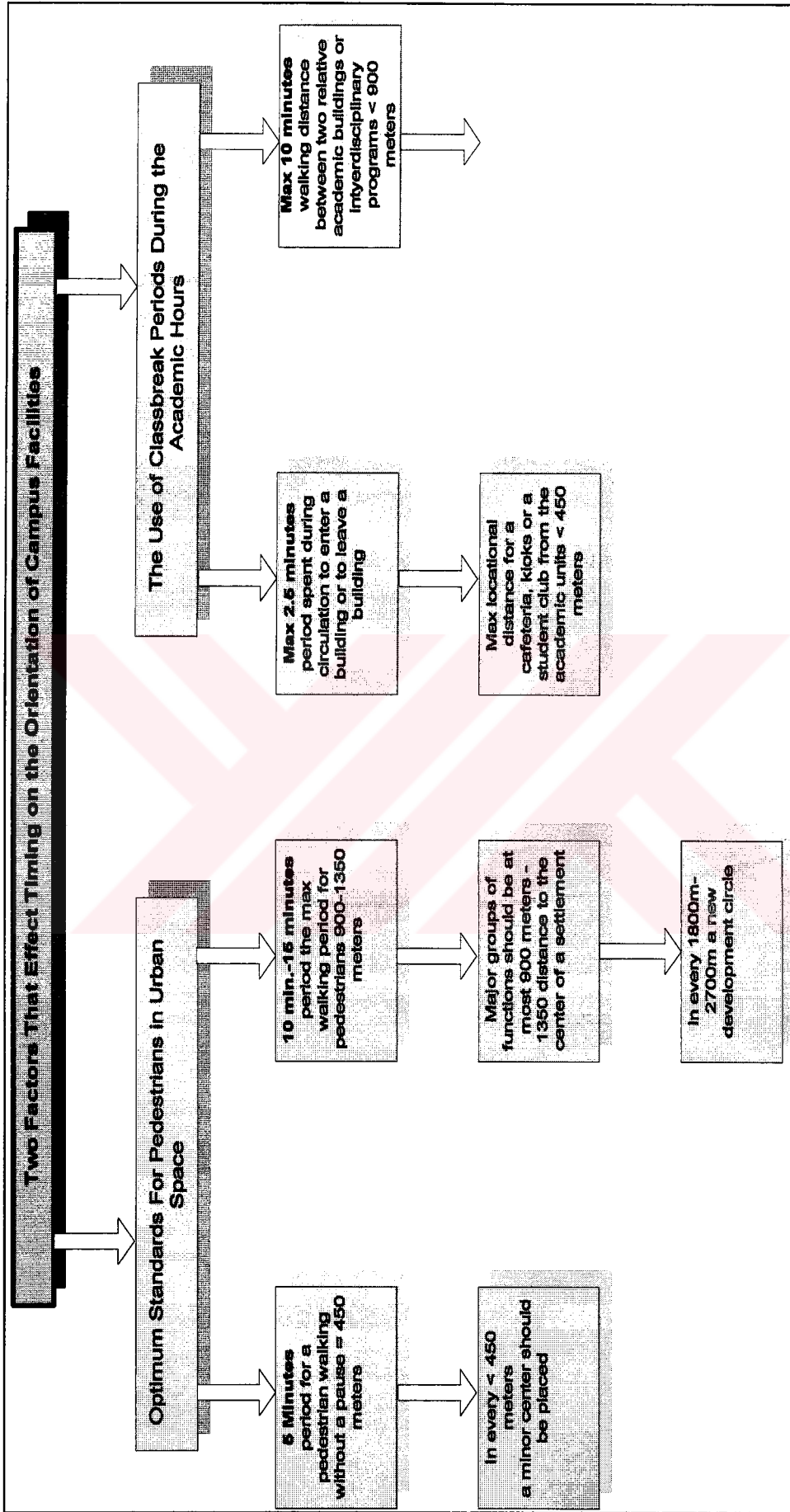
two buildings. However this period is divided equally into two, as reaching time and turning time for the accessibility of students and it is found out that the whole distance should be limited in two and a half minutes walking period. This corresponds to  $90,75\text{meters per minute} \times 2,5\text{ minutes} = 225\text{meters}$  distance in horizontal axis. Then it can be stated that in ideal the conditions an academic unit should be less than 225meters distance to a minor center, a cafeteria or a library building which may be defined as the primary access points for students during the class break. In a development axe these facilities should be repeated in maximum of every 450meters distance when an academic unit is placed in the middle of the two minor centers. (Look at Table 2.3. for a summary of determined four criteria.)



**Figure 2.27. Max. Walk. Distance between Classrooms and the Minor Centers During the Class break Period.**



**Table 2.3. The Determinants of Four Major Accessibility Criteria on Campus Design**



After the assumptions made on the determinants of four major accessibility criteria on campus design in relation to the physical structure of campus settlements, it is now appropriate to apply these ideal development measures for various types of defined campus settlements in the following chapter. In order to that first of all major design principles of each defined campus pattern will be explained in the third chapter. Then each determined accessibility criteria will be applied on each one of them. However it will be noticed that while some of the campus patterns provide all the required criteria on their schemes other campus patterns due to their special circumstances will not be able to provide all these determined criteria. Therefore by the help of these evaluated criteria most appreciated and efficient campus patterns will be found in the third chapter.



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## CHAPTER THREE

# COMPARISON OF CAMPUS PATTERNS WITH CITY MODELS.

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### **3. Comparison of Campus Patterns with City Models.**

Educational policies of countries are directly reflect on the physical planning of their university campuses. So every plan is different from one another. However there is a similarity in the main problem of expansion. Up to now, planners have developed alternative campus settlements with some variations. It is interesting to notice that most of these divergent typologies of campus patterns show great similarities with specific city models either proposed or applied in urban settlements. Therefore the evaluation of these campus patterns in relation with their corresponding city model is needed in the evaluation process of each campus pattern. These are classified in two major categories according to their types of expansion and their zoning of functions.

First major category, which considers the campus patterns that are developed in various types of expansions, is composed of five groups as:

1. Molecular Type of Expansion.
2. Centralized Type of Expansion.
3. Linear Type of Expansion.
4. Grid Type of Expansion.
5. Scattered Type of Expansion.

The second major category considers campus patterns in various zoning systems of the campus functions. It is composed of three groups:

1. Horizontal Zoning.
2. Vertical Zoning.
3. Megastructural Zoning.

Most important difference between functional zoning and the classification of expansion systems in campus patterns is the criteria of obtaining effective accessibility conditions for the campus inhabitants. Among the three types of functional zonings, accessibility between the major functions in horizontal and vertical zoning systems is provided much harder because of this concept. Students spend more effort and time to reach these areas. Only in megastructural grouping these distances are shorter. However megastructural grouping system needs highly developed technologies and it is much more expensive. Planners do not appreciate it. On the other hand campus patterns which are based on various types of expansion are much more effective on the easy access of students. Table 3.1 given below shows the evaluation of the defined campus patterns from an analytic approach of city models.

\*The first column of the table gives the number of defined campus patterns.

\*The second column of the table classifies the defined campus patterns under two major categories as the ones designed in various types of expansion systems and the ones grouped in various zoning systems.

\*The third column of the table gives the existing and proposed city models since antiquity up to present time that correspond to the defined campus patterns in the second column.

\*The fourth column of the table gives the existing university examples of these campus patterns.

The table also examines the campus patterns, which do not correspond to any type of city model. After the evaluation of Table 3.1, each of these eight different campus patterns will be analyzed in relation with their corresponding city models and the selected university examples. This analytic approach will be followed according to the numbering system of Table 3.1.

Table 3.1 Evaluation of the Campus Patterns in Relation with Their City Models.

Number of the Defined Campus Pattern	Classification of the defined campus Patterns under two categories		Existing or proposed city models which correspond to the defined campus settlement	Examples of the defined campus settlements.
	Patterns under two categories	Existing or proposed city models which correspond to the defined campus settlement		
1.0	1.1 Modular Type of Expansion	1.2 The Satellite City	1.3 University of York	1.3 University of York
3.0	3.1 Linear Type of Expansion	3.2 The Linear City	3.3.1 University of Surrey 3.3.2 University of Bath	3.3.1 University of Surrey 3.3.2 University of Bath
5.0	5.1 Scattered Type of Expansion	5.2.1 The Baroque Axial Network 5.2.2 The Lace Work City	5.3 University of Leeds	5.3 University of Leeds
7.0	7.1 Horizontal Grouping	No existing City Model	7.3. University. City of Mexico	7.3. University. City of Mexico
Campus patterns designed in various types of expansions		Campus Patterns designed in various zonings of the functions		

### **3.1.Molecular Type of Expansion in Campus Settlements.**

This campus pattern is composed of diverse structural and organizational units, which may consider different planning systems. Each unit is a complex within itself. There is a main center that obtains the relations of each unit in the campus settlement. Due to its scattered planning, the density of the settlement is rather low. This brings a limitation to the communication and interrelation between different disciplines of the university. Division of a unit into new units provides minimum growth possibilities. Each unit considers a library, dormitory, lecture rooms, practical studies, tutorial rooms, staff flats and student clubs. However macro growth can be easily provided by the formation of new units. Socialization areas such as dining halls and student clubs are not usually equalized between the molecular units. As more units are added to the system phase by phase, then major socialization center gets away from these units. To overcome this problem and to reach the idealized accessibility circumstances in molecular type of expansion, some additional units such as the major socialization centers should be repeated systematically throughout the development of the campus site.

If the ideal accessibility circumstances that were determined in the previous chapter are applied to this campus pattern, then each unit or each molecular cell should be at most 10min or 15min average walking distance to the closest major socialization area. This means that in idealized molecular schemes the major centers should be repeated in every 1800meters distance in the case of traffic separation and in every 2700meters distance in the case of no traffic segregation in the campus. In addition to that, to develop relations between the molecular cells, maximum locational distance between each cell should be less than 900meters or 1350meters which is the average walking period for pedestrians. Minimum campus population for these universities is 10,000 people. For providing good accessibility in the campus, pedestrian traffic within the cells and vehicular traffic between the cells should be obtained.

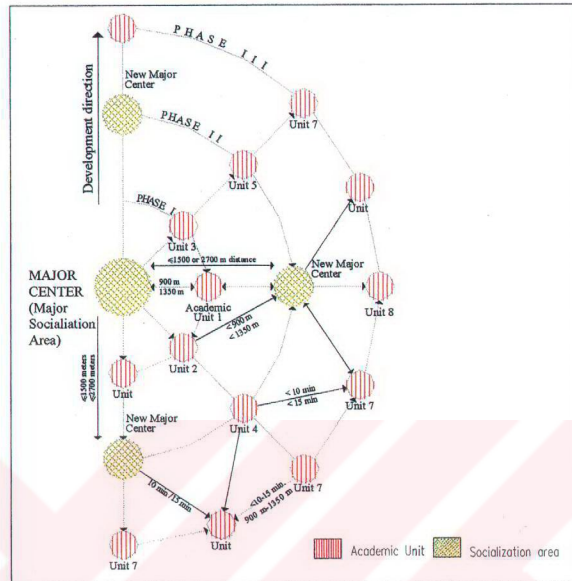


Figure 3.1. An Idealized Scheme for the Development Phases of Molecular Type of Expansion

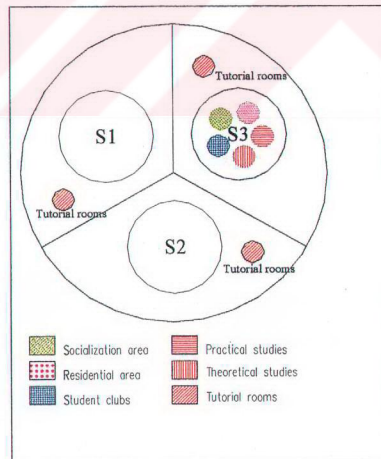
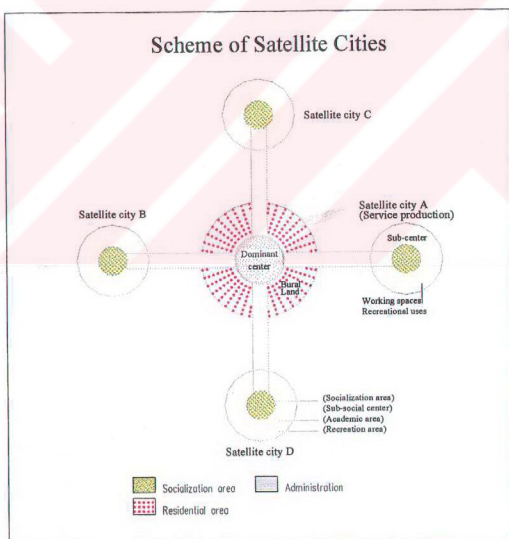


Figure 3.2. Division of A Unit into New Units.

### 3.1.1. Satellite City Model.

The idea is that the central city should be surrounded by a set of satellite communities of limited size. The dominant center is maintained in a radial form, but growth is channeled into communities separated from the center instead of along the radial arms. They are separated from the mother city by broad stretches of rural land and they are surrounded by greenbelts. Each satellite has its own center, services and productive activity. This satellite concept has been the most influential of all the models and appears frequently in planning proposals. When it is compared with a university campus it brings the university pattern an opportunity to grow in macro and micro systems. This model provides a system of various colleges that are directed from one main administration.



**Figure 3.3. A Scheme of A Satellite City Model.**



### **3.1.2. Example of a Molecular Type of Expansion on Campus Settlements.**

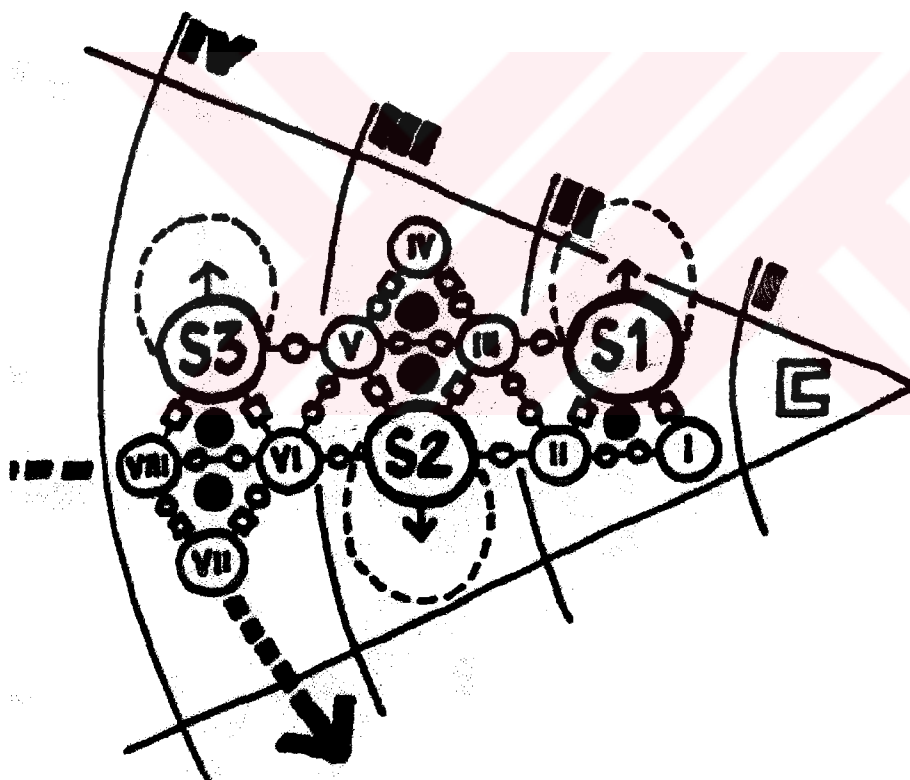
**University of York, Robert Matthew, Johnson-Marshall and Partners, 1963.**

The main reason for choosing the University of York as an example is that it's the first university, which adopted a collegiate system after the industrial revolution period. It differs from the modern university system by developing departments system instead of faculties in educational program. The university is located in 1½miles distance from the nearest town center. It covers a 187 acreage area. Its total population is 4000 people, where its 3200 people are the student population. University has a cellular characteristic, composed of eight collages. Each college is considered a single cell unit with 400-student population. 400 people of capacity for each college are stated as an economic unit for a dinning hall and sports clubs.

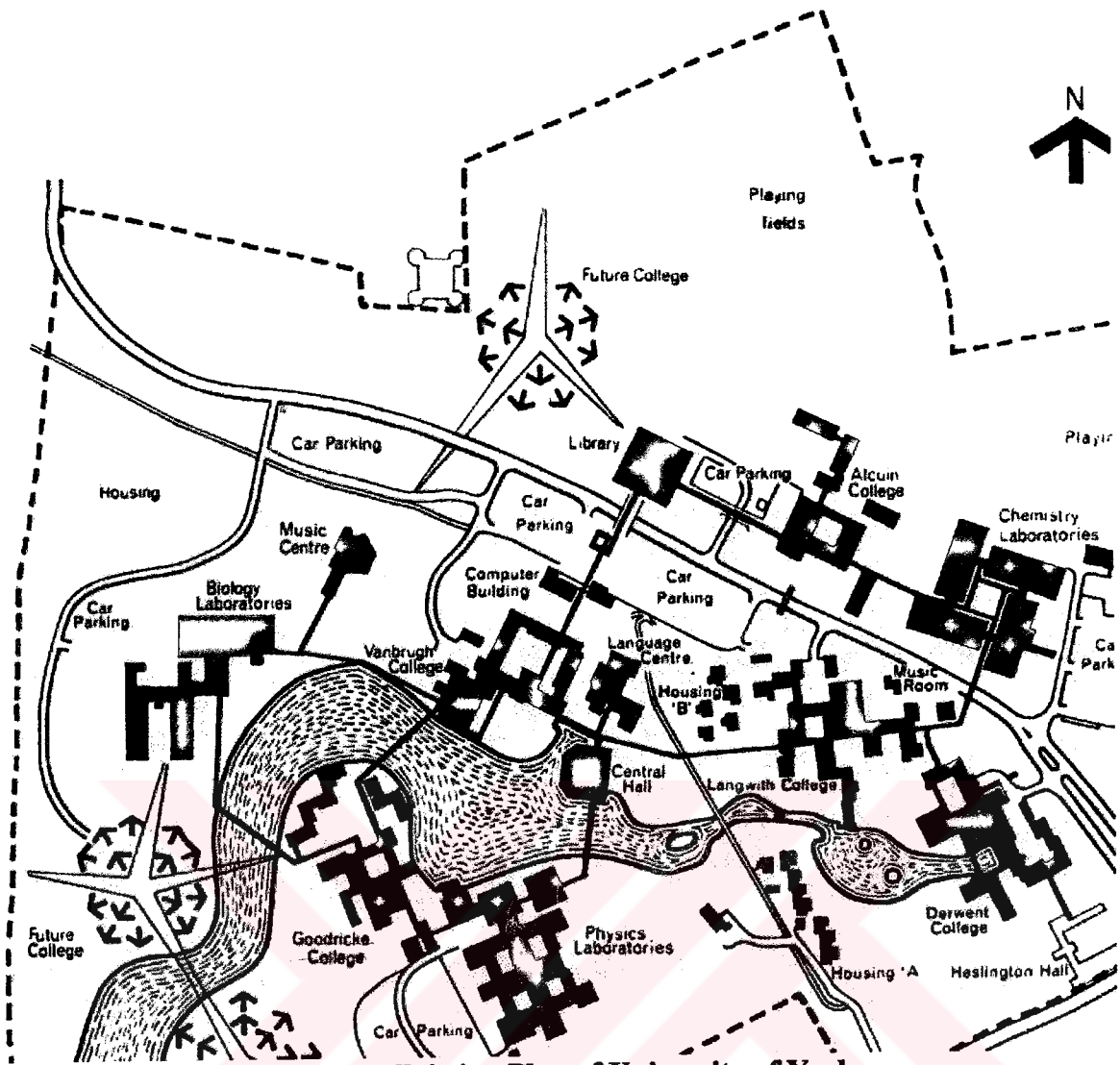
Main idea behind these colleges is, to unite the three major aspect of a student life-living-learning and recreation within a single building, to blur the customary dividing lines between these functions and to give members opportunities to come into contact with people. This has a disadvantage that it avoids the secondary and interdisciplinary relations between each college unit. To solve this problem, the education program is followed on two regimes as: 9am-1.00pm and 5.00pm-7.00pm. During that empty time, students of a certain college can strengthen their communications with the other colleges.

To establish a basis for a physical plan, a matrix of relationship and lines of communication have been applied. The plan provides a clear hierarchy of identifiable and related groups from the individual to the whole so that each person and group can define himself in the campus and identify its own unique position in the university. The fundamental cell is the college, York, whose size is the maximum number affording facial recognition after a year's a regular contact. Each college is assigned an association of related subjects called a department and these departments make up the major faculty. Within each college there are two or three separate

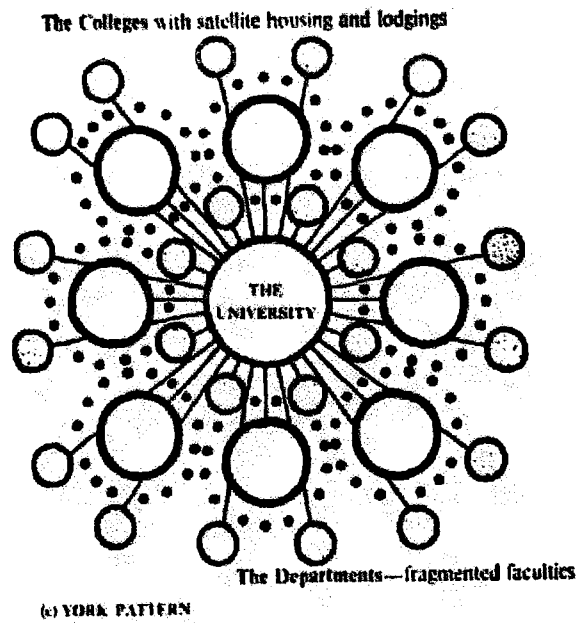
departments expect the natural sciences departments because their laboratories are centered in only one place of the whole campus site. Each department, comprises lecture, seminar tutorial rooms and offices. They are supported by a set of communal facilities such as a sports center, concert hall and central library. Circulation problem is overcome by producing a site that is free of all vehicular traffic and contains only feeder roads. Pedestrian network which extends over the site forms direct routes between building units and crosses the main feeder road on bridges.



**Figure 3.4. A Theoretical Diagram Applied to Site and Building Program of University of York.**



**Figure 3.5. Existing Plan of University of York**

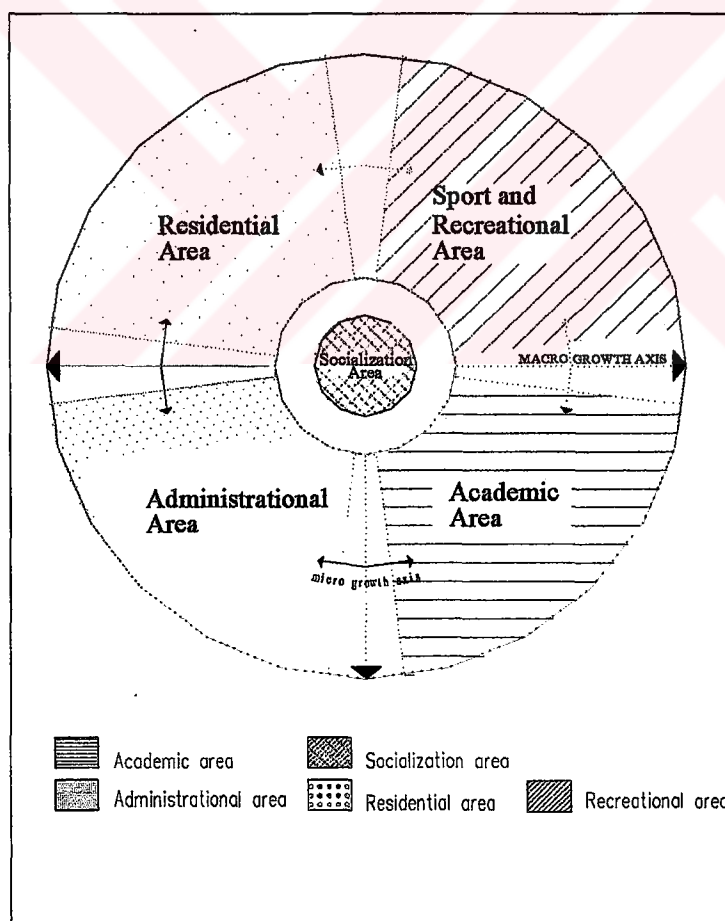


**Figure 3.6. Academic Pattern of University of York.**

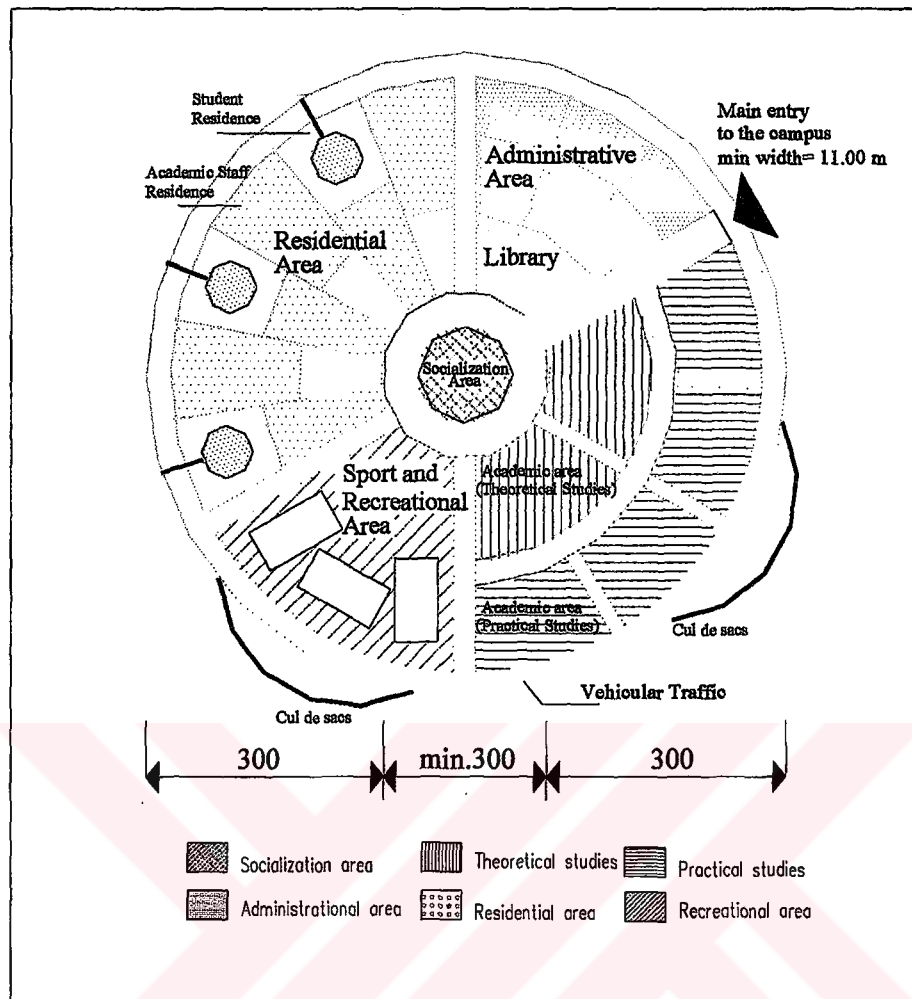
### 3.2. Centralized Type of Expansion in Campus Settlements.

This type of campus pattern has a specificity in that all the functions are united as a whole in a radial grid. The theme is to provide the unity among the facilities and to strengthen the social relations. It also promotes totality within the university as well as the variety. Here, four types of alternative solutions can be developed for campus patterns.

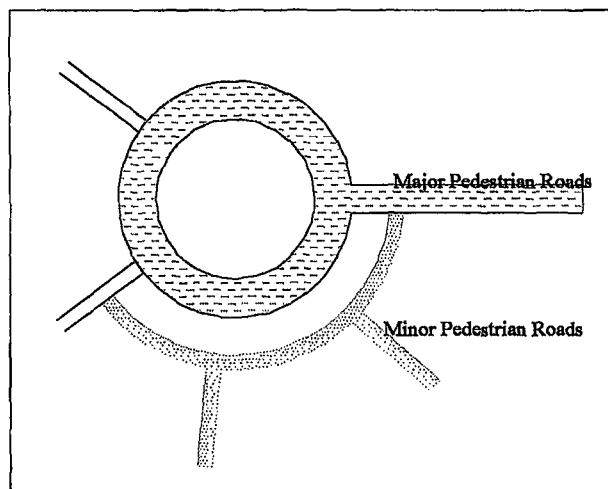
**\*Type 1.** First one is mainly the composition of different activities surrounding the center and it expands on the radial axis vertically for micro growth possibilities. Each function's relation with the other function becomes weak on the horizontal axis in other words between the parallel radial axis. Secondary relations are important as well as the primary relations.



**Figure 3.7. Various schemes for the First Alternative Solution of Centralized Type of Expansion (Scheme 1)**

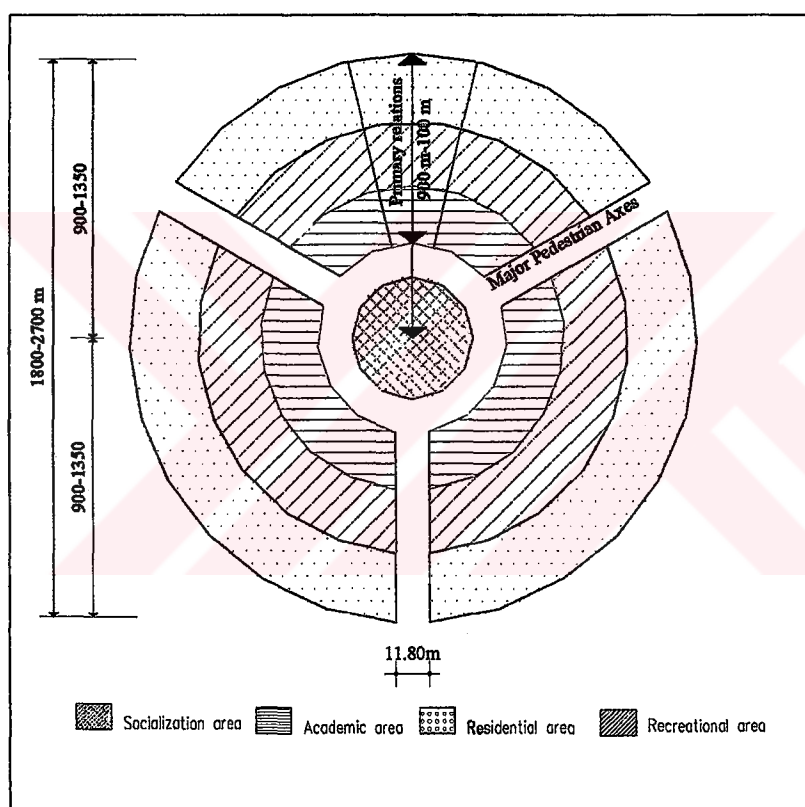


**Figure 3.8. Various Schemes for the First Alternative Solution of Centralized Type of Expansion.(Scheme 2)**



**Figure 3.9. Various Schemes for the First Alternative Solution of Centralized Type of Expansion.(Scheme 3)**

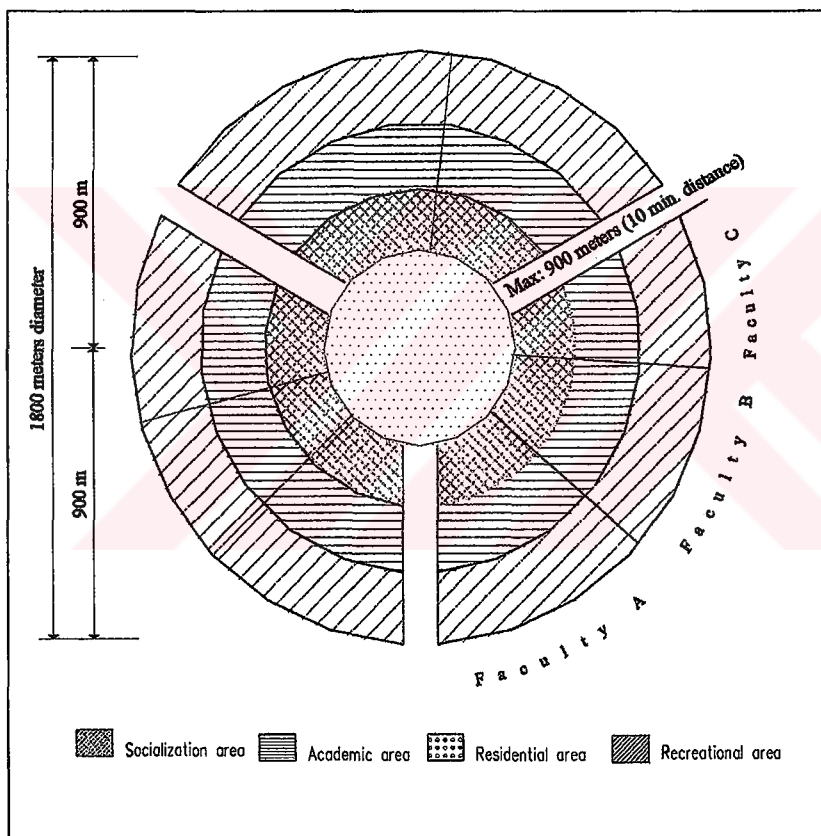
**\*Type 2.** The second centralized solution places the socialization units in the middle like in the first solution scheme. However it expands each function horizontally in equal circles within this radial grid. There is a rigid system and definite planning decisions should be made at the beginning of the planning. This is because expansion at micro and macro level cannot be achieved on the vertical axis. The whole system has a capacity of 5,000 people. Vehicular network is avoided in the middle of the centralized form it may only make a loop around the borderlines of the system. The whole system depends on the easy accessibility of the major pedestrian axis.



**Figure 3.10.A Scheme for the Sec. Alter. Solu. of Cent. Type. of Expansion.**

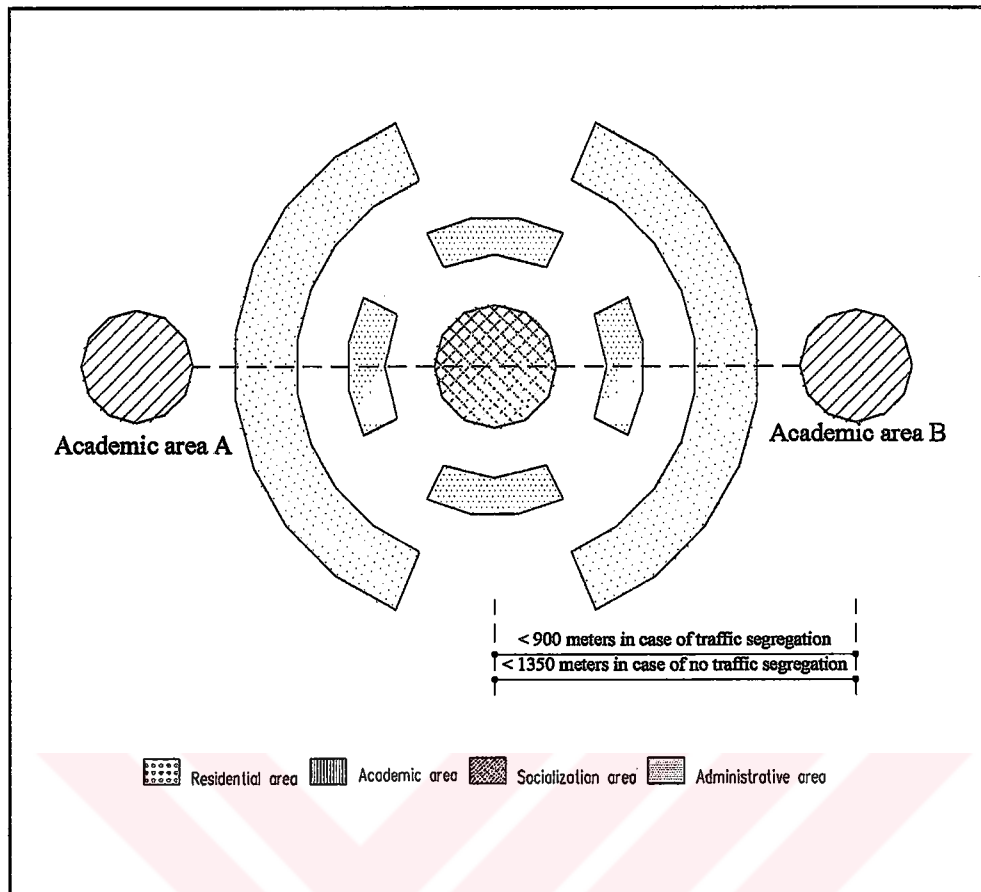
**\*Type 3.** The third centralized solution is very similar to the second they both have differences from the first and the fourth solution. Second and third centralized solutions differ from the first in their maximum diameter of the site because primary relations that follow each other are situated equally around the center. For this reason the maximum length of one radial arm or axe which satisfies all the primary relations should not be more than 10min distance to the main center. This 900-1,000 meters

for one radial axis. This results with a diameter of  $900+900+$  socialization center radii  $\cong 1800$  meters. In the second centralized solution there is the socialization area as the center of the campus site, whereas in the third centralized solution the socialization area is in the middle of the residential and academic area. The residential area becomes the main center point of the campus site. In both of them the width of the major pedestrian axis are minimum 11 meters. This width can be decreased in the minor axis. In both only micro growth possibilities are available in horizontal axis.



**Figure 3.11. A Scheme for the Third Alternative Solution of Centralized Type of Expansion.**

**Type 4.** The fourth centralized solution the most isolated academic pattern. Because the academic units are separated from the dormitory and socialization buildings, success can only be gained here by providing 10 min walking period between the center and the farthest edge of the campus.



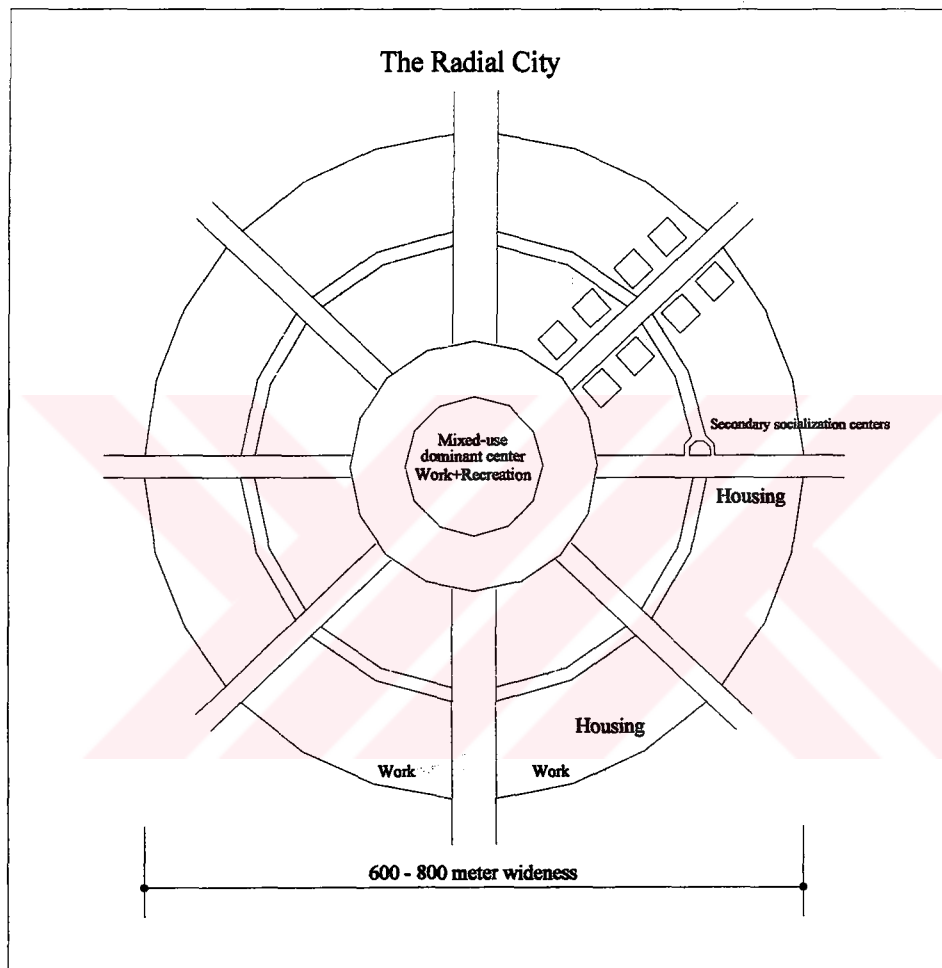
**Figure 3.12. A scheme for the Fourth Alternative Solution of Centralized Type of Expansion.**

### 3.2.1. The Star /Asterisk City Model.

According to this view, the form for any city of moderate to large size is a radial star. The radial pattern has a stronger center with lines moving outward where the flow of movement that has a common origin, destination and volumes arriving at the center can be controlled. It considers a single dominant center, of high density and mixed-use from which four to eight major transportation lines radiate. Secondary centers are dispersed at intervals along these lines and the more intensive uses either cluster around these sub-centers or string out along the major lines. The network gives the most practical line of travel, it works well in gathering and disturbing traffic to and from the peripheries. To bypass the center of radial system, a ring road may be introduced. Cutting off and looping together the spokes of the “wheel”, some distance back from the center can obtain parking and vehicular services.



The model is a rationalization of the form of compact central cities that grow rapidly outward. It is the basis of the plan of Washington D.C., Copenhagen and Moscow. Maximum traveling distance by walking from two opposite sides of the city varies between 600m-800m. This star model city is the applied university campus type. It only limits the macro growth of the university.



**Figure 3.13. A Scheme of a Radial City Model.**

### **3.2.2.Example of Radial Type of Expansion in Campus Settlements.**

#### **Temasek Polytechnic Singapore James Stirling & Micheal Wilford.**

This selected example does not exactly perform a closed central expansion, but it gathers the whole complex in a semi-circular /horseshoe form where each faculty in one arm radiate to the outer parts of the complex. A huge program has been transformed into a radial network of places linked in urban conservation.

Temasek caters 11500 students, 1000 academic staff and 500 support employees in a total of 13000 population. The system is designed in a semi-central form resembling a horseshoe form. The place enclosed by the horseshoe creates a plaza, which is the administrative center of the organization and provides a social focus. An arcade surrounds it, which shelters the visitors from tropical sun and showers during their trip to bank, shops and exhibition galleries. This gigantic six-story horseshoe of building forms the focus of the socialization uses. The horseshoe acts as the hub of the whole organization. From it the spokes of four faculties technology, design and applied science whiz out into the parkland. Each spoke of schools begins with a node of an administration unit that locks into the curve of the horseshoe.

Between all these orthogonal projections, special laboratories from schools of technology and applied sciences are rotated 45degrees to the main axe to form a composition with the other academic units. They are also angled to maximize views over the lake and the park. Recreational units such as students center, play-fields and parkland is located to the outer parts of the horseshoe hub. The central axis of the horseshoe helps defining the edge of the student center to the southern side of the axis where there are play-fields. There is no living accommodation on the site apart from a small amount of staff housing which are cylindrical housing towers terminate the site. There is a separation of vehicle traffic and pedestrians traffic in the complex. Car parking areas are located parallel to the motor way axis whereas pedestrian circulation is maintained along each school spoke, they create social interaction and give access to the open parkland.

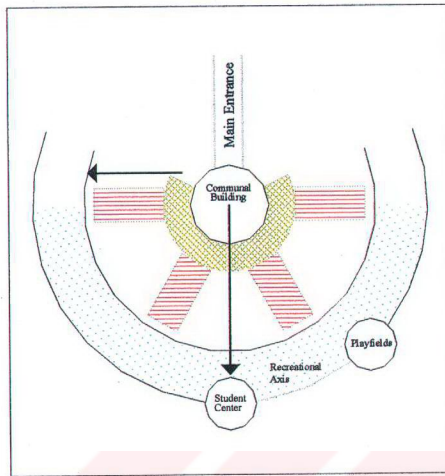


Figure 3.14. A Schematic Plan of Temasek Polytechnic.

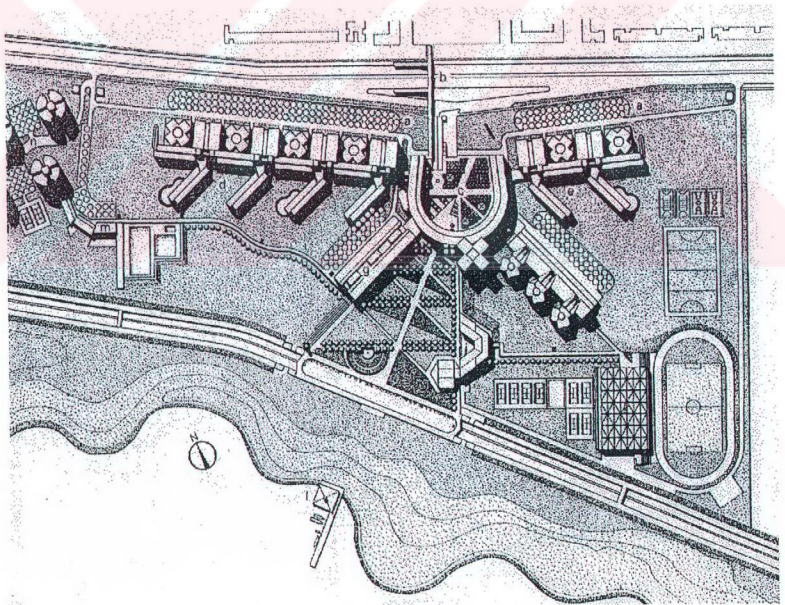
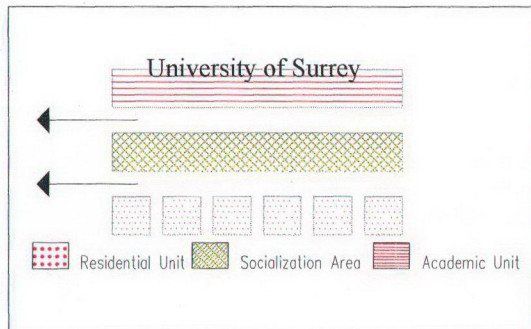


Figure 3.15. Existing Plan of Temasek Polytechnic.

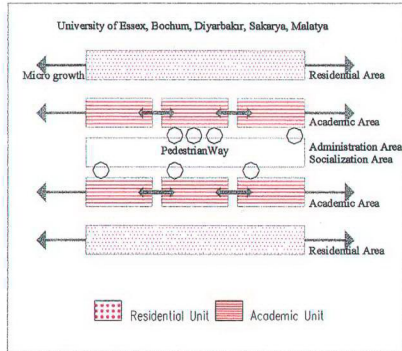
### 3.3. Linear Type of Expansion in Campus Settlements.

The basic principle is that the campus is composed of an alley, which forms the main pedestrian route. It is accepted that in an unlimited area, an infinite growth can be realized. The planning system is considerable for both large and small campuses. Similar patterns of buildings are repeated along the alley. This creates a unity in the campus but this repetition of the same building type causes a kind of monotony. There are four basic plan types in linear type of expansion.

**\*Type 1.** First linear solution considers a horizontal zoning of major functions in parallel direction to the main pedestrian axe. It is the continuation of the CIAM principles but it differs from it by emphasizing the main pedestrian axe situated linearly in the middle of the center of the campus. In most of the examples, there are academic units on both sides of the main alley, which considers the socialization buildings within it. Residential units and play fields follow the academic zone. In some cases however main alley which is the socialization area, is situated in the middle where the residential units and the academic units that are located on both sides of it. Expansion on both of them is limited on the vertical axis. It is not available for gradual development. It can only grow on the horizontal axis. Both of the alternatives for the first linear solution follow the principle of Functional Center Concept by locating socialization areas in the middle of the major campus facilities.

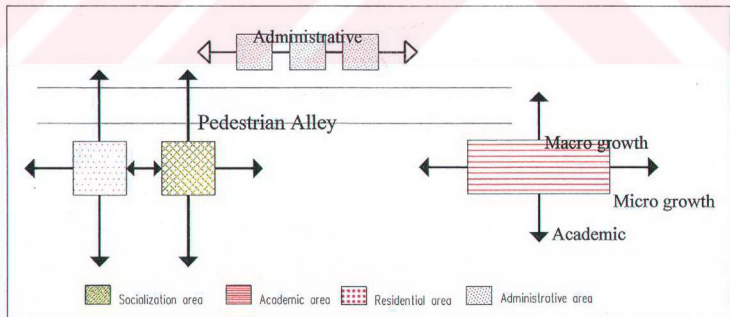


**Figure 3.16. Various Schemes for the First Alternative Solution of Linear Type of Expansion. (Scheme 1)**

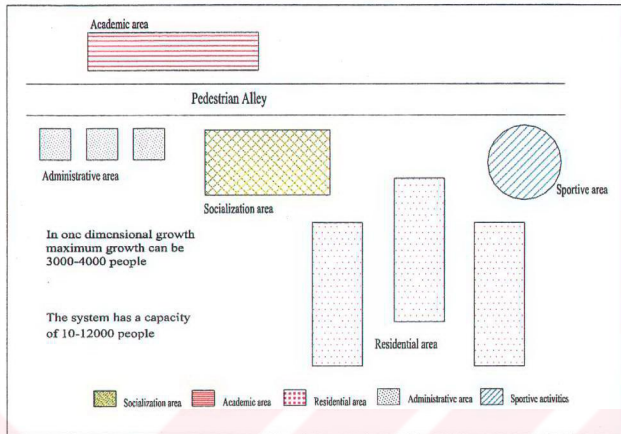


**Figure 3.17. Various schemes for the First Alternative Solution of Linear Type of Expansion. (Scheme 2)**

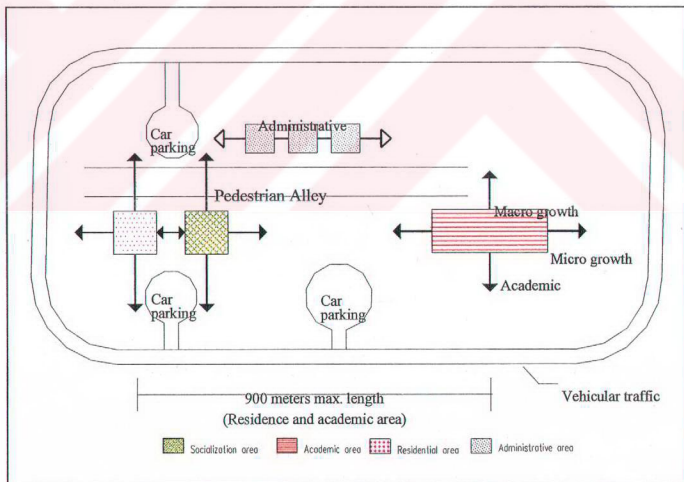
**\*Type 2.** In the second linear solution, there is still a main pedestrian alley but the academic units are gathered on one side of the alley and the socialization areas plus dormitories are placed on the other. There is still the problem of accessibility between the academic and social facilities. Growth at macro and micro level of for each group of functions is available on the vertical axis. Macro growth cannot be achieved on the horizontal axis.



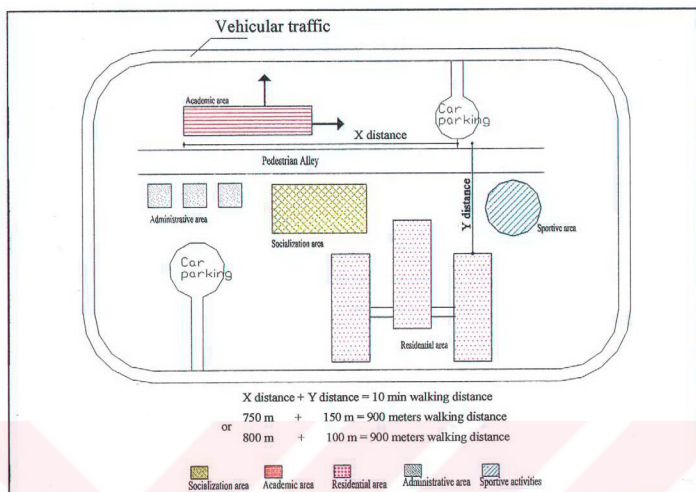
**Figure 3.18. Various Schemes for the second Alternative solution of Linear Type of Expansion. (Scheme 1)**



**Figure 3.19. Various Schemes for the Second Alternative Solution of Linear Type of Expansion.(Scheme 2)**



**Figure 3.20. Various Schemes for the Second Alternative Solution of Linear Type of Expansion. (Scheme 3)**



**Figure 3.21. Second Linear Solution (Scheme 4)**

**\*Type 3.** In the third linear solution, there is a major axis situated horizontally in the campus. There is a principle of vertical zoning between the major functions, which are situated at right angles to the major axis. By considering usually the main entrance of the campus from the middle of the major pedestrian alley located linearly, functions are placed in a hierarchical order from common uses to general uses, particular uses and specialized uses at the two opposite directions. Common uses that are located horizontally on the pedestrian axis strengthen the meaning of socialization process on the major alley. The system has availability of micro and macro growth possibilities. This alternative solution requires a highly dense settlement. Disadvantages of this solution are, according to this hierarchical order, residential buildings are located far away from the communal buildings and the academic units and the residential units are divided into four sections. These avoid the development of primary and secondary relations between the students of other faculties. However this can be overcome by arranging the maximum locational distance between public uses (administrational uses) that are located in the middle and private uses (residential uses) that are located at the end of the campus in less than 900 meters or 1350 meters according to the traffic separation in the campus. On

the other hand this solution has the advantage of using the major spine equally at every point of campus. The example of vertical-linear expansion is the University of Dublin.3.22.

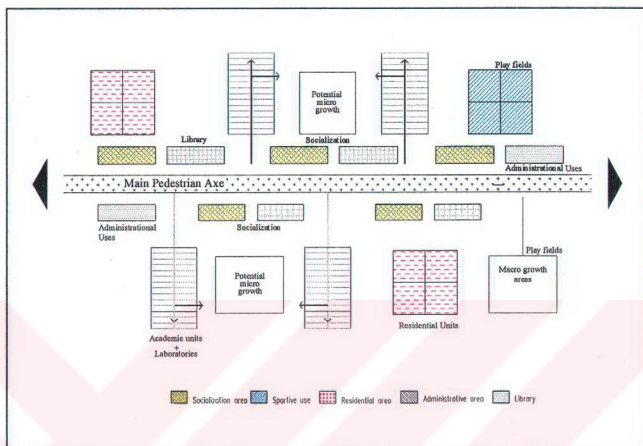


Figure 3.22. Various schemes for the Third Alternative Solution of Linear Type of Expansion.(Scheme 1)

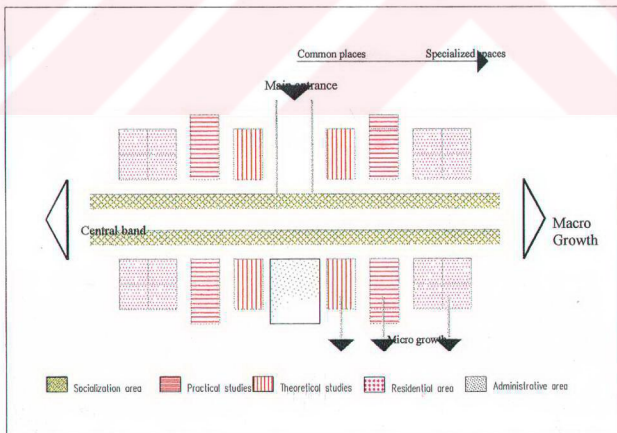
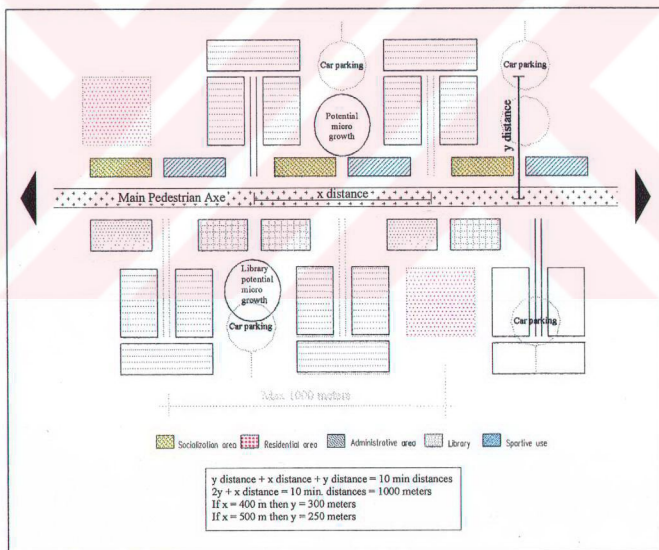


Figure 3.23. Third Linear Solution (Scheme 2)



**\*Type 4** The fourth linear solution emphasizes a complex urban settlement where all the major functions are gathered around a linear development axis to create compact and complex pattern. It avoids the zoning concept, it unites all the functions around every building block. It either locates the residential units on the top floors of each academic unit or between the academic units through the linear spine. The system has flexibility for macro and micro growth possibilities. The capacity of population can be maximum of 10,000 people-12,000 people for ideal pedestrianization in the campus. Then the pedestrian accessibility becomes available for 10 minutes distance. This alternative strengthens the primary and the secondary relations of the campus. The academic units are the only building blocks situated at right angles to the major pedestrian axe. Example of a compact-linear pattern is the University of Bath.



**Figure 3.24. Various Schemes for the Fourth Alternative Solution of Linear Type of Expansion.(Scheme 1)**

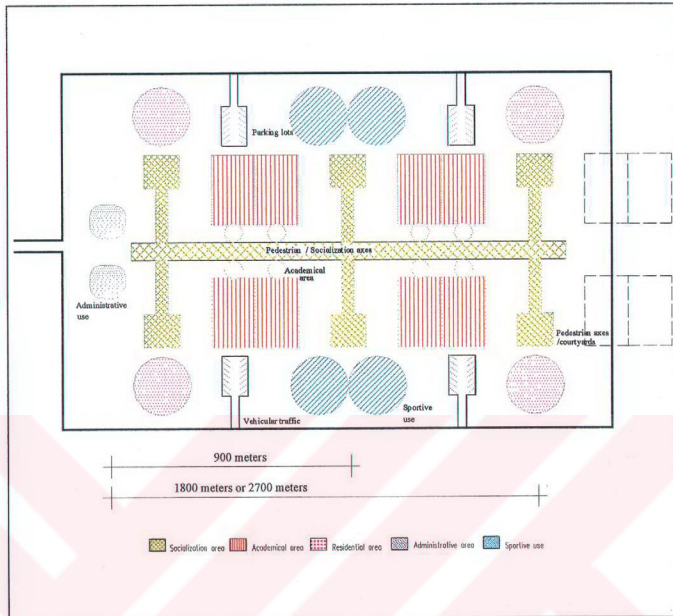
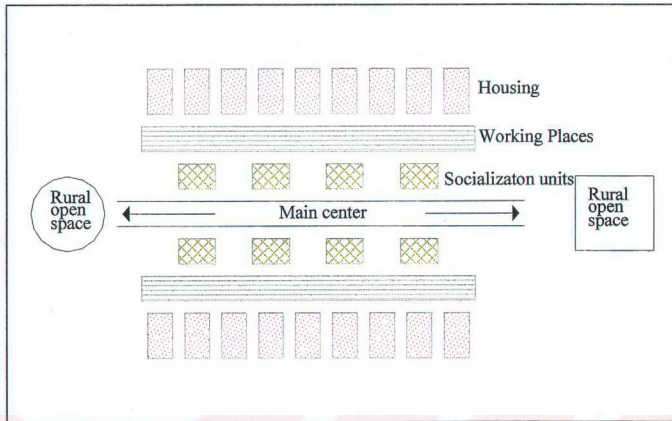


Figure 3.25. Fourth Alternative Solution of Linear Type (Scheme 2)

### 3.3.1. Linear City Model.

The concept of a linear city has been unfurled as a new theoretical idea but it has rarely been applied to universities. The form is based on a continuous transport line along which front all the intensive uses of production, residence, commerce and service moving away from the line, one soon reaches rural open space. It is like one of the arms of the star model-city that endlessly extends. There are no dominant centers everyone has equal access to services jobs and open land. Linear form is successful at small scales such as the commercial strip or a small university campus. At the city scale however, the system has serious problems. Distances between elements are much greater than in a compact city. Lack of intensive centers is a handicap because centers are psychologically important. The supposed flexibility of the form can occur at the remote ends of the line or at right angles to it.



**Figure 3.26. A Scheme of A Linear City Model.**

### 3.3.2. Examples of Linear Type of Expansion in Campus Settlements.

After analyzing four alternative patterns for linear expansion, it will be helpful to examine the two extreme solutions, the first and the fourth alternatives which differ from each other in applying the zoning principle on one side and by a complex pattern on the other side. Finding out the advantages and the disadvantages of the two by a comparison will direct us in choosing the best linear solution for a proposed campus site. Second alternative is not taken into consideration because it is a scattered linear one, which does not program the functions within a system. On the other hand, the third linear solution, which is a vertical linear one, has the same problems with the first one. It's a different version of it.

#### 3.3.2.1 University of Surrey 1968.

University of Surrey is established on a 375-acreage site. There is 84 acres on the northern side of Staghill on top of the Guilford Cathedral and a 289 acres on the western side of the cathedral. Total student population is 5000. Horizontal zoning principle of C.I.A.M. has been applied in this linear pattern. There are three building zones that follow the contours below the crest of the hill in compact linear form.

They are situated parallel to the main pedestrian axis, which considers both the administrative social and cultural units is in the middle of the academic and residential units.

These communal buildings are connected to both by a series of staircases, high level pedestrian streets and lift shafts. The university is planned as a self-contained enclave. Segregation of pedestrians from vehicles is a major feature in the scheme. Through traffic is left to the boundaries. Service roads from the east and west come together under the communal areas. As the core lies between the contouring service roads it may be entirely for pedestrians. Grouping of buildings, pools and planting make the axis pleasurable. Each specific zone contains a different building type. In the academic zone, three scales of space are provided according to workshop areas, laboratories and individual rooms. Students' residences are designed to offer a series of ascending scales of social grouping to small groups. Main disadvantages of the plan are:

\*Even though the system has the advantage of micro growth possibilities in between the empty spaces on both directions, there is only a chance for macro growth possibilities in horizontal direction, which is in a limited area.

\*The academic area is located far from the residential area, this prevents the campus to realize a 24-hour university concept.

\*The academic area is divided into two parts by a major vehicle traffic, which is not desired in a pedestrianized campus. This effects the students to become apart from the other campus buildings. Culdesacs and high level pedestrian buildings are not efficient enough to form a unity in the campus.

\*Socialization areas create a structural center concept in the University of Surrey, which is not preferred. They lack of the sub-social units that may be situated in the distant parts of the campus, where needed such as between the academic units. Primary relations of a campus may not be gained in all parts of the campus.

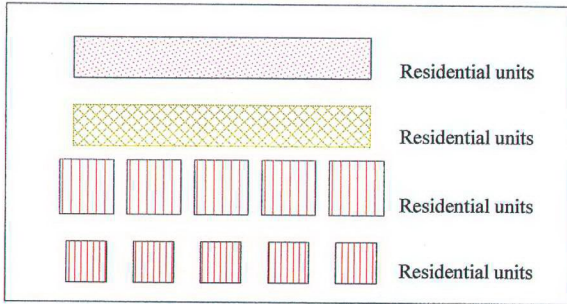


Figure 3.27. Schematic Plan of University of Surrey.

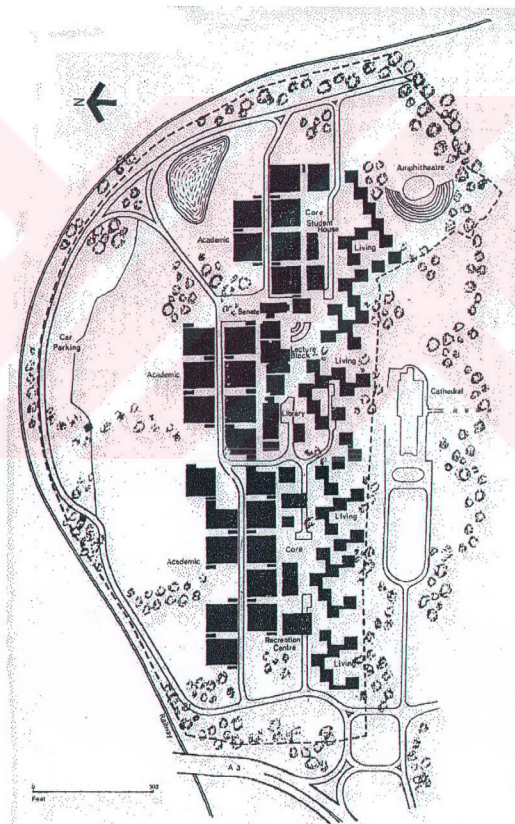


Figure 3.28. Plan of University of Surrey.

### 3.3.2.2 University of Bath, Robert Matthew, Johnson, Marshall.1962.

University of Bath is planned to contain a total population of 7200 people with its 5000 students and 700 academic staff. University of Bath has a functional relationship with the industry. Implications of continuous change in academic patterns and building uses form the planning of teaching and research areas as a single connected units rather than a separate academic discipline. The design, where buildings run into one another, reflects the wholeness of the university experience with no sharp division between work and leisure. There is an integration of living and working areas. A largely self-sufficient community is created. The students of various faculties have their own libraries and common rooms. This realizes a 24-hour university concept. There is an informal pattern for student residences, flats and study bedrooms grouped in various ways throughout the university site.

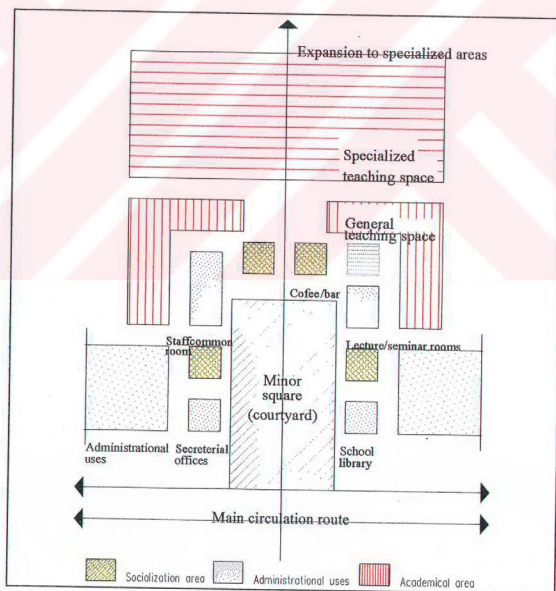


Figure 3.29. Schematic Plan of University of Bath.

Creating a sense of communal identity is the main reason of growing desire of student independence. It is also a decision to regard the academic schools of study as the primary focus of social life and contact. The idea of creating conformity with the educational philosophy of maximum interdisciplinary contact is developed by encouraging the students to use the university facilities intensively and by avoiding artificial barriers that may be erected by dividing the campus. For this reason, some of the student housings are situated in the center of the university to reflect a desire to sustain the life of parade in the evenings and at weekends. Principle of creating a complex environment on the two sides of the main parade identifies the structural center concept. For ease of access and close physical link with each building, campus is designed within a 700meters-diameter area where the average walking distance is less than 10min between the two ends of the linear alley. Pedestrian traffic is separated from the vehicular traffic on the same axe through an upper level line. This pattern of growth allows academic units to expand at right angles from the central core. Location of the main entrance in the middle of the linear line directs the system to grow and expand equally on both open ends of the campus.

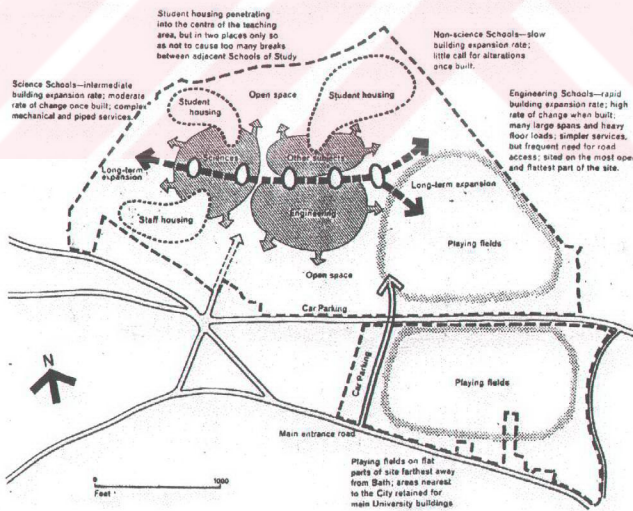
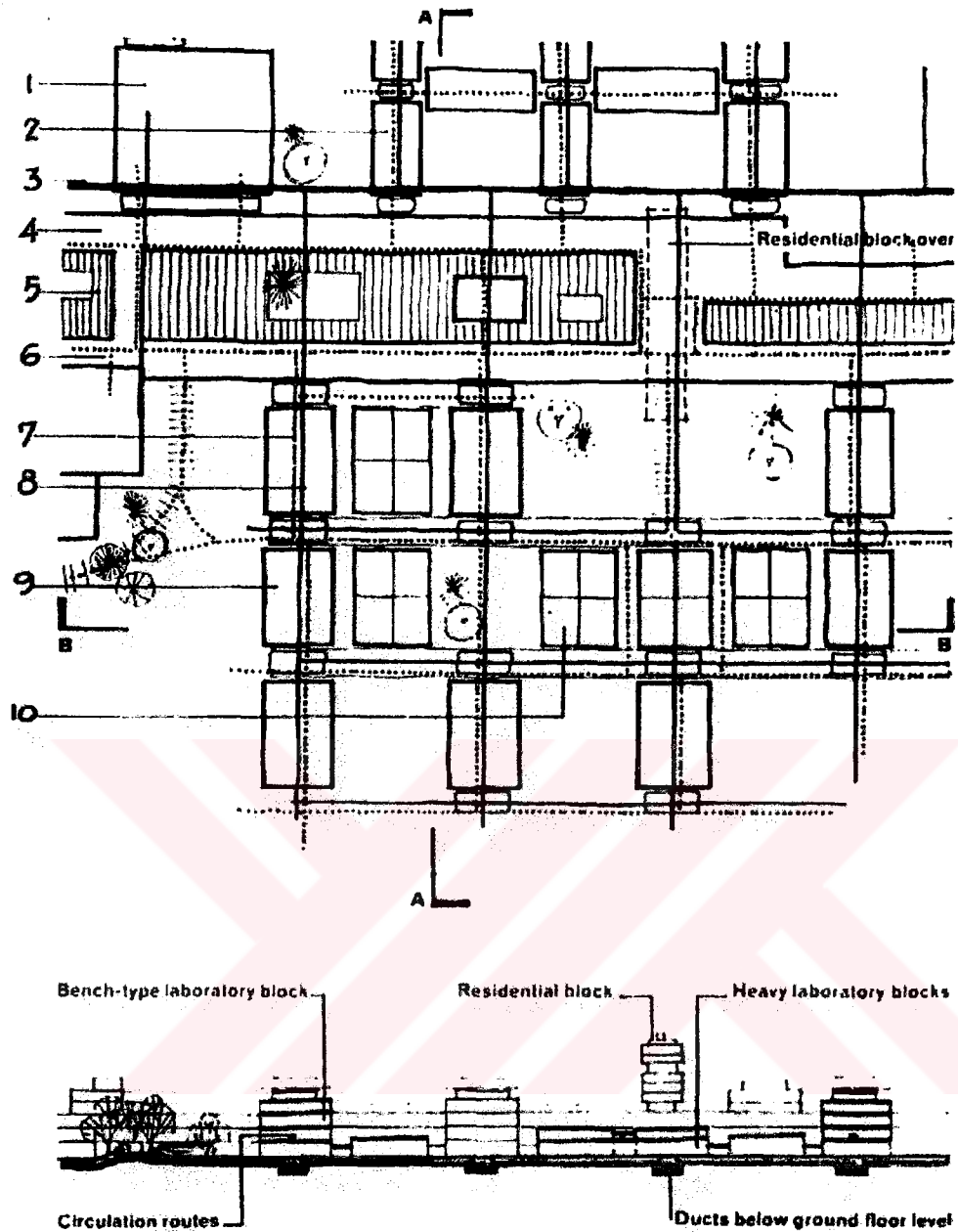


Figure 3.30. The Existing Plan of the University of Bath.(Dober,R.1990, p 78)



**Figure 3.31. Partial Plan of University of Bath. (Dober, R. 1990.p78.)**

- 1) Library
- 2) Academic Spaces
- 3) Main Flow
- 4) Central Core
- 5) Main Center with Closed Road
- 6) Main Center with Closed Road
- 7) Connections
- 8) Flows
- 9) Laboratories (Light)
- 10) Laboratories (Heavy)

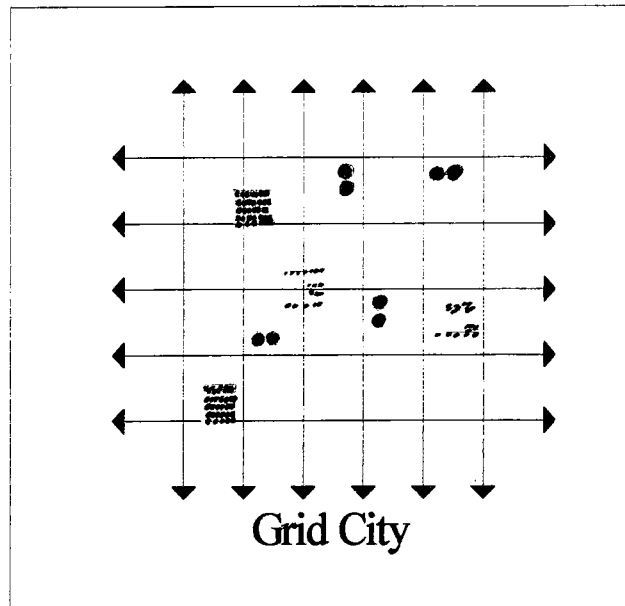


### **3.4. Grid Type of Expansion in Campus Settlements.**

This is mainly a grid system where all the functions of the campus cut each other. It needs a flat site in connecting the courtyards and the buildings of the grid. It has a high-density settlement. Micro growth possibilities are related to the empty squares within the network system, whereas macro growth can only be developed around the edges of the network. In the use of this model in a university campus there is always a problem of extension. It cannot be extended indefinitely without changing the flows and uses in its central areas. This system is mostly successful on technology institutes where relations between interdisciplinary programs are very compact with each other so that more than two faculties can share the same semi-open and open courtyards of the grid network. In an idealized grid network major centers which collect the socialization facilities around a main courtyard should be repeated in less than every 1800meters or 2700meters distances on four directions according to the traffic segregation in the campus. In addition to that maximum locational distances between the major groups of functions such as dormitory buildings, administrative buildings and interdisciplinary academic buildings should be less than 900meters or 1350meters average walking period to each other.

#### **3.4.1. The Rectangular Grid City Model.**

The essential idea is quite simple. A rectangular net of roads divides the urban terrain into identical blocks and can be extended in any direction. Ideally the form has no necessary boundaries and no central points. Change and expansion can occur anywhere inside or outside. The grid has been favored for two contradictory purposes: One of them is to ensure control and express magical perfection. Second one is to support individualistic society. Gridiron layouts are often criticized for their wastefulness that all streets are have the same standard, for their visual monotony and lack of focus. Depending on the scale and situation many of these objections can be overcome, by developing a hierarchical grid. The grid lines may vary a grid as they approach major activity centers.



**Figure 3.32.A Scheme of A Grid City Model.**

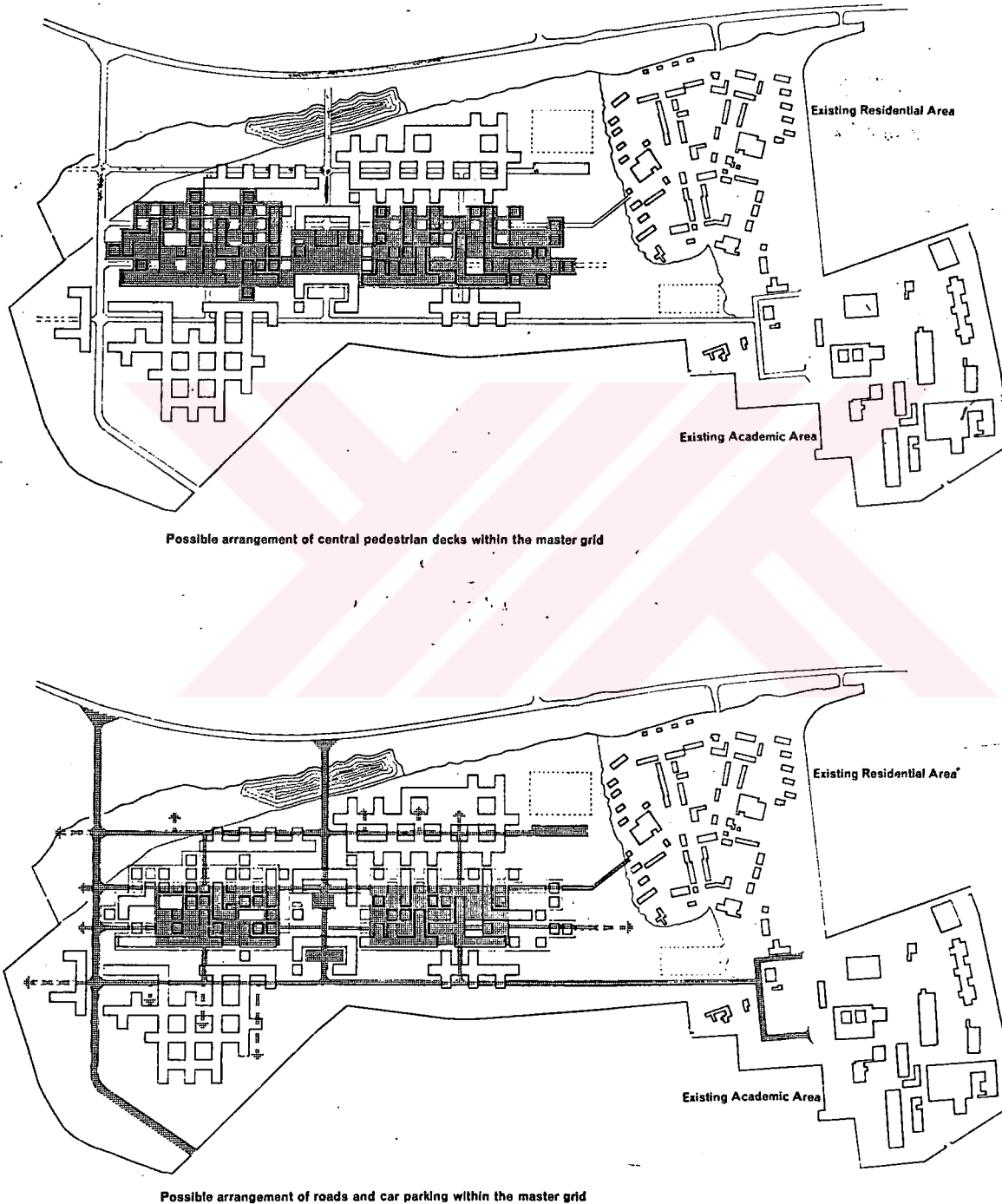
### **3.4.2. Example of a Grid Type of Expansion in Campus Settlements.**

**University of Loughborough. Arup Associates.1964.**

The college owns about 130 acres of land. The student population is given as 5000 people. The basic design principle of the campus is stated as the continuity between formal and informal educational experience and the physical opportunity for the informal mixing of staff and students should be encouraged. This problem is solved by a pattern which will ensure a sense of order and continuity in the development, but which will be flexible enough to provide the framework for future requirements. The pattern is designed in a three dimensional geometry of multiple, but not coincident, grids. There is a basic space unit of 14,70meters & 14,70meters as the primary grid for the academic pattern, whereas there is a secondary grid of 4,50meters & 4,50meters for the service units. This academic grid pattern has the availability of expansion on four sides of the modular grid for macro and micro growth possibilities.

This modular grid system unites each 100 or 200students in every foyer (unit). This strengthens the interdisciplinary relations between different disciplines. These primary grids of the academic uses are rejected in the residential blocks

because of the necessities of different space characteristics according to their functional requirements. However they are designed in another modular grid system that does not deform the continuity of the campus pattern. The plan avoids horizontal zoning principle of C.I.A.M. It rather provokes a mixture of all activities as a continuation of Team X principles.



**Figure 3.33. Existing Plan of University of Loughborough.**

### **3.5. Scattered Type of Expansion in Campus Settlements.**

In scattered type of expansion the development of the scheme is only limited by the boundaries of urban land. All the academic units are like separate buildings, which are situated in a great park. The scheme is uneconomic and it is considered as an anti-social and individualistic pattern. It has no settled plan characteristics. Pedestrian traffic and vehicular traffic are not separated from each other. They are not considered as the main design criteria. When the plan is to serve only pedestrian traffic then maximum capacity of the campus should be no more than 5000 people. This number can be increased to 10000 people if vehicular traffic is added to the campus.

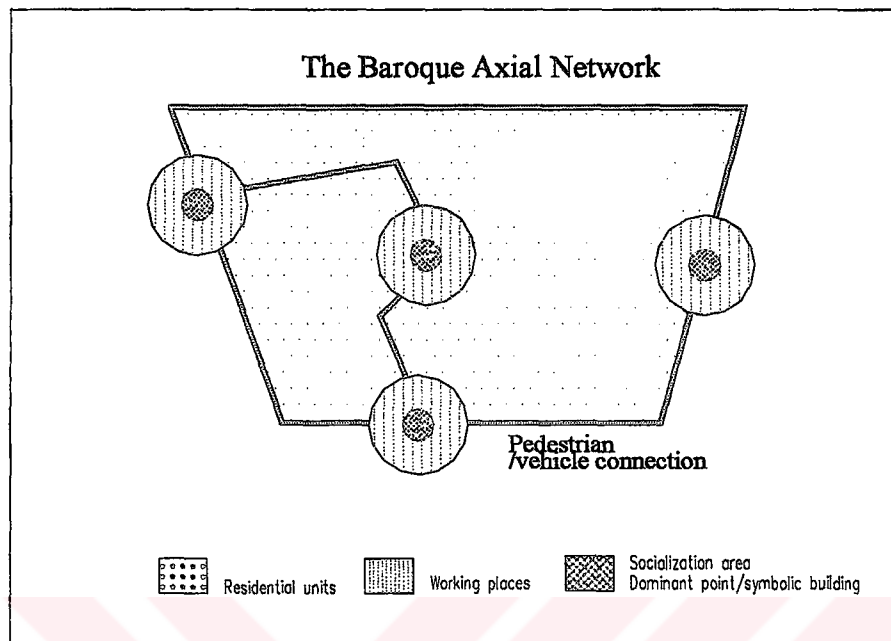
#### **3.5.1. Scattered (Irregular) City Models.**

There are mainly two types of city models that are classified under this category. These are the Baroque axial network and the Lacework City. The most specific similarity between the scattered type of expansion in campus patterns and the two city models is that in both of them there is a distribution of functions and facilities. There is no definite systematic planning approach. There is a kind of coincidence on the location of various functions in the system.

##### **3.5.1.1. The Baroque Axial Network Model.**

The structure consists of a set of symbolically important and visually dominant nodal points distributed over an urban area on commanding points of ground. Pairs of these are connected by arterial, which are occupied by upper social groups and prestigious activities. Other areas can develop independently within the network as long as they do not intrude on the nodes. Thus an irregular triangular network of special quality covers the urban area (16<sup>th</sup> Century City of Rome). For areas of moderate scale and irregular form, where symbolism is important and effect is required rather quickly the baroque network is a proven choice. It achieves its ends with a minimum control and leaves many users free to develop at will. This pattern

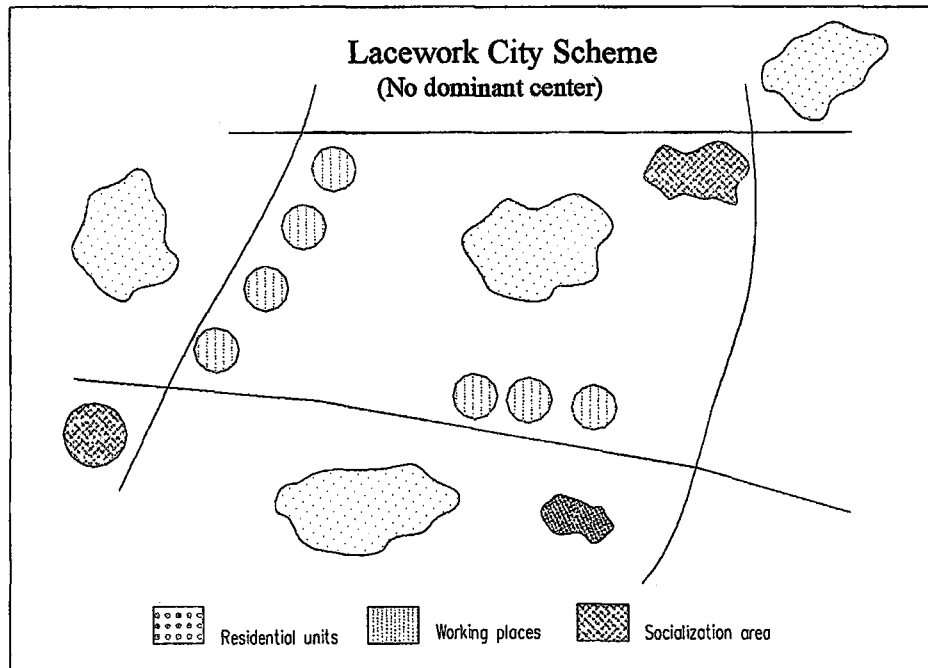
with its dominant and sub-centers can be adapted to a university campus where site has an irregular form.



**Figure 3.34.A Scheme of Baroque Axial Network.**

### 3.5.1.2 The Lacework City Model.

The name is modified from a term of Christopher Alexander's book, *A Pattern Language*, it refers to a type of low-density settlement in which the traffic ways are widely spaced. This is a network of linear settlements or a blown-up grid. By sacrificing the density of occupation and the length of transportation, the linear ideals of flexibility and convenient access are more easily achieved. It requires lavish space, sophisticated individual transport and some affluence. Given these, it may be a pleasant form to live in. lack of basic dominant centers and the distances between settlements prevents the pattern to be a university campus settlement.



**Figure 3.35. A Scheme of Lacework City.**

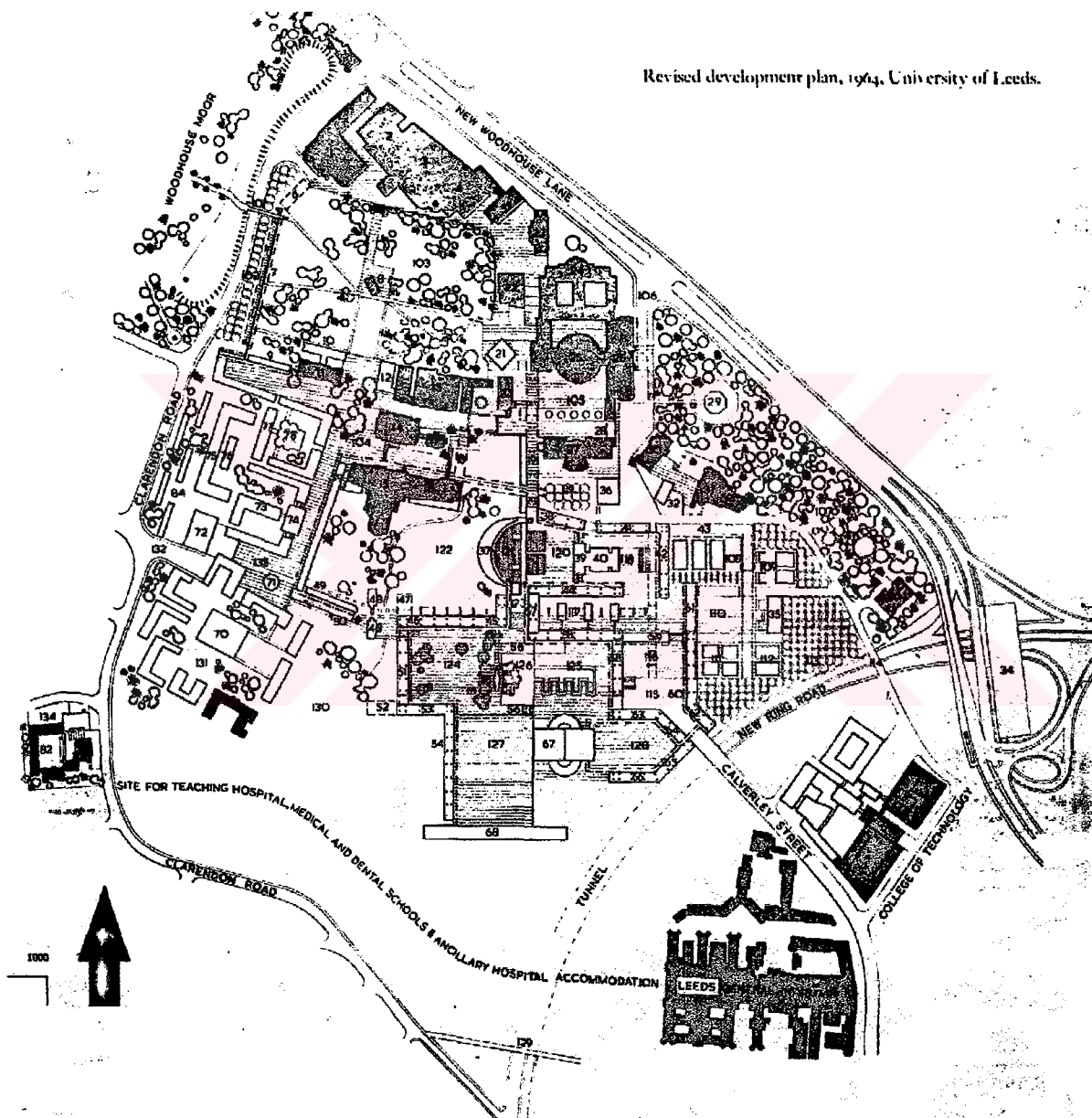
### 3.5.2. Example of a Scattered Expansion in Campus Settlements

**University of Leeds. Chamberlin, Powell and Bon, Architects, 1963.**

In Scattered type of expansion designers allow differentiated space with area set-aside for specialized activities for sudden unknown expansion. They use the principle of courtyard planning, completion of space contrasting space to space and they design without dependence on symmetry and on centerlines. Following these basic principles the role of the departments which form the focus of student life has been minimized. The overall university is modified by the students' experiences in their practical training. A central social focus is established for limited social facilities. The other building types such as academic and residential units are scattered throughout the plan to create a mixture of small complex urban environment. Expansion areas are also scattered haphazardly. Building types are categorized by degree of flexibility.

On the other hand, as a solution for circulatory systems, there is a creation of a large vehicular free campus and open spaces. The natural slopes are used for connecting series of terraces and plazas in an informal urban pattern. The

underground areas contain the service roads to the buildings and parking spaces. On behalf of these reasonable design criteria, there are disadvantages of the scattered system. Macro and micro growth availability do not follow a systematic expansion, which creates problems in the campus.



**Figure 3.36. Existing Plan of University of Leeds.**

### **3.6. Mega-Structural Grouping in Campus Settlements..**

The meaning of the word mega-structure can be described as a big structure . However its concept identifies a different structural organization. If a structure satisfies only one of the major functions of a settlement then it cannot be accepted as a mega-structure even if how big it is. According to Fuhimiko Maki, a mega-structure is a big frame system that compromises all the functions of a settlement. A university settlement that is proposed to be designed under mega-structural grouping criteria should be composed of four headings as:

- \*The university should be constructed from modular
- \*The university should have an indefinite development identity
- \*The university should have a frame structure that contains small components of various groups of functions.
- \* The university should be available for expansion both in horizontal and vertical direction.

#### **3.6.1. Mega-Structural City Models.**

##### **3.6.1.1.Megaformal Grid City Model. (A Proposed City Model)**

Current imaginings on future city concepts have started to develop by the studies on Linkage Theory. Linkage theory was highly popular in 1960s. In his landmark treatise, **Investigations into collective form**, Fumihiko Maki discussed several factors that go into the creation of a framework of spatial linkages. Maki addressed linkage as the most important characteristic of urban exterior space stating that, linkage is simply the glue of the city. It is the act by which we unite all the layers of the activity and resulting physical form in the city. What emerges from his important work is that the composition of public space is established as a totality before individual spaces or buildings are planned. Another leading figure in exploration of structures generated by linkage is Kenzo Tange. In his experiments proposing linked mega-structures, the environment became a diagram of movement systems. The study of circulation and connection however, was extremely important



to the understanding of the structure. Mega-formal imaginings are mainly three-dimensional structures in which the city is one single. Roads and utilities are integral parts of this structure supported directly on the earth.

### **3.6.1.2. Trihex Grid City Model.**

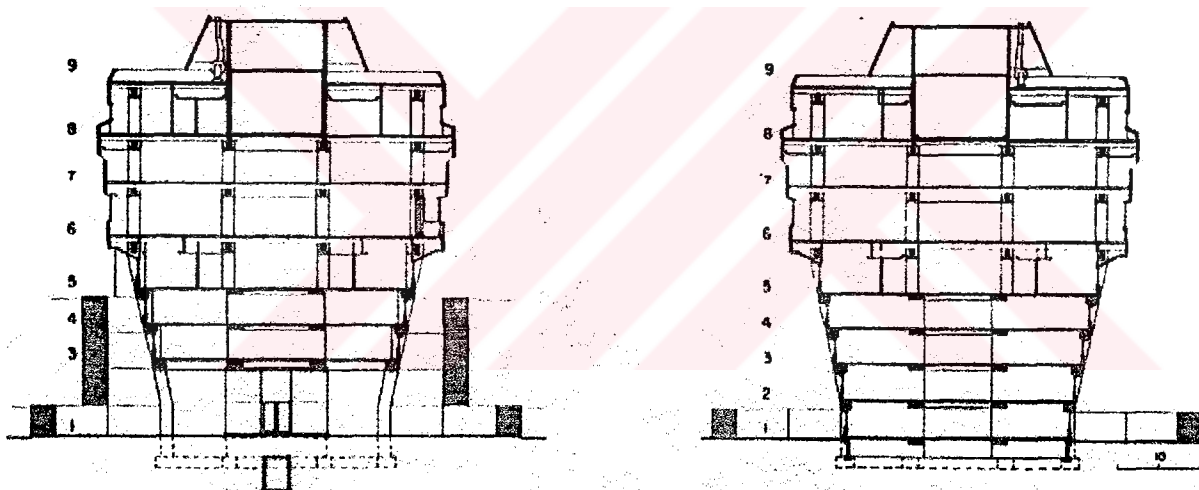
It is a mosaic of hexagons subdivided into triangles, which is suggested as a new concept by Robert Le Ricolais, from University of Pennsylvania, Institute of Architectural Research. He has analyzed the Trihex pattern in a block area for easy accessibility. He has found that his trihex grid yielded 20% fewer intersections than the orthogonal grid. Using a simple mathematical model, Le Ricolais compares the trihex and orthogonal systems in terms of moving pedestrians and motor vehicles when both are separated from each other. The qualitative analysis indicates that a trihex vehicular grid at one level, coupled with a trihex grid for pedestrians at another, produces the most ordered and efficient system of differentiated movement. Automobiles would travel at straight lines, free flowing with minimum intersection points. Pedestrians would move across vehicular lines along triangular routes, which are the shortest paths for travel. They would have no contact with motor vehicles. The pattern makes it possible to differentiate between small and large areas, public and private areas. The trihex grid is usable for one way system that makes the use of 60° intersection, which allows closer spacing of the grid streets. The minimum distance between intersections or crossings should be 215 meters. Two streets of the same direction should have about 750 meters between them.

### **3.6.2. Example of Mega-structural Groupings in Campus Settlements**

#### **Lethbridge University, Erikson and Massey, 1975.**

The structure resembles the futuristic cities of the 21<sup>st</sup> century where there is a sharp separation between nature and the building block. This university is constructed as a single giant building in 300 meters length, 30 meters in width and eight floor of height. This super-block system, which is called a mega-structure, considers all the activities of a university within its structure. Main design principle

of the university is to develop an interdisciplinary educational system where all the faculties are located very close to each other on the same floor. They share the same communal, recreational and residential buildings of the university. The system has a capacity of 1800 students. In the first four floors there are the residential units of the students and academic staff. Fifth floor considers the theoretical classes of the faculties. Sixth floor is reserved for the communal and recreational uses of the university. Finally seventh and eighth floors consider the practical study rooms such as laboratories and research rooms of the faculties. A student who leaves the laboratories and enter the residential unit come across with the same interior space, because different functions are overlapped on top of each other in the same structural grid. This brings monotony and rigidity to the system. It avoids the creativity of the environment.

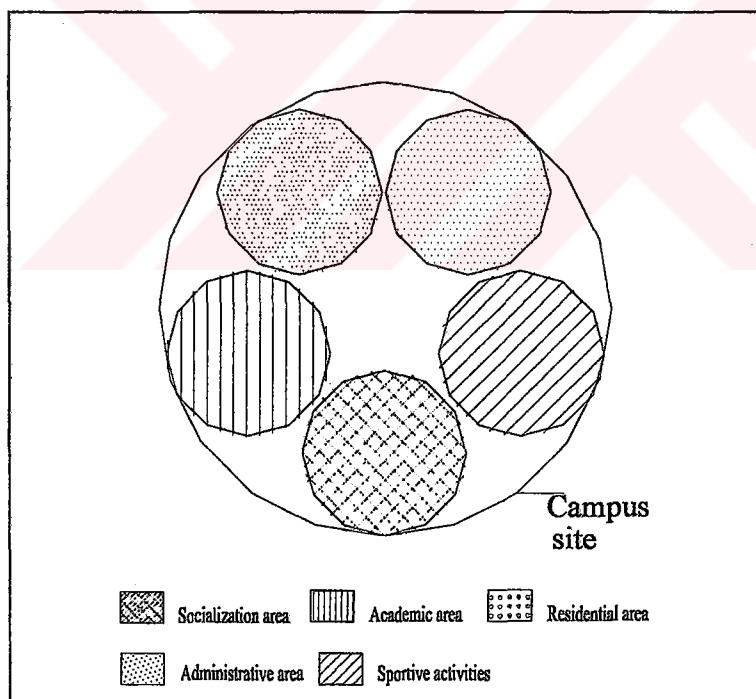


**Figure 3.37. the Existing Sections of the University of Lethbridge  
(Kortan, E.1978.p211)**

- 1, 2, 3 ) Residential Floors.
- 4) Residential, Library Health Services and Other services Floor.
- 5) Seminar Rooms, Offices and Library Floor.
- 6) Dining Hall, Library, Student Common Rooms, and Studios Floor.
- 7) Administration, Laboratories and Studios Floor.
- 8) Offices, Seminar Rooms and Research Laboratories.
- 9) Service Floor.

### 3.7. Horizontal Grouping in Campus Settlements

Basically a rigid zoning is offered in this type of a campus settlement. Functions are located on separate areas. The organization of the scheme is realized under the principles of CIAM. However the division between academic disciplines according to their functional activities increases the flexibility. Expansion of the scheme is not limited but receiving special lands for special purposes cause lack of variety in the campus. In general, there is a direct interrelation between nature and the campus. The main problem in this scheme is the problem of designing and using empty spaces for recreational purposes during day and night- time. Because some facilities are not available to be used by the students 24-hour a day. As a result there's always a lack of compact relations between these various facilities of the campus.



**Figure 3.38. A Scheme for Horizontal Grouping in Campus Settlements.**

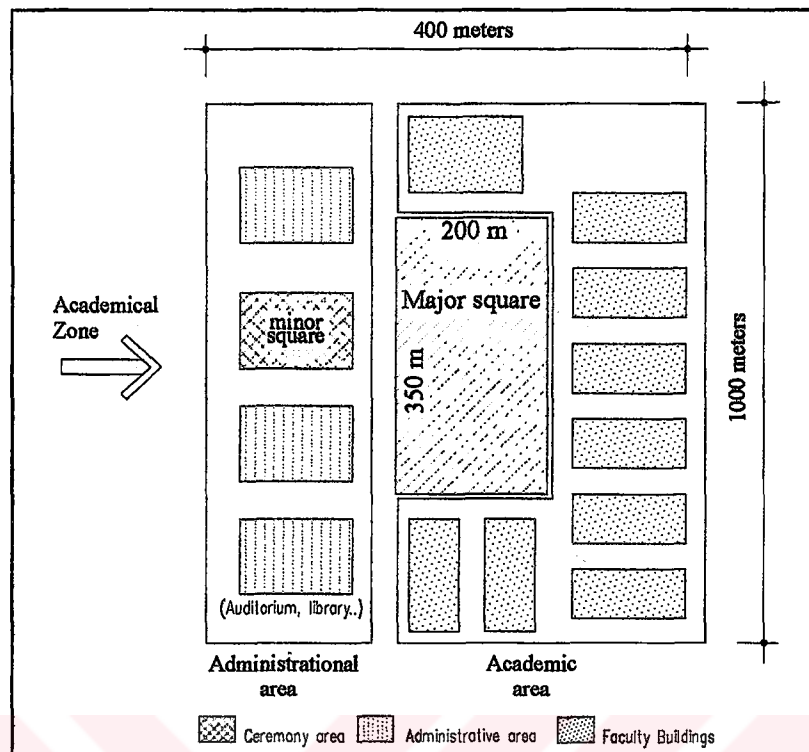
### **3.7.1.Example of Horizontal Zoning in Campus Settlements.**

**University City of Mexico, Mexico (La Cite Unvarsitare De Mexico)**

**Mario Pani, Enrique del Moral, 1950.**

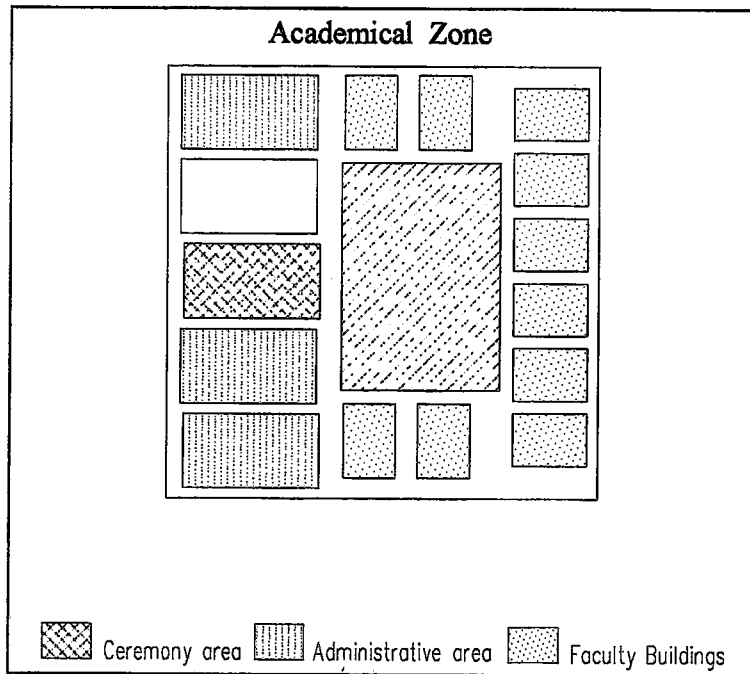
It can be considered as a successful university-city example, which performs a mega-university identity, related to its big population criteria. This project is unique by following the horizontal zoning principle of CIAM, and by using the 1000 meters diameter distance pedestrian scale in each major zone of the university campus rather than limiting the whole campus site within only 1000 meters diameter campus site. The basic reason for designing the project in this way is related to the addition of new educational programs, the increase on student population and high density of needed total floor space. Under the circumstances of these requirements, a designer can follow the principles of CIAM only in bigger campus sites.

For the Academic Zone; the area is designed in a compositional structure where single unit faculty buildings, administrative buildings and communal building such as auditoriums, theatres and shopping malls surround a square of 350 meters by 200 meters. This creates various formal (major) and informal (minor) pedestrian squares within the academic site. The outer borders of the academic site identify a 400mX1000m rectangular area. The academic zone considers two different groups of functions (faculties-administrational buildings) within the same area. However the administrative area is located on the western part of the academic area with its auditorium, libraries and the ceremony hall. In other words, this separation of the functions in the horizontal axe, creates five major visible zones in the campus site rather than the four zones as it is proposed in the principles of CIAM congress. All of the buildings in this zone are designed in a hierarchical order according to their uses. The maximum walking distance between the two distant faculties is calculated as 10 minutes. Administrative buildings are designed higher than the other buildings to create landmarks within the campus.

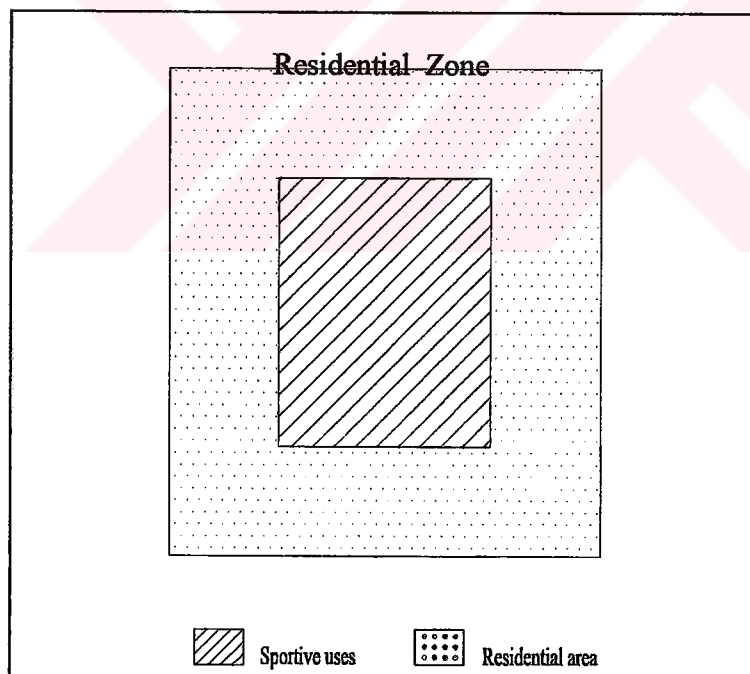


**Figure 3.39. Schematic Plan of the Academic Zone of University City of Mexico. (Kortan, E. 1978, p 209.)**

For the Residential Area: It is located in a triangular area on the southern part of the site. It is separated from the academic zone by a road used for vehicular traffic. However, pedestrians can pass to the academic zone by the two underground passageways. The residential site considers a 900mX800m lengths rectangular open area. The use of two major functions within the borders of a major zone can be corresponded in the residential zone just as in the academic zone. Here, sports and recreational buildings are located in the middle of the residential zone. Consequently residential units and recreational uses are mixed with each other. There is a system of horizontal zoning within the zones. The composition of sports halls in the middle of the residences is successful for creating a livable community atmosphere. The maximum walking distance is calculated as 750 meters, which is within the limits of pedestrian scale. Academic staff lodgings however, are separated from the main residential zone. They are located in the middle of the recreational zone as a super-block.



**Figure 3.40. Schematic Plan of the Academic Zone of University City of Mexico.(Kortan,E.1978.p 209.)**



**Figure 3.41. Schematic Plan of the Residential Zone of University City of Mexico.(Kortan,E.1978.209)**

**Recreational Zone:** It is designed in a 1200mX500m rectangular park, which considers an Olympic stadium within it. Pedestrians can reach to the recreational zone from either academic or residential zone by the underground passageways. Just as in the previous two zones, recreational zone considers two major functions (Olympic stadium and academic staff lodgings within the same zone).

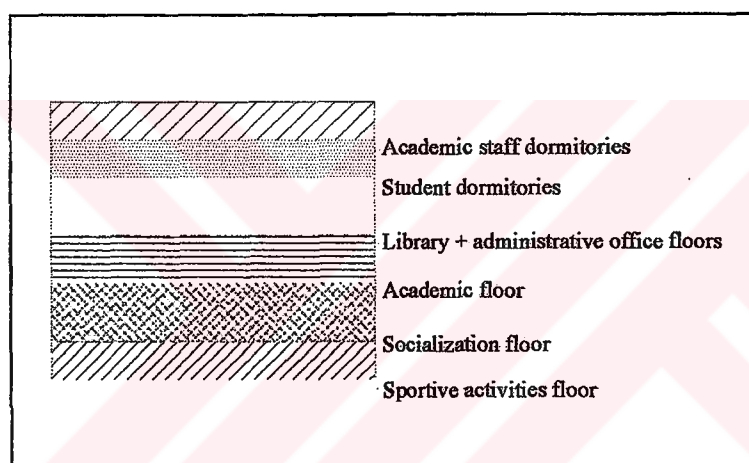
**In the circulation system:** Vehicular and pedestrian traffic are segregated by underground and over ground passageways that lie on the same surface level. This principle of separation in vertical directions has been successfully applied in University City of Mexico. In the project, the vehicular traffic continues outside the borderlines that surround each campus zone, so that vehicular traffic does not disturb the pedestrian movement within the zones. The campus site is hardly completed within a 1200 meters diameter distance and the principles of CIAM are applied effectively into the project.



**Figure 3.42. Existing Plan of University City of Mexico.**

### 3.8. Vertical Grouping in Campus Settlements.

This campus pattern has a flexible zoning area. Only elevations and staircases strengthen the relations between various disciplines. There is no vehicular traffic within the campus. Expansion of the campus is limited on inward and horizontal directions. Basic principles of this planning are established according to the principles of Team X. The structure is composed of overlapping of functions. Nature is neglected in this scheme. Socialization can only be realized at one floor, which is usually the basement floor. This creates a problem between the primary relations of the campus. Macro growth possibilities can only be obtained by the addition of new units and by bringing a connection between them.



**Figure.3.43. Scheme of Vertical Grouping in Campus Settlements.**

#### 3.8.1. Example of Vertical Grouping in Campus Settlements.

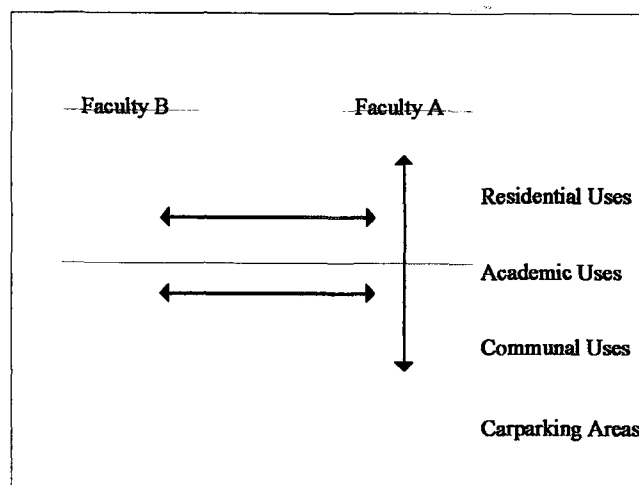
**Tougaloo University. Gunnar Birkerts. 1965.**

The campus is designed as an additional complex to an older university campus in Mississippi, it has a population of 2500 students. Basic design principle in the campus is the creation of a settlement of high density and compact urban pattern. The plan reflects characteristics of a medieval town center. It unites different groups of functions all together in a compact campus pattern that follows zoning principles of C.I.A.M. However, this matrix system which constitutes different groups of functions all together in a compact campus pattern forms zoning on vertical direction



by superposing these functions on top of each other. In other words, the zoning principle is applied to the campus pattern in sections rather than in plan.

The system is composed of three levels. First level of the system is situated on the ground floor for serving motorized traffic and car parking areas, whereas the second level is completely assigned to pedestrians who are separated from motorized traffic. At this level, there are the academic buildings where all the academic staff and students can communicate within an appropriate walking distance. Ease of access for pedestrians is the main design criteria for socialization. Maximum distance between two farthest points is 1000 meters, 10 minutes walking period. Third level of the system on the other hand is reserved for the residential blocks of the campus. Its structural system, which differs from the academic pattern, is situated on top of the northern and southern parts of the academic blocks. There are only faculty buildings that unite with another faculty on horizontal direction. All the other relations such as communal, residential, academic and socialization uses are separately connected to each faculty in vertical directions. In other words, students of faculty A can only come together with students of faculty A during the academic and residential hours. Interdisciplinary relations of different faculty students become harder, because students have to move through different functions of flats in a certain faculty to pass to another faculty flat. Interdisciplinary relations are only maintained at horizontal levels, whereas primary relations are maintained at vertical levels.



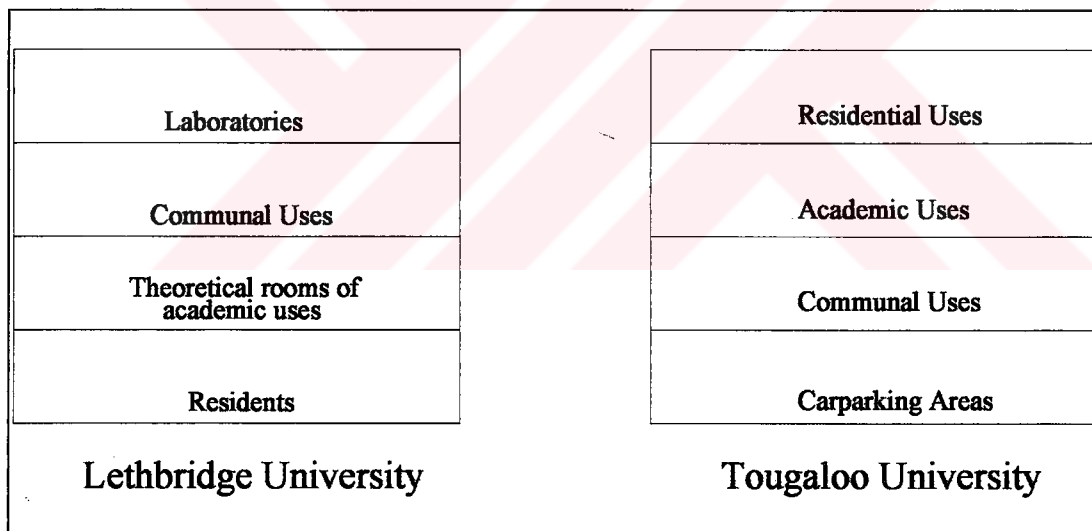
**Figure 3.44. Schematic Plan of Tougaloo University.**

Gunnar Birkets, designer of the campus, defines his project as an open system mega-structure for bringing mobility to the campus users both on physical and social circumstances. However, the system differs from a mega-structure by bringing the matrix system both on vertical and horizontal dimensions. If all the faculties would be on the same flat and on the same horizontal axis than it would have been a mega-structure. But here, all the faculties constitute a different place on the horizontal plan, this is against the principles of mega-structures. That is the reason why for this system mobility is the only solution for a student to communicate with his surrounding. On the other hand primary relations of certain uses such as residential units and socialization areas become apart from each other, this weakens the students mobility and flexibility between the various floors.



**Figure 3.45. The Existing Plan of Tougaloo University.(Kortan,E.1978.p 218.)**

Lethbridge University is a mega-structural example which differs from Tougaloo University. It is a vertical grouping example for that all of its activities are united in only one structure. It is not composed on a horizontal character, in which the system has open areas between the quads of the faculty buildings. It is a completely closed structure. It covers less space on horizontal dimension than on vertical dimension. On the other hand, residential units are not constructed within the same structural grid in Lethbridge University, whereas in Tougaloo University residential units are constructed in a different structural grid on top of the northern and southern sides of the academic units. Lethbridge University structure is not available for macro and micro growth and keeps students away from nature. In Tougaloo University site conditions are available for macro and micro growth between the quads of the campus. It also unites students with nature by locating communal units close to the ground floor. As a result Tougaloo University is much more appreciated rather than a mega-structural example Lethbridge University.



**Figure 3.46. Schematic Plans of Tougaloo and Lethbridge Universities.**

In this chapter mainly various types of campus patterns either applied or proposed are determined according to a new classification system. At present eight types of campus patterns are defined in relation with their city models. In this classification system first of all, the required design and planning conditions for each one of the campus pattern are explained. Then the matching city model for each campus pattern are analyzed. Finally each given type is resulted with an existing or proposed university example.

In addition to them, the major accessibility criteria which were determined in the previous chapter are applied on these campus patterns in order to provide the ideal circumstances for pedestrians. During that process it is noticed that all of these accessibility criteria were not valid for some of the campus patterns. This is because these campus patterns such as, molecular type of expansion , vertical grouping and megastructural grouping consider special characteristics that they have rigid design structures.

On the other hand, it is also noticed that some of the campus patterns are appropriate to apply all of the four accessibility criteria. These campus patterns are found as, the ones with linear type of expansion , radial type of expansion , grid type of expansion , scattered type of expansion and horizontal zoning. So it can be stated that these campus patterns which are more flexible on their land use plans in applying these accessibility criteria should be more appreciated.

In the following chapter the efficiency of these campus patterns due to the changing circumstances will be analyzed on the existing Turkish Universities by the help of a survey study. The success of each campus pattern will be investigated according to the present circumstances. Besides that university education in Turkey will be compared with the developing countries.

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## CHAPTER FOUR

# A SURVEY OF EXISTING TURKISH UNIVERSITIES

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### 4. Method Employed on the Survey.

This chapter takes into consideration existing Turkish universities by analyzing their present circumstances through a survey. The main idea of following such a survey is that there has been a rapid increase on the establishment of new universities up to present. Especially after 1992, the government incitements both on the private attempts of foundational institutions and on the regional development programs had effected this acceleration. "Today the total number has reached up to 71." (YÖK. 1997. P. 45.) The statistical findings show that each one of all these new universities and technology institutes that were built within a short period of time, have performed divergences on educational programs and on their reflection to the physical structure of their campus sites.

This situation puts forth some basic deficiencies of Turkish higher-education system. When it is compared with the educational planning programs of other societies, it is come acrossed that all of them have established specific institutions. These institutions can control the quality on higher-education and the establishment of new universities by taking major decisions on the design phases of the physical structure of a proposed university. As an example German Government has established the Higher Education and Planning Institute of Stuttgart University since 1962. It serves as a directory institution on planning and design of higher-educational buildings. Unfortunately there is not such an autonomous structure, which may guide the government planning institution in our country. The absence of such an institution, which emphasizes particularly the spatial requirements of universities, stands as the major physical planning problems of university settlements in Turkey.

Therefore a general comparison on the present approaches of campus design concepts is necessary in order to measure the effectiveness of existing campus patterns in creating livable environments for university population. Among the 71 established universities 12 are: University of Yeditepe, University of Maltepe, University of Sabancı, University of Haliç, University of İstanbul Kültür, University of Kadir Has, University of Çağ, University of Doğuş, University of Çankaya, University of Beykent, University of Bahçeşehir and University of Atılım were not taken into consideration in the survey. These universities started to give education in the academic year of 1997-98. Most of their major faculties and institutes have not yet opened. Their academic staff number and student population therefore cannot be determined definitely. On the other hand, the survey was conducted in 1997 the year before these universities were established. Consequently the survey comprises of 59 universities which were established before 1997. Here, it is mainly aimed to make general optimization and standardization on the design and accessibility criteria of campus settlements by the help of the findings of this survey.

#### **4. 1. Evaluation of the Survey Questions from Question 1 to Question 5.**

The evaluation of the survey, aims to put forth whether these selected 59 universities are successful or not on satisfying the physical requirements of an ideal campus. The survey, which is comprised of 14 questions, is based on the findings of the present conditions of these universities. The findings of the questions are discussed in relation with the divergent conditions of each university campus. For showing statistically the results of each question percentages were used to explain the positions of the universities among the total. Most of the questions are analyzed in separate tables. Only the questions, which are related with each other are classified under the same major tables.

Apart from the given 14 questions of the survey, photocopies of the existing or proposed campus plans of each university were asked at a scale of 1/2000 or 1/1000. The campus plans are required to support the survey results because the questions of the survey after the fifth question are related with the universities which

have only one permanent campus site that is existing or to be established in the near future. So the survey study which considers the questions from 1 to 5 is defined as the first of the evaluation of the results of the study. By measuring the locational distances in horizontal direction between major facilities in each of these campus plans, the required design and accessibility criteria are investigated among the campus settlement in Turkey.

**4.1.1. Question 1:** The organization of the faculty buildings in the university.

- A) They are all located within a major campus site.
- B) Most of them are located within a major campus site but some of them are scattered around the region.
- C) There is no major campus site; instead they are collected in multiple campuses that are scattered throughout the region.

**4.1.2. Question 2:** Type of the educational hinterland the university is located.

- A) It is located at a metropolitan educational hinterland.
- B) It is located at an urban educational hinterland.
- C) It is located at regional educational hinterland.
- D) It is located at sub-regional educational hinterland.

Questions 1 and 2 are continuations of each other. They both search out the locational characteristics of the universities established before 1997. The findings of the questions are given in two categories on table 4.1. First category, which represents Question 1, is placed horizontally on the table. It classifies the universities in two columns according to the distribution of their academic units.( See Table 4.1.)

A).First column considers two types of universities in Turkey. They are those, which already have one major campus and those which aim to collect their distributed academic units in one main campus in the near future. These campuses are either to be established or under construction. The aim of grouping these two types of universities in one column is that all of them share the desire to establish their university according to principles of a major campus environment. Their

their university according to principles of a major campus environment. Their common goal is important for the survey because it searches out the present conditions and the success of these campus settlements in Turkey.

B). The second column on the other hand considers two types of universities which share a common problem. They do not provide the ideal circumstances of a major campus concept at present. First are the universities that have more than one major campus site and in addition to that, some of the academic units are distributed at different parts of the region. Others are the universities, which have no major campus site, all of the units are distributed throughout the region. These universities do not have the goal of collecting their academic units under a main campus. The second category, is represented by Question 2. It is placed on the vertically on the table. It classifies universities into four columns according to their education hinterland. By means of educational hinterland, it is tried to emphasize the settlement characteristics of the area that the university is located in. They are defined as below:

- A) Metropolitan education hinterland.
- B) Urban education hinterland.
- C) Regional education hinterland.
- D) Sub-regional education hinterland.

When the columns of the two categories are crossed with each other in the table, the following results are found. The numbers of universities, that are located in metropolitan education hinterland, are 23. 13 out of 23 universities have existing or proposed major campuses, whereas 10 out of 23 have distributed multiple campuses. The ratios show that the desire of planning either one major or multiple campuses seem to have close percentages between each other in metropolitan settlements. Among the ones, which have one major campus, there are the ones, which were established in 1960's as regional universities. However, rapid increases on population ratios, have led most of the urban settlements to expand to the outer parts of their city. So these settlements become congested in the middle of the city. Other universities with permanent campuses are mostly designed in limited and compact areas, they are not successful on the spatial organization of a campus life. On the



other hand, the universities, which are distributed to the various parts of their city, are mainly planned to overcome the transportation problems of the students in metropolitan settlements.

The numbers of universities, which have urban education hinterland, are 8. There are 5 out of 8 universities in this column which have existing or proposed major campuses. The other 3 have no specific campus site. Their academic units are distributed within the various parts of the urban settlement. The ratios show that there is uncertainty on deciding whether the university should have one major or multiple campuses. These universities' education hinterland, the urban education hinterland, is effected by sub-regional and metropolitan settlement planning decisions. But nonetheless, there is a demand on performing a major permanent campus rather than distributing the academic units. As the population of these settlements increase they become more like metropolitan settlements and these universities with major permanent campuses decentralize to the various parts of the settlement rather than collecting at one place.

The number of universities which are located in a sub-regional education hinterland are 24. There are 17 out of 24, which are planned as one major campuses. These universities have provided the needed campus environment whereas 7 universities have distributed campuses. This is mainly because these universities are in close relationship with the urban settlements around them. On the other hand 3 out of 4 universities that are located in regional educational hinterland have one permanent campus site, which is afforded for developing regions. All these ratios point out that regional education hinterland develop the universities as some kind of attraction that may be effective on the social, cultural and economic circumstances of the region. (See Table 4.1.)

Table.4.1. The Location of the Existing Turkish Universities According to Their Education Hinterland

	Universities Considered In The Survey.	The Organization of their campus settlements.	
		The Universities which have one major campuses either established or under construction.	The universities which have no major campus, instead multiple.
Metropolitan education hinterland	Bilkent University	*1	
	Başkent University	*1	
	Galatasaray University	*1	
	Fatih University	*1	
	Boğaziçi University	*1	
	M.E.T.Ü.	*1	
	Ege University	*1	
	Uludağ University	*1	
	Cukurova University	*1	
	Mimar Sinan University	*1	
	Koç University	*1	
	Izmir Technology Institute	*1	
	Biği University	*1	
	Istanbul Technical University		*
	Işık Technical University		2
	Istanbul University		3
	Yıldız Teknik University		6
	Ankara University		3
	Hacettepe University		2*
	Gazi University		3
	Marmara University		13
	Dokuz Eylül University		8
	Akdeniz University		3
Pamukkale University	*1		
Celal Bayar University	*1		
Cumhuriyet University	*1		
Karadeniz Technical University	*1		
Balikesir University	*1		
Anadolu University		3	
Trakya University		4	
Çanakkale Onsekiz Mart University		X	
Kocaeli University	*1		
Mağla University	*1		
Erciyes University	*1		
Mersin University	*1		
Sakarya University	*1		
Selçuk University	*1		
Niğde University	*1		
İnönü University	*1		
GaziOsmanPaşa University	*1		
Gaziantep University	*1		
Firat University	*1		
Abant İzzet Baysal University	*1		
Kırkkale University	*1		
Gebze Technology Institute	*1		
Kaifas Technology Institute	*1		
Ondokuz Mayıs University	*1		
Kahramanmaraş University	*1		
Mustafa Kemal University		2	
Süleyman University		11	
Osman Gazi University		3	
Afyon Kocatepe University		2	
Zonguldak University		5	
Dicle University		X	
Dumlupınar University		2	
Harran University	*1		
Yüzüncü Yıl University	*1		
Atatürk University	*1		
Adnan Menderes University		2	
Reg. Edu. hinterland			

#### 4.1.3. Question 3: The present student population of the university.

The question investigates the effects of student population ratios on designing either one major campus or multiple distributed campuses. The findings of this table, Table.4.4, are evaluated in two phases. First phase takes the ratios of student population, which have one major existing or proposed campus. The total numbers of these universities are 38. Their student population ratios vary as the following;

**Table 4.2. Student Population Ratios among 38 Universities with One Major Existing or to be Established Campus Site.**

Universities with one major existing or proposed campus	Student Population Ratios	Their Percentages to the Total.
14 out of 38 University	1,000-5,000 People	36 %
10 out of 38 University	5,000-10,000 People	26 %
4 out of 38 University	10,000-15,000 People	10 %
3 out of 38 University	15,000-20,000 People	7 %
2 out of 38 University	20,000-25,000 People	5 %
3 out of 38 University	25,000-30,000 People	7 %
1 out of 38 University	30,000-35,000 People	2%

Consequently it can be stated that as the student populations increase, the number of universities with one major campus decreases. This is because control and administration of the campus facilities becomes harder in high student capacities. As an example the control of the campus life and the effective education in a campus settlement requires additional networks above 15,000 people. This value which demonstrates the ideal population of Small City settlement in the Medieval Period gives the ideal standards for campus population. By the help of the vehicular or ring connections within the campus site this ratio may hardly increase up to 30,000 people. Among the 38 universities none has a population which exceeds 30,000 people. On the other hand 28 out of 38 universities (75 percent) have student population ratios between 1,000-15,000 people. It is interesting that most of these universities are located in sub-regional education hinterland. On the other hand

universities which have more than 15,000 people are located in metropolitan or urban settlements. Here the student demand of the region is an effective factor .

Therefore it can be stated that Turkish planners are successful on applying the ideal campus population standards on these campuses. The second phase of Table.4.4 takes into consideration the student population ratios of the universities, which have distributed, multiple campuses with some additional buildings scattered around the region. Among these 21 universities the ratios vary as the following:

**Table 4.3. Student Population Ratios of the Universities which have Distributed Multiple Campuses.**

Universities with Multiple Campuses.	Student Population Ratios	Their Percentages to the Total
2 out of 21 University	1,000-5,000 People	9 %
3 out of 21 University	5,000-10,000 People	14 %
3 out of 21 University	10,000-15,000 People	14 %
2 out of 21 University.	15,000-20,000 People	9 %
1 out of 21 University	20,000-25,000 People	4 %
1 out of 21 University	25,000-30,000 People	4 %
2 out of 21 University	35,000-40,000 People	9 %
1 out of 21 University	40,000-45,000 People	4 %
1 out of 21 University	45,000-50,000 People	4 %
2 out of 21 University	55,000-60,000 People	9 %

Among these universities with distributed multiple campuses student population ratios vary between 1,000-60,000 people. These ratios vary between 1,000-30,000 people for universities that are located in sub-regional and urban settlements. On the contrary these ratios vary between 30,000-60,000 people for the universities that are located in metropolitan settlements. This is because there is a demand on university education in big settlements and that auto control mechanisms are more developed in metropolitan settlements. The administrative systems of the universities are distributed to more than one central place to keep up with control.

( See Table 4.4.)

Table 4.4. Student Population Ratios of Turkish Univ. with Single Major or Multiple Distributed Campuses.

Existing Universities	Student Population Ratios													
	1,000	5,000	10,000	15,000	20,000	25,000	30,000	35,000	40,000	45,000	50,000	55,000	60,000	
Bogaziçi University	■													
Mimar Sinan University	■													
Başkent University	■													
Fatih University	■													
Galatasaray University	■													
Muğla University	■													
Gaziantep University	■													
* Gebze Y.T.Ü	■													
* Izmir Y.T.Ü	■													
* Kahramanmaraş S.İmam University	■													
* Kafkas University	■													
* Kırıkkale University	■													
* Koç University	■													
* Bilgi University	■													
Izmit Baysal University	■													
Bilkent University	■													
Celal Bayar University	■													
Gazi Osman Paşa University	■													
Harran University	■													
Yüzüncü Yıl University	■													
İnönü University	■													
Sakarya University	■													
Pamukkale University	■													
* Balıkesir University	■													
Cumhuriyet University	■													
Fırat University	■													
Niğde University	■													
Kocaeli University	■													
Çukurova University	■													
Erciyes University	■													
M.E.T. University	■													
Karadeniz Technical University	■													
* Ondokuz Mayıs University	■													
Atatürk University	■													
For University	■													

Universities which have one major campus, either established or under construction

#### 4.1.4. Question 4: Numbers of Staff in Turkish Universities

The Question demonstrates total number of students per academic staff by type of university settlements' in a major table, Table 4.6. by the help of the two determining factors. First determining factor searches out the effects of the locational characteristics of universities on their student/staff ratios. Second determining factor on the other hand searches out the effects of distributing or uniting the university buildings on the university's student/staff ratios. In order to compare present ratios of universities with different characteristics, the average value for total student population per total academic staff is calculated. Total academic staff, which is comprised of academicians, instructors and lectures, is found as 52744 and the total number of university student population is found as 1,213,165 by the academic year of 1996-1997. The average ratio of students per academic staff is 23. However the ideal standards on student/academic staff ratios are different in developed countries. Table below gives the general average ratios of some developed countries by 1995 and Turkey by 1997.

**Table 4.5. Student/Staff ratios in higher education institutions of developed countries.(1995)**

Name of the country + University	Ratios on student/academic staff (instructor+lec+aca)	Ratio of students by members of academic staff.
Barcelona University (Spain)	20	137
Rene Descartes University (France)	18	170
Manchester University (England)	13	143
Helsinki (Finland)	11	116
Wien University (Austria)	8	108
Japan (General)	19	65
Turkey (General)(1997)	23	69
Average ratios	16	120-130

Source: UNESCO Statistical Yearbook 1995, pp. 316-322.

This table shows that the average value for the number of students per academic staff in the developed countries is 16. On the other hand the ideal value that is determined by the Turkish University Organization, YÖK, is accepted as 15. For the evaluation of question 4, Turkish standard value will be the base for Turkish universities.

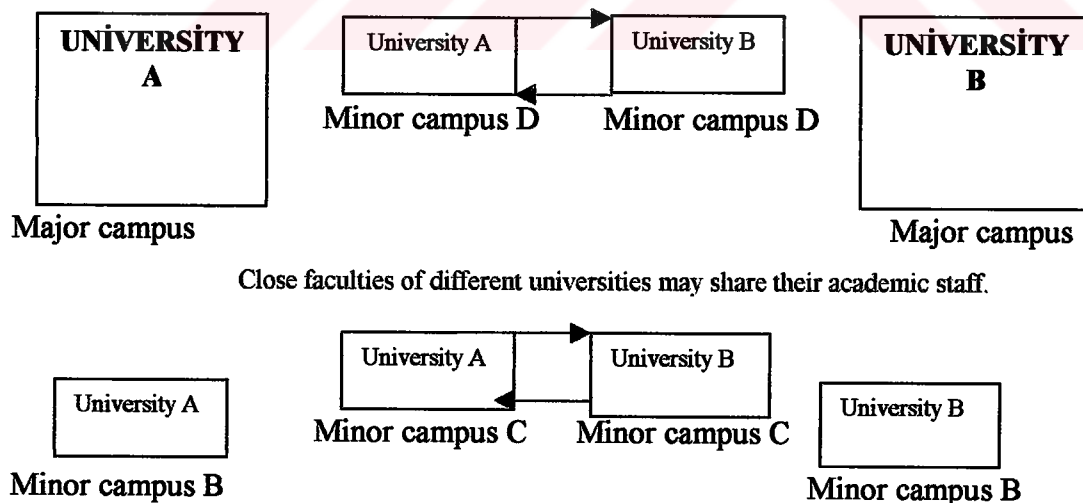
All the findings of the universities related to their student / academic staff ratios are shown in Table 4.6. The number of universities which exceed 15 students per staff limit vary according to their education hinterland in the table. Among the universities located in metropolitan education hinterland, mostly the ones, which have distributed multiple campuses, exceed the limit. However among the universities located in urban education hinterland almost all have either one major campus or distributed multiple campuses exceed this limit. This is due to their settlement conditions. These universities are located in rather small and developing urban settlements and the universities cannot provide the required conditions completely. The same problem is encountered among the universities that are located in sub-regional education hinterland. They do not provide the required number of academic staff for students. This ratio increases in the universities, which have one major campus settlements. This is because it may be harder to collect academic staff under one main campus where distance increases between the city centers and the campus.

To overcome this required staff problem among the universities established in sub-regional and regional settlements first of all, a university should not be established in various scattered places throughout the region. Instead of establishing distributed campus buildings, centralization of higher education on a major campus site should be appreciated in such small and developing settlements. In addition to that it is not economical to establish staff lodgings in each distributed campus site of a proposed university.

Secondly the proposed academic curriculum of the new established universities that are located within the same sub-regional or regional settlements

should be controlled by the higher education organization (YÖK). If universities are located close to each other, and if there are not enough academic staff for specific academic programs then one of these two universities should not open that academic program. Instead it may open another academic program which is not opened in the other universities. By this way each university may both specialize on different branches of education and provide the required academic staff in their major campus.

Thirdly, when there is a desire of distributing academic units of the university to encourage the development of these settlements, then again the same education planning concept should be followed. It is that a university should not open the same academic programs in the scattered areas that are located close to the scattered buildings of another university. They should be in coordination with each other to establish different branches of departments in the scattered campuses of two universities that are located close to each other. Then it may be harder to find the same numbers of academic staff on the same specific branch in each university. (See Table 4.6.)



**Figure 4.1 Division of Major Specific Programs between the Campuses of Neighbor Universities.**



**Table 4.6. Student/Staff population ratios in the institutions of higher-education in Turkey by 1997.**

	Names of the University,	Ratios on universities with one major existing or proposed campuses	Ratios on universities which have distributed multiple campuses.
	Bogazici University	15	
	Mimar Sinan University	9	
	Baskent University	4	
	Fatih University	8	
	Galatasaray University	7	
	Bilkent University	10	
	M.E.T.Ü.	7	
	Ege University	11	
	Uludağ University	20	
	Çukurova University	15	
		11	
	Koc University	10	
	Izmir Technology Institute	13	
	Bligei University	44	
	İstanbul Technical University		32
	İşık Technical University		10
	İstanbul University		18
	Yıldız Teknik University		16
	Ankara University		10
	Hacettepe University		7
	Gazi University		13
	Marmara University		19
	Dokuz Eylül University		19
	Akdeniz University		9
	Pamukkale University	10	
	Celal Bayar University	19	
	Cunhüyükel University	12	
	Karadeniz Technical University	19	
	Balikesir University	20	
	Anadolu University		445
	Trakya University		17
	Canakkale Onsekiz Mart Univ		17
	Kocaeli University	20	
	Mağla University	23	
	Erciyes University	18	
	Merisn University	25	
	Sakarya University	19	
	Selçuk University	23	
	Niğde University	24	
	İnönü University	20	
	Gazi/OsmanPaşa University	15	
	Gaziantep University	10	
	Firat University	11	
	Abant İzzet Baysal University	20	
	Kırıkkale University	9	
	Gezeze Technology Institute	12	
	Kafkas Technology Institute	5	
	Ondokuz Mayıs University	23	
	Kahramanmaraş University	10	
	Mustafa Kemal University		24
	Süleyman Kemal University		23
	Osman Gazi University	7	
	Afyon Kocatepe University		21
	Zonguldak University		21
	Dicle University		10
	Dumlupınar University		29
	Harran University	13	
	Yüzüncü Yıl University	11	
	Atatürk University	6	
	Adnan Menderes University	8	

\* The numbers colored in red represent the ratios that exceed the defined average ratio for Turkish Universities

**4.1.5. Question 5: Numbers of academic institutions in the universities.**

- A) ..... number of faculties.
- B) ..... number of undergraduate schools.
- C) ..... number of institutes.

The question analyzes the relations between the increase in the number of faculties, institutes and undergraduate schools in the universities and the desire of collecting these units under major campuses. First of all, the findings of the existing universities are classified in two categories in the table as the ones that have one major campus existing or under consideration and the ones that have distributed multiple campuses. Then it is accepted that the number of faculties, institutes and undergraduate schools increase as the student population increase in a university. However, the max and min numbers of each one in each university varies in the two categories. The ratios of the 38 universities in the first category vary as the following in Table 4.7.

The numbers of faculties are between 3-13 in each university.

The numbers of institutes are between 1-25 in each university.

The numbers of undergraduate schools are between 3-27 in each university.

The ratios of the 21 of universities in the second category vary as the following in Table.4.7.

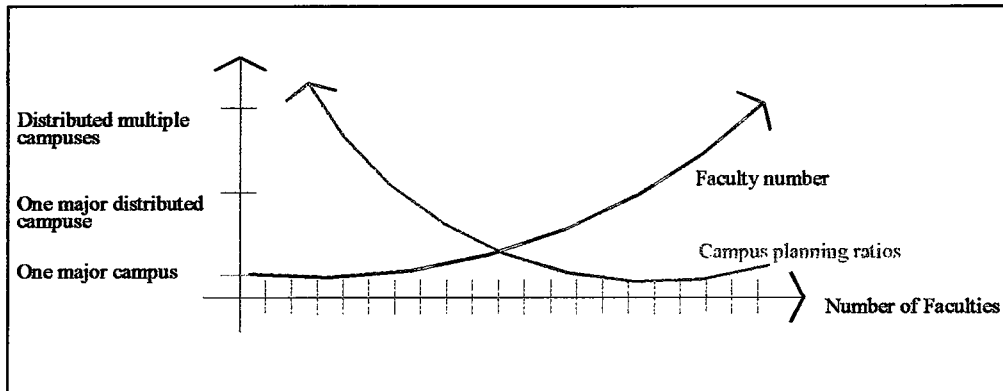
The numbers of faculties are between 2-23 in each university.

The numbers of institutes are between 5-21 in each university.

The number of undergraduate schools 2-17 in each university.

In addition, the average value according to the sum of the total universities per university varies in each category. Among the universities with one major campus the average number of faculty per university is given as six faculties. This value increases to nine faculties per university in the second category. It can be stated

that as the number of faculties per university increase the desire of establishing one major campus decreases.



**Figure 4.2. A Schematic Diagram on the Proportions between Campus Planning Ratios and the Faculty Members.**

It is interesting to notice that the average numbers of institutes per university are always higher than the average number of faculties per university in each category. This shows that institutes, which mostly consider the highest number of academic units and programs in a university, play an important role on the improvement of interdisciplinary education between the faculties. This interdisciplinary relationship between the faculty and the institute is effected from the organization of the academic units in the campus settlement. This means that the required accessibility distances for a pedestrian should be provided between these building types in the campus. Therefore in establishing a campus settlement either distributed or not, the location and the number of institutes should be taken into consideration.

On the contrary, if the locational characteristics of the universities which exceed the given average values for faculties, institutes and undergraduate schools are analyzed in each category, then one may come across numbers which are also related with the type of their education hinterland. As an example, among the 38 universities which are established on one major campus, 13 exceed the average values for number of faculty, institute and higher education schools / university. Most of these 13 universities are located in either sub-regional or regional education

hinterland. This shows that most of the new established universities in developing settlements follow the same academic curriculum, consequently they open same amount of similar academic units in their campuses.

However this creates a problem on the unemployed graduates on similar branches. In addition, designers try to increase the total space of the campus in order to follow highly dense academic programs and to establish too many faculties and institutes within the same campus site. This congestion creates problems on the accessibility of a pedestrian to a specific area in the campus. Because as the total space of campus site increases, it takes more than 10-15 minutes for the accessibility of a pedestrian walking on average speed.

Among the 21 universities, which have either multiple, distributed campuses, 10 of them exceed the average value for the number of faculty, institute and undergraduate school per university. Most of these 10 universities are located in metropolitan settlements.

As the number of the academic units increase in distributed places of a university which are located far away from each other, their control and administration becomes harder. Therefore, at least some of these distributed units should be collected under minor campuses that are specified on major branches of higher education. ( See Table 4.7.)

#### 4.2. Evaluation of Survey Questions from Question 6 to Question 14.

The evaluation of the survey between questions 6 and 14 considers the 38 Turkish universities which have one major campus either existing or under construction. This is because these questions in the survey investigate campus planning and design principles in each present campus. Main object of comparing their present conditions is to measure the success of Turkish universities on providing the ideal design and accessibility criteria on campus planning concept. In order to answer these questions, the campus plans with a scale of 1:1000 or 1:2000 were provided from these universities. Then the findings of each measured campus are listed in the tables of the related questions. Among the universities, which have not sent their existing campus plans, some of them were visited and this measurement system was done by the researcher.

##### 4.2.1. Question 6: Type of the campus pattern adapted for the existing or proposed campus site of the university.

- |   |  |
|---|--|
| A) Linear type of campus pattern with         | a.a. Compact density<br>a.b. loose density |
| B) Grid type of campus pattern with           | b.a. Compact density<br>b.b. loose density |
| C) Scattered type of campus pattern with      | c.a. Compact density<br>c.b. loose density |
| D) Radial type of campus pattern with         | d.a. Compact density<br>d.b. loose density |
| E) Molecular type of campus pattern with      | e.a. Compact density<br>e.b. loose density |
| F) Horizontal zoning of campus pattern with   | f.a. Compact density<br>f.b. loose density |
| G) Vertical zoning of campus pattern with     | g.a. Compact density<br>g.b. loose density |
| H) Mega structural grouping of campus pattern | h.a. Compact density<br>h.b. loose density |

**4.2.2. Question 7:** Existing conditions of the university campus on the requirement of accessibility distances for a pedestrian between the center and the farthest edge in less than 10-15 minutes walking period.

- A) Yes campus provides the required conditions. They are located in less than 10-15 min walking distance in horizontal direction.
- B) No, campus does not provide the required conditions. They are located in more than 10-15 min walking distance in horizontal direction.

The results of the following questions, questions 6 and 7 were evaluated under one major table, because the findings of question 6 are related to question 7. They are the continuation of each other. Questions discuss the accessibility circumstances of pedestrians in the existing or proposed campuses of the 38 universities in relation with the type of campus pattern and the settlement densities they have selected. These 38 campuses are evaluated under three determining factors in Table 4.8. First determining factor classifies the universities according to their education hinterland and the ones located in either regional or sub-regional education hinterland. The second determining factor represents the Question 6, it searches out the success of various types of campus patterns when they are designed in either compact or loose densities.

Finally the third determining factor which represents Question 7, compares the findings of the two factors with the required accessibility distances of ideal university campuses. As it was explained in Chapter Two there are four accessibility criteria determined from the optimum standards of the pedestrians and from the mid class breaks of students during the teaching hours. Among the four accessibility criteria only one of them is selected to be applied for measuring the accessibility circumstances of these 38 major campuses. This accessibility criteria which defines the 10-15 minutes maximum walking distance for pedestrians who walk with an average walking speed between two distant facilities is effective on all types of campus patterns. This is because it determines the ideal development circles for each campus plan. It helps to measure the required accessibility distances for each

development circle of a campus plan, which accepts the 10-15 minutes average walking distance from the center to the farthest point of a campus settlement.

However the other three accessibility criteria determined in Chapter two are more related with the selected type of campus pattern. Since the arrangements of the major groups of functions may vary according to the principles of each campus pattern these criteria may already be provided on some of the patterns. This means that there is no need to measure these three accessibility criteria on all of the 38 major campuses. Therefore 10-15 minutes average walking period can be accepted as the primary effective criteria on the evaluation of the accessibility circumstances in the following questions. Consequently this criterion which represents the third determining factor on the table measures whether the maximum length of a radius, from the center to the farthest campus facility exceeds the maximum distance of 900meters or 1350meters. In other words it measures whether the major groups of functions in the campus are repeated in every 1800meters or 2700meters diameter in relation with the traffic network in the campus.

By taking these determining factors into consideration, the success of each type of campus pattern with either loose or compact densities on creating accessible campus environment are investigated in relation with the universities education hinterland. The table shows that among these 38 universities, the ones that are located in sub-regional and regional education hinterland have selected linear type of expansion with compact densities and horizontal zoning with either compact or loose densities as their campus patterns. These campus patterns constitute the majority of the most dominant campus settlements in that group. It is found out that both of these campus patterns were successful on providing the required accessibility circumstances for pedestrians only when they are designed in compact densities.

On the other hand, among the rest of the 38 universities that are located in either metropolitan or urban education hinterland, scattered type of expansion and horizontal zoning with loose and compact densities constitute the majority of the selected campus patterns. Although both of the campus patterns are not appreciated

in campus planning, designers were successful to provide the required accessibility criterion in these campuses by locating the campus facilities in compact densities. However, the success of these campus patterns is not the outcome of a conscious planning approach instead it is coincidentally the reflection of the congestion which produced compact densities within the limited spaces of the urban settlements. Even if they provided the ideal accessibility criterion between the farthest points of their campuses, these campus patterns do not give a sense of direction and an axial order to campus settlements. In addition, all campus facilities cannot be defined in these limited spaces. Therefore it can be stated that campus typology is the most effective on providing the accessibility criteria in campus planning. (See Table 4.8.)







#### **4.2.3. Question 8: Total space of the existing or proposed major campus site.**

The question mainly analyzes the relations between the total spaces of universities, which have one major existing or proposed campus and their selected campus settlement patterns. Among these 38 universities that are grouped in the same category 6 universities which are University of Gaziantep, Boğaziçi, Galatasaray, Bilkent and Koç did not send their present campus plans. Therefore the required data on their total space, campus patterns and the densities of their settlement was not obtained for the evaluation and they were not taken into consideration in Question 8.

So, when the findings of the 32 universities are investigated in Table 4.9. it is found out that as the total space of a given campus plan increases, selected types of campus patterns shows divergences. For example in small scale campuses with total spaces between 5000 sq. meters- 2.000.000sq meters, all types of settlement patterns that were adapted into campuses were successful on providing the required accessibility criteria. This was once a necessity in the medieval cities has continued its validity on ideal campus settlements only by the organization of all these patterns in compact densities.

However, it is found out that as the total space of campuses increases up to 13.000.000 sq. meters, some of these settlement patterns become insufficient on providing the required accessibility criteria. This is mainly because those campuses are designed in loose densities related to their space organization. As a result, long walking distances between the academic units and the other groups of functions avoided the development of primary and interdisciplinary relations in these campuses. One thing that is remarkable in this table is that, the universities, which had applied linear type of campus patterns, are the only successful ones on the accessibility criteria.

On the other hand it is interesting to notices that, among the universities which hand total spaces between 13,000,000 sq. meters – 45,000,000 sq. meters the

ones that were successful on providing the required accessibility distances between their major centers, all have common design characteristics on their campuses. In all of them, the designers have combined two different types of campus patterns into each other on the spatial organization of the academic units. This is because, as the total space of a certain campus increases the academic units that are established within a certain pattern become located far away from each other. In order to avoid these scattered academic units designers try to form campus settlements in more compact and coherent densities. Here it is noticed that linear type expansion, which is often the most dominant campus pattern, is mainly combined with two types of campus patterns. They are the horizontal zoning pattern and grid type of expansion.

As a result, the propitiate formula on deciding what type of a campus pattern at what sq. meters should be selected for providing this required accessibility criterion may be given as the following:

\*Between 5,000 m<sup>2</sup>-2,000,000 m<sup>2</sup> = All types of campus patterns with compact densities can be applied.

\*Between 2,000,000 m<sup>2</sup>-13,000,000 m<sup>2</sup> = Only linear type of expansion is the appropriate campus pattern with compact densities can be applied.

\*Between 13,000,000 m<sup>2</sup> – 45,000,000 m<sup>2</sup> = Linear of expansion +Horizontal zoning campus pattern with compact densities or Linear type of expansion + Grid type of expansion with compact densities can be applied.

(See Table 4.9.)

**Table 4.9. Relationships between Total Spaces and Selected Campus Patterns on Providing the Ideal Accessibility Criteria.**

Universities which have one major existing or proposed campuses	Total space of the existing or proposed campuses	Their selected campus patterns	Density of the Settlement	Radius of the campus is less than 10-15min accessibility distance.
Mimar Sinan University	7421 m <sup>2</sup>	Scattered type	Compact	Yes
Fatih University	140,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Karadeniz Technical University	1,000,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Celal Bayar University	1,200,000 m <sup>2</sup>	Linear type	Compact	Yes
GaziOsmanPaşa University	1,200,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Kırıkkale University	1,400,000 m <sup>2</sup>	Linear type	Compact	Yes
Sakarya University	2,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Başkent University	2,200,000 m <sup>2</sup>	Scattered type	Loose	No
Fırat University	2,198,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Niğde University	2,272,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Abant İzzet Baysal University	2,700,00 m <sup>2</sup>	Linear type	Compact	Yes
Muğla University	2,464,000 m <sup>2</sup>	Linear type	Loose	No
Mersin University	3,250,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Kocaeli University	3,300,000 m <sup>2</sup>	Linear type	Compact	Yes
Balıkesir University	3,500,000 m <sup>2</sup>	Scattered type	Loose	No
Kafkas Technology Institute	3,750,000 m <sup>2</sup>	Scattered type	Loose	No
Gebze Technology Institute	4,000,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Ondokuz Mayıs University	4,000,000 m <sup>2</sup>	Horizontal zoning	Loose	Yes
İzmir Technology Institute	4,400,000 m <sup>2</sup>	Horizontal zoning	Loose	No
İnönü University	7,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Yüzüncü Yıl University	8,000,000 m <sup>2</sup>	Scattered type	Loose	No
Selçuk University	10,000,000 m <sup>2</sup>	Horizontal + grid type	Loose	No
Cumhuriyet University	12,000,000 m <sup>2</sup>	Scattered type	Loose	No
Kahramanmaraş University	13,000,000 m <sup>2</sup>	Linear type	Compact	Yes
Uludağ University	16,000,000 m <sup>2</sup>	Horizontal + linear type	Compact	Yes
Ege University	19,000,000 m <sup>2</sup>	Scattered type	Loose	No
Gökurova University	20,000,000 m <sup>2</sup>	Scattered type	Loose	No
Pamukkale University	22,000,000 m <sup>2</sup>	Linear type + Horizontal zoning	Compact	Yes
Harran University	27,000,000 m <sup>2</sup>	Horizontal zoning	Compact	Yes
Atatürk University	32,900,000 m <sup>2</sup>	Scattered type	Loose	No
M.E.T.Ü.	41,000,000 m <sup>2</sup>	Linear type + Horizontal zoning	Compact	Yes
Erciyes University	45,000,000 m <sup>2</sup>	Horizontal zoning	Loose	No
Gaziantep University	*	*	*	*
Boğaziçi University	*	Scattered type	Compact	Yes
Galatasaray University	*	*Scattered type	Compact	Yes
Bilkent University	*	Scattered type	Loose	No
Koç University	*	Scattered type	*	*
Bilgi University	*	Scattered type	*	*

The columns colored in yellow represent the campuses that provide 10-15 min accessibility distance in a development radius.  
\* The required data of these universities are not provided from the survey study.

**4.2.4. Question 9: Accessibility possibilities between the city and the campus site.**

- A) Accessibility by train.
- B) Accessibility by ring system.
- C) Accessibility by private car.
- D) Accessibility by pedestrian routes.
- E) All above.

The question evaluates the alternative circulation networks between the neighborhood settlements and the major campus sites of 38 universities with regard to the accessibility of campus inhabitants. Table 4.10. below gives the findings among the five answers on alternative circulation networks. Here column B gives the required answer in the ideal circumstances. It defines that the university has established a ring network between the city-center and the campus site. The table shows that only 10 from 38 universities, in other words 1 out of every 3 university with existing or proposed permanent campus, have provided the required accessibility criterion between their campus site and their city-centers.

It is interesting that most of these universities are located in either sub-regional or regional education hinterland. This may be related to two major reasons. One of them is that the universities are established in developing regions where the existing social and economical conditions are lower than the urban and metropolitan settlements. So, there is a demand for using public transportation systems such as ring buses and trains. The second major reason is these universities are usually located far away from the city-center of these developing regions and this avoids the use of private car for accessibility.

Ideally the ring networks should be accepted as a part of campus planning process. They should be developed between the universities and the city centers located in metropolitan and urban settlements, too. This is because the ring networks decrease the additional university traffic from the existing transportation systems of the city, which is already congested. (See Table 4.10.)

**Table 4.10. Alternative Circulation Networks Established between the city centers and Their Evaluated University Campuses.**

Settlement hinterland	Universities with one major existing or proposed campuses	Selected answers				
		A	B	C	D	E
Metropolitan educational hinterland	Bilkent University					
	Başkent University					
	Galatasaray University					
	Fatih University					
	Bogaziçi University					
	M.E.T.U.					
	Ege University					
	Uludağ University					
	Çukurova University					
	Mimar Sinan University					
	Koç University					
	İzmir Technology Institute					
Urban educational hinterland	Pamukkale University					
	Celal Bayar University					
	K.T.Ü.					
	Cumhuriyet University					
	Balıkesir University					
Sub-regional educational hinterland	Kocaeli University					
	Muğla University					
	Erciyes University					
	Mersin University					
	Sakarya University					
	Selçuk University					
	Niğde University					
	İnönü University					
	GaziOsmanPaşa University					
	Gaziantep University					
	Fırat University					
	Abant İzzet Baysal University					
	Kırırkkale University					
	Gebze Technology Institute					
	Kafkas University					
Ondokuz Mayıs University						
Kahramanmaraş University						
Regional education hinterland	Harran University					
	Yüzüncü Yıl University					
	Atatürk University					
	Koç University					

\*\*The dashed columns represent the answers of selected universities for question 8

**4.2.5. Question 10: Most dominant circulation network within the university campus site.**

- A) The campus is planned on the basis of a major ring network either by buses or by train. In addition to that there is also vehicular and pedestrian network.
- B) The whole campus is designed for only pedestrian network. No other circulation network is established.
- C) The campus is designed on the basis of both vehicular and pedestrian network where it is needed.

The question analyses the alternative circulation networks that are established in 38 universities, which have existing or proposed major campuses. Table 4.11. below shows the findings of the question in three columns. Each column emphasizes a different circulation network that is dominant on the campus pattern. Column A represents the university campuses which have major ring networks as their dominant circulation system. The number of the universities which have established this system on their major campus are 10 out of 38 universities. It is not a coincidence to notice that most of these university campuses are located in either sub-regional or regional education hinterland.

Due to their locational characteristics they have established ring networks as the major transportation system to and from their city-centers and they continued to adapt the same concept within their campus sites. On the other hand 4 out of 38 universities, which have chosen answer B, are designed according to the accessibility of the pedestrians through the major pedestrian axes in their campuses. The universities total spaces are less than 1.000.000 m<sup>2</sup> and they do not require any other motorized network within their campuses. They are all located in metropolitan education hinterland. In other words, they already have traffic separation in their campuses as it is appreciated. The other 22 universities out of 38 universities that are represented in column C have both vehicular and pedestrian network where it is needed as their dominant circulation systems. (See Table 4.11.)

**Table 4. 11. Alternative Circulation Networks Established within Each Evaluated University Campus.**

	Existing Turkish universities with one major campus sites.	Selected answers		
		A	B	C
Metropolitan education hinterland.	Bilkent University			
	Başkent University			
	Galatasaray University			
	Fatih University			
	Bogaziçi University			
	M.E.T.U.			
	Ege University			
	Uludağ University			
	Çukurova University			
	Mimar Sinan University			
	* Koç University			
	* Bilgi University			
	* İzmir Technology Institute			
Urban educational hinterland	Pamukkale University			
	Celal Bayar University			
	K.T.Ü.			
	Cumhuriyet University			
	* Balıkesir University			
Sub-regional educational hinterland	Kocaeli University			
	Muğla University			
	Erciyes University			
	Mersin University			
	Sakarya University			
	Selçuk University			
	Niğde University			
	İnönü University			
	GaziOsmanPaşa University			
	Gaziantep University			
	Fırat University			
	Abant İzzet Baysal University			
	* Kırkkale University			
	* Gebze Technology Institute			
	* Kafkas University			
* Ondokuz Mayıs University				
* Kahramanmaraş University				
Regional education hinterland	Harran University			
	Yüzüncü Yıl University			
	Atatürk University			
	Total	11/38	4/38	21/38

\*\* These universities' campuses are either proposed or under construction by 1997.



The columns colored in gray represent the answers of the selected universities.



**4.2.6. Question 11: Degree of separation between motorized and pedestrian traffic in the campus site.**

- A) There is a complete segregation between each other.
- B) There is a segregation of vehicular traffic only in the major zones, which are only used by pedestrians.
- C) There is segregation of vehicular traffic only in the academic zone and other areas are accessible by motorized traffic.
- D) There is no segregation between each other; they both use the same circulation axes in the campus site.

The question evaluates the degrees of segregation between motorized and pedestrian traffic in the campuses of these 38 universities. In order to analyze the results of question 11, the findings of the table 4.11. from question 10 should be remembered. In that table it was found out that the universities which had established only pedestrian circulation were already accepted to have traffic segregation in their campuses. Therefore it is decided to follow the evaluation of Question 11 for the rest of the universities in table 4.11. Then these universities are collected in another table, Table 4.12, in question 11 according to their degrees of traffic segregation. The selected answers are given in four columns, then the findings of the table are evaluated in relation with their campus patterns. In table 4.12. colored columns A and B represent the most appreciated traffic segregation of an ideal campus plan for easy accessibility of campus inhabitants. They either provide complete traffic segregation on the whole campus or within each major zone such as dormitories, academic units and recreational units. On the other hand columns B and D represent the least appreciated traffic segregation of an ideal campus plan.

Among the 34 universities which have not established pedestrian circulation in their campuses, the ratios changes at the following: Ratio of the universities which bring complete separation in vehicular and pedestrian traffic are 8% percent of the total ratio of 34 universities. These universities that belong to column A, are all designed in linear type of campus patterns. They are all located in sub-regional or urban education hinterland. Basically they have established loop systems for vehicle

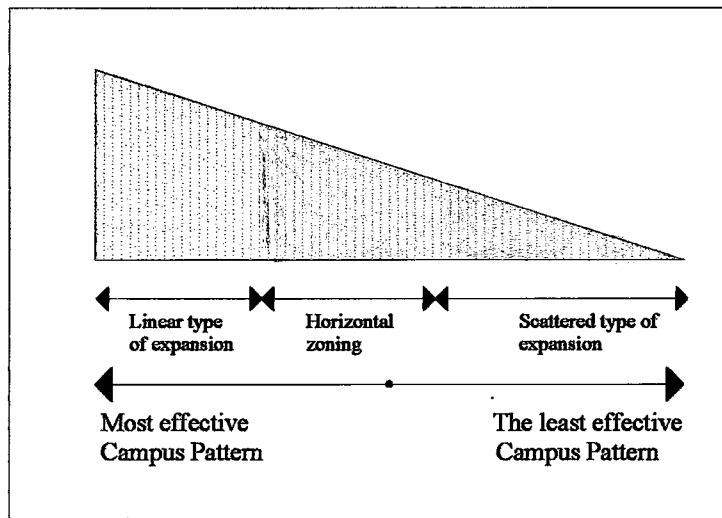
traffic and they have provided continuous pedestrian axes to connect the four major zones. On the other hand by the addition of the ratios the four universities that already have traffic separation their total ratio on providing complete segregation in universities with major campuses increases to 17% percent success.

The ratio of the universities which bring a partial separation in vehicular and pedestrian traffic between the major zones of their campus are 30% percent to the total ratio of the 34 universities. The dominant campus patterns that are selected for this separation between the major zones are linear type of expansion and horizontal zoning. The ratio of universities where vehicular traffic is separated only in their academic zones is 14% to the total 34 universities in the table. The continuity of open spaces is interrupted in recreational, administrative and dormitories units of these universities. This type of traffic segregation in campus planning corresponds to column C in table 4.12. These universities' campus patterns vary between linear type, scattered type and horizontal zoning. However, the obstructions on easy accessibility between these spaces avoid the required environment for pedestrians.

Finally the ratio of universities which have no traffic segregation in their campuses are 40 percent, which means only 14 out of 34 universities. The majority of these universities in column D have the least advised campus patterns. These are the scattered type expansion horizontal zoning. Both of the two patterns do not strengthen neither primary nor interdisciplinary relations among the campus inhabitants. This percentage shows that the majority of the university campuses in Turkey do not have the vehicular and pedestrian traffic segregation.(See Table 4.12.)

After the evaluation of question 11, three types of campus patterns which are, scattered type of expansion, horizontal zoning and linear type of expansion and their combinations, are found to be the only effective patterns that are efficiently to Turkish universities with major permanent campuses. Due to the results of the table 4.12 it can be stated that the success on providing required traffic separation varies according to the density and the type of the selected campus patterns. This means that this success decreases in scattered type of expansion. Horizontal zoning stands in

the middle, due its advantages and disadvantages in campus planning it becomes more effective when it's combined with linear type of expansion.



**Figure 4.3.A Schematic Diagram That Shows the Relations Between Various Types of Campus Patterns and Their Effectiveness on Accessibility Criteria.**

(See Table 4.12.)

**Table 4. 12. Degrees of Traffic Separation within Each Circulation Network of Evaluated Campuses.**

	Universities with one major campus sites.	Selected answers				
		A	B	C	D	Campus pattern
Metropolitan educational hinterland.	Bilkent University				■	Scattered type of expansion
	Başkent University				■	Scattered type of expansion
	Galatasaray Uni.				■	Scattered type
	Fatih University					Scattered type of expansion
	Bogaziçi University				■	Scattered type of expansion
	M.E.T.U					Horizontal zoning + linear
	Ege University				■	Scattered type of expansion
	Uludağ University					Horizontal zoning + linear
	Çukurova University				■	Scattered type of expansion
	* Mimar Sinan Univ.					Scattered type
	* Koç University					Horizontal zoning
	* Bilgi University					Horizontal zoning
	İzmir Technology Inst.				■	Horizontal zoning
	Urban educational hinterland	Pamukkale University				
Celal Bayar University				■		Linear type of expansion
K.T.Ü.					■	Horizontal zoning
Cumhuriyet University				■		Scattered type of expansion
Balıkesir University						Linear type of expansion
Sub-regional educational hinterland	Kocaeli University					Linear type of expansion
	Muğla University					Linear type of expansion
	Erciyes University					Horizontal zoning
	Mersin University				■	Horizontal zoning
	Sakarya University					Linear type of expansion
	Selçuk University				■	Horizontal zoning + grid type
	Niğde University			■		Horizontal zoning
	İnönü University			■		Linear type of expansion
	GaziOsmanPaşa Univ.					Horizontal zoning
	Gaziantep University					Horizontal zoning
	Fırat University				■	Horizontal zoning
	A. İzzet Baysal Univ.				■	Linear type of expansion
	Kırırkkale University					Linear type of expansion
	Gebze Tech Inst.					Horizontal zoning
	Kafkas University				■	Scattered type of expansion
	Ondokuz Mayıs Univ.				■	Horizontal zoning
	Kahramanmaraş Univ.					Linear type of expansion
	Regional education hinterland	Harran University				
Yüzüncü Yıl Univ.				■		Scattered type of expansion
Atatürk University					■	Scattered type of expansion
Total		7	12	5	14	
	10%	8%	35%	14%	40%	

\* Above universities are considered to have traffic segregation already, by applying only pedestrian circulation.

□ Yellow represents the appreciated answers ■ Gray represents not appreciated answers.

**4.2.7. Question 12:** Location of the socialization centers of the university either inside or outside the campus site.

- A) They are all located in a specific zone within the campus site.
- B) Some of them are located inside the campus site whereas the other recreational facilities are located outside the campus site.
- C) They are all located outside the campus site; but within the borders of the city center.
- D) They are all located outside the campus site; but within the borders of the region.

This question asks for the location of major socialization and recreational buildings in 38 universities with existing or proposed campus sites. The question is analyzed under two determining factors. According to these, the findings of the question are listed in two tables. The first evaluates whether the major socialization and recreational units of each university are established within their major campus site or outside. It gives the alternative locations for these building types in each university in four columns in Table 4.13.

Here column A is the required choice for the question, it means the entire major socialization and recreational units are located within the university's major campus sites. So, the universities, which have marked answer A in the survey, are taken into consideration for the evaluation of the second determining factor. They are collected in another table, Table 4.14. The number of the universities that are evaluated in the following table, Table 4.14 are 28 out of 38 universities, which have one major existing or proposed campus, sites.

The second determining factor, on the other hand, analyses whether these socialization and recreational units are located in accessible distance to the specific facilities in these campuses. Here the accessibility distance varies between max. 10-15 minutes period for a pedestrian with an average walking speed according to the traffic separation in each campus. Ideally, it is accepted that major socialization and recreational centers should be in shortest locational closeness with two types of

functions in the campus. They are mainly the academic units and the dormitories. This is because they form the primary relations in the campus sites. When one of them is not accessible within the accepted average walking distances, then students may not use the campus facilities as it is expected to be used. Therefore in the evaluation of the accessibility criteria in Table 4.14 only the socialization units of the universities which are located at most 900meters or 1350meters distances to both of their dormitories and academic units will be considered as successful campuses. The number of these successful campuses in Table 4.14, are only 17 out of 28 universities which have marked answer A from the previous table. This is approximately 50% success on designing the right location for socialization centers among the 38 universities, which have one major existing or proposed campus.

If it is compared with the present number of Turkish universities by 1997, then only 17 out of 59 universities, which means 1 out of every 3 university offer their students socialization buildings located in accessibility distances in a complete campus environment. Another point to be noticed from this Table 4.14. is that most of these successful campuses have linear type of expansion and horizontal zoning as the dominant patterns with the combinations of other patterns. (See Table 4.13. and Table 4.14.)

**Table 4. 13. Analysis on the Locations of the Major Socialization Buildings of Each University by 1997.**

Universities with one major existing or proposed campus sites.	Selected answers			
	A	B	C	D
Mimar Sinan University				
Fatih University				
Bogaziçi University				
Başkent University				
Galatasaray University				
Muğla University				
Gaziantep University				
Gebze Technology Institute				
İzmir Technology Institute				
Kahramanmaraş Sütçü İmam University				
Kafkas University				
Kırırkkale University				
Koç University				
Bilgi University				
Izzet Baysal University				
Bilkent University				
Celal Bayar University				
GaziOsmanPaşa University				
Harran University				
Yüzüncü Yıl University				
İnönü University				
Sakarya University				
Pamukkale University				
Balıkesir University				
Cumhuriyet University				
Fırat University				
Niğde University				
Kocaeli University				
Çukurova University				
Erciyes University				
M.E.T.U				
K.T.U				
Ondokuz Mayıs University				
Atatürk University				
Ege University				
Uludağ University				
Selçuk University				
Mersin University				

Yellow represents appreciated answers  Gray represents not appreciated answers

**Table 4. 14. Accessibility distances of the socialization and recreational buildings to academic and dormitory buildings of the universities that selected answer A in Table 4. 13.**

The universities that selected answer A in table 4. 13.	10-15 min. walking period accessibility criteria		Type of the campus pattern
	Close to the academic buildings.	Close to the dormitory buildings.	
Mimar Sinan University	Yes	Yes	Scattered type of expansion
Fatih University	Yes	Yes	Horizontal type of zoning
Bogaziçi University	Yes	Yes	Scattered type of expansion
Başkent University	Yes	No	Scattered type of expansion
Muğla University	Yes	Yes	Linear type of expansion
Gaziantep University	Yes	Yes	Horizontal zoning
Gebze Technology Institute	No	Yes	Horizontal zoning
İzmir Technology Institute	Yes	No	Horizontal zoning
K.Maraş S. İmam Univ.	Yes	Yes	Linear type of expansion
Koç University	Yes	Yes	Horizontal zoning
Bilgi University	Yes	Yes	Horizontal zoning
Izzet Baysal University	Yes	No	Linear type of expansion
Bilkent University	Yes	No	Horizontal zoning
GaziOsmanPaşa University	Yes	Yes	Horizontal zoning
Harran University	Yes	Yes	Horizontal zoning
Yüzüncü Yıl University	No	No	Scattered type of expansion
İnönü University	Yes	Yes	Linear type + horizontal zoning
Pamukkale University	Yes	Yes	Linear type + horizontal zoning
Balıkesir University	Yes	Yes	Linear type of expansion
Cumhuriyet University	No	No	Scattered type of expansion
Fırat University	Yes	No	Horizontal zoning
Kocaeli University	Yes	Yes	Linear type of expansion
Çukurova University	No	No	Scattered type of expansion
Erciyes University	No	No	Horizontal zoning
M.E.T.U	Yes	Yes	Linear type + horizontal zoning
K.T.U	Yes	Yes	Horizontal zoning
Ondokuz Mayıs University	Yes	Yes	Linear type of expansion
Mersin University	No	No	Horizontal zoning

Yellow represents that the locations of the socialization buildings are accessible.



**4.2.8. Question 13:** Location of the dormitory buildings in the major campus site.

- A) They are located in a specific zone in the campus site.
- B) They are located in the campus site, but they are scattered into different parts of the campus.
- C) University does not have any dormitories established, yet.

The question evaluates the locational conditions of the dormitory buildings among the Turkish universities, which have one major existing or proposed campus. Dormitories, which are considered as one of the four major groups of functions in campus design, represent the private life of campus inhabitants. For this reason, dormitories' maximum locational distance with the other campus facilities on horizontal direction is important on creating a 24-hour university concept. On the evaluation of the present conditions of the dormitories in the 38 universities first of all, the selected answers for the question are shown in Table 4.15. (See Table 4.15.)

Here, column A and column B that accept the location of the dormitory buildings within the campus sites of the universities are the required answers for the question. Column A gives the number of universities which have distributed the dormitory buildings in various places throughout their campus sites. The designers can appreciate both of the answers, however both of them have advantages and disadvantages for the primary relations of the campus inhabitants. The number of universities in column A and B are 32 out of 38 universities. The locational distances of the dormitory buildings of 32 universities to other facilities within their campus site are evaluated in another table, table 4.16. under three determining factors.

By means of locational distances it was investigated whether they were located in the major groups of functions in the campus within the determined average walking distances. This accessibility distance, which will be the basis of the evaluation for table 4.16, had been defined in the previous chapter as max of 10 minutes walking period in campuses with vehicular separation, and as max of 15 min. walking period in campuses with no vehicular separation. Since an average walking speed of a student was defined as 90,75 meters / minute in the ideal

circumstances, then the locational proximity of dormitories to other building groups should be less than 1000 meters or 1350 meters in horizontal distance.

After identifying the accessibility standards for locational closeness horizontally, by measuring the distances between dormitories and their related spaces, the academic units, socialization buildings and the main pedestrian axes in each campus plan, the findings of each column are listed in the table, Table 4.16. Findings of the first column represent the dormitories that are located in accessible distances to the academic units in each campus. Second column gives the dormitories that are located in accessible distances to socialization units and third column gives the dormitories that are located in accessible distance to major pedestrian axes of their campuses.

.After listing the related data to each column in Table 4.16, they are matched with the selected campus pattern for each university that are given in another column. Then, the dormitories of universities, which are located in less than the maximum locational distances to at least two major zones that are relative with them, are accepted to be located at the right places in their campuses. This means that the design criteria on the establishment of each dormitory building in their campuses had been successful in relation with their campus pattern.

The numbers of successful campuses from this point of view are found as 9 out of 32 universities in the table. Most of these successful campuses, except three of them, have linear type of campus patterns, then horizontal zoning pattern follows it. In addition to that, combination of these two patterns also give alternative solutions on locating the campus facilities closer to each other. ( See Tables 4.15. and 4.16.)

**Table 4.15. Analysis on Locations of the Dormitory buildings of Each University.**

The universities, which have major existing or proposed campus sites.	Selected answers for question 13			
	A	B	C	D
Mimar Sinan University				
Fatih University				
Bogaziçi University				
Başkent University				
Galatasaray University				
Muğla University				
Gaziantep University				
Gebze Technology Institute				
İzmir Technology Institute				
Kahramanmaraş Sütçü İmam Univ.				
Kafkas University				
Kırıkkale University				
Koç University				
Bilgi University				
Izzet Baysal University				
Bilkent University				
Celal Bayar University				
GaziOsmanPaşa University				
Harran University				
Yüzüncü Yıl University				
İnönü University				
Sakarya University				
Pamukkale University				
Balıkesir University				
Cumhuriyet University				
Fırat University				
Niğde University				
Kocaeli University				
Çukurova University				
Erciyes University				
M.E.T.U				
K.T.U				
Ondokuz Mayıs University				
Atatürk University				
Ege University				
Uludağ University				
Selçuk University				
Mersin University				

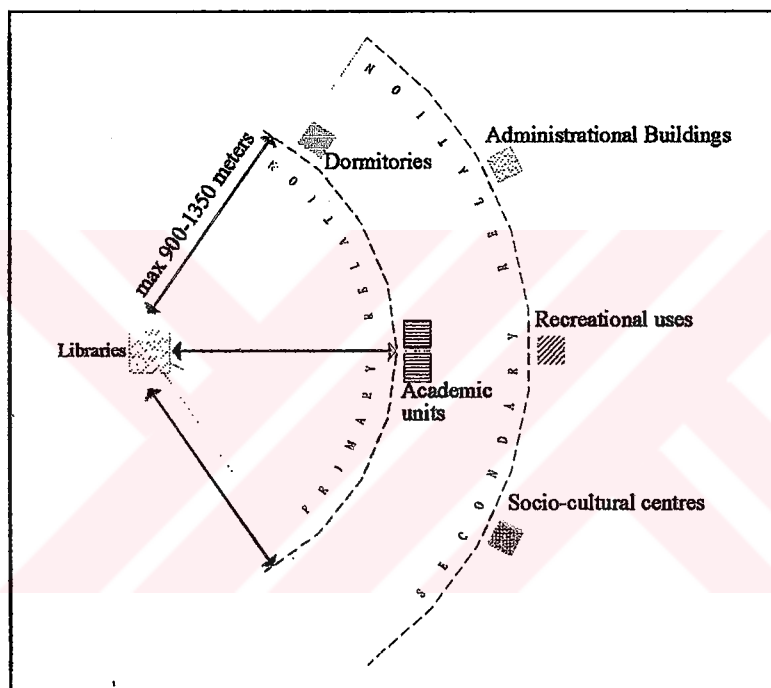
Yellow represents appreciated answers  Gray represents not appreciated answers

**Table 4. 16. Accessibility Distances of the Dormitory Buildings to Basic Spaces on Each University Campus.**

The universities, which have dormitories, located in their campus site.	Locational distance to the academic units	Locational distance to the socialization areas	Locational distance to major pedestrian axes	Type of the campus pattern
Bilkent University				Scattered type
Fatih University				Scattered type
Boğaziçi University				Scattered type
Başkent University				Scattered type
M.E.T.U				Linear + horizontal zoning
Ege University				Scattered type
Uludağ University				Linear type + horizontal zoning
Izmir Technology inst.				Horizontal zoning
Celal Bayar University				Linear type + horizontal zoning
Bilgi University				Horizontal zoning
K.T.U				Horizontal zoning
Balıkesir University				Linear type
Kocaeli University				Linear type
Muğla University				Linear type
Mersin University				Horizontal zoning
Selçuk University				Grid type + horizontal zoning
Niğde University				Linear type + horizontal zoning
Inönü University				Linear type + horizontal zoning
GaziOsmanPaşa University				Horizontal zoning
Gaziantep University				Horizontal zoning
Fırat University				Horizontal zoning
Abant İzzet Baysal University				Linear type
Kırıkkale University				Linear type
Gebze Technology Inst.				Horizontal zoning
Kafkas University				Scattered type
Kahramanmaraş Sütçü İmam University				Linear type
Harran University				Horizontal zoning
Koç University				Horizontal zoning
Atatürk University				Scattered type
Ondokuz Mayıs University				Horizontal zoning
Pamukkale University				Linear type + horizontal zoning
Yüzüncü Yıl University				Scattered type

Yellow represents that the locations of the dormitory buildings are in accessible distances.

Figure below explains the required accessibility distances between the library buildings and other groups of functions schematically. It emphasized that academic and dormitories should be primarily located closer to the libraries. On the other hand administrative, recreational and administrative buildings have secondary importance on their locational accessibility to the libraries.



**Figure 4.4. The Relations between the Libraries and Other Groups of Functions.**

**4.2.9. Question 14:** Location of the library halls in the major campus site of the university.

- A) The university has one main library hall located in the middle of the campus site.
- B) The university has one main library hall located at one side of the campus site.
- C) The university has more than one main library hall; there are minor libraries in almost each faculty building.
- D) The university's central library is located outside the borders of the campus site, located in another area.

In question 14, the library buildings of each university with major existing or proposed campuses are evaluated according to their locational distances to other groups of functions located in their campus site. Here, the maximum locational distances of the libraries to major functions is still accepted as between 10-15 minutes walking period as it was explained before. However in the case of libraries, some groups of functions are more related with libraries as the continuation of 24-hour university concept. These are the dormitories, academic buildings and major pedestrian axes that reach to libraries. Primarily these three spaces should be located in accessibility distances to the libraries the campus. On the other hand, socialization centers recreational areas and administrative buildings do not require direct access to the library buildings, they have secondary relations with libraries.

Since the library buildings are primarily related with three major locations, dormitories, academic buildings and the main pedestrian axes then it is much more realistic to search the locational distances of the libraries of the university campuses which, already consider these spaces within their campuses. When one of these spaces lacks in the campuses then the evaluation cannot be followed on the primary relations of the libraries. In the previous chapter, it was found out that only 32 universities out of 38 universities (with major existing or proposed campuses) had dormitories established within their campuses. Therefore the evaluation of question 14 can only be followed on the 32 universities which have dormitories in their campuses. The other university campuses cannot be taken into consideration because

their dormitories, which are one of the primary relative spaces with libraries, do not share the same campus area with the libraries of their university.

The findings of the locational distances of libraries for the three given spaces of all 32 universities are collected in Table 4.17. The first column represents libraries that are in accessible distances to academic buildings in each campus, where as the second column and the third column represent the libraries that are close to dormitories and the major pedestrian axes. From the table it was found out that only 7 out of 32 university libraries are located in accessible distances to three primary spaces. These universities are University of Uludağ, Celal Bayar, Balıkesir, Kocaeli, Abant İzzet Baysal, Kırıkkale and University of Pamukkale. They have two common features that separate them from the other 25 universities in the table. One of them is the total spaces of these campuses are less than 7,000,000,000 sq. meters which means they have small and accessible campuses.

The other common feature is that linear type of expansion with a combination of another pattern is the dominant campus pattern. Besides that there are 12 university libraries which are located to at least two primary spaces within the accessible distances. These university libraries are also accepted successful on providing the required locational closeness to other units in the campus. This is because by the addition of new library buildings in the campus, which are specialized minor library buildings, these libraries may get closer to these three related spaces. So, totally there are 19 out of 32 university libraries with appropriate locations in their campuses. There are only 13 university libraries, which do not provide the required accessibility to other relative spaces. Then it may be stated among all the 38 universities which have one major existing or proposed campuses only 19 universities, which means one out of every two campuses, can efficiently use their libraries throughout day and night. (See Table 4.17.)

**Table 4. 17. Accessibility Distances of the Library Buildings to Major Spaces on Each University Campus.**

The universities, which have dormitories located in their campus site.	Locational distances to academic buildings.	Locational distances to dormitory buildings.	Closeness to the major pedestrian axes	Type of the campus pattern
Bilkent University				Scattered type
Fatih University				Scattered type
Boğaziçi University				Scattered type
Başkent University				Scattered type
M.E.T.U				Linear type + horizontal zoning
Ege University				Scattered type
Uludağ University				Linear type + horizontal zoning
Izmir Technology inst.				Horizontal zoning
Celal Bayar University				Linear type + horizontal zoning
Bilgi University				Horizontal zoning
K.T.U				Horizontal zoning
Balıkesir University				Linear type
Kocaeli University				Linear type
Muğla University				Linear type
Mersin University				Horizontal zoning
Selçuk University				Grid type + horizontal zoning
Niğde University				Linear type + horizontal zoning
Inönü University				Linear type + horizontal zoning
GaziOsmanPaşa University				Horizontal zoning
Gaziantep University				Horizontal zoning
Fırat University				Horizontal zoning
Abant İzzet Baysal University				Linear type
Kırıkkale University				Linear type
Gebze Technology Inst.				Horizontal zoning
Kafkas University				Scattered type
Kahramanmaraş Sütçü İmam University				Linear type
Harran University				Horizontal zoning
Koç University				Horizontal zoning
Atatürk University				Scattered type
Ondokuz Mayıs University				Horizontal zoning
Pamukkale University				Linear type + horizontal zoning
Yüzüncü Yıl University				Scattered type

Yellow represents that the locations of the library buildings are in accessible distances.



### **4.3. General Results of the Survey.**

After the evaluation of the survey questions replied by 59 universities which were established by 1997, the results of the survey are summarized below. Since the main aim of the survey was to measure the success of each university on campus planning concept, among the 59 universities only 38 universities had one main existing or proposed campuses that will be permanent are taken into consideration for the major table, Table 4.16. The findings of these 38 universities related to the accessibility criteria that are determined from the evaluation for the survey are collected under that table. From the survey accessibility criteria which effect the success of a campus design are grouped in 10 major headings. These are;

1. The accessibility criterion which is related to vehicular and pedestrian segregation in each campus plan, it may be either be complete traffic segregation or separation of vehicular traffic within each zone.
2. The accessibility criterion, which measures the maximum locational distances of socialization units to academic units in each campus,.
3. The accessibility criterion which measures the maximum locational distances of socialization units to major pedestrian axes in a campus.
4. The accessibility criterion, which measures the maximum locational distances of dormitories to academic units in a campus.
5. The accessibility criterion which measures the maximum locational distances of dormitories to main pedestrian axes in a campus.
6. The accessibility criterion which measures the maximum locational distances of dormitories to socialization units in a campus.
7. The accessibility criterion which measures the maximum locational distances of the libraries to academic units in a campus.
8. The accessibility criterion which measures the maximum locational distances of the libraries to dormitories in a campus.
9. The accessibility criterion which measures the maximum locational distances of the libraries to main pedestrian axes in a campus.

10. This accessibility, criterion which searches out whether the campus plan provides accessibility conditions for a pedestrian with an average walking speed with 1300 meters or 1500 meters distances from the center to the edge of the campus settlement. This distance varies between the given measures relating to the traffic separation in the campus.

Each one of these accessibility criteria is represented by the findings in each column. In order to make a comparison in the table, universities which had provided the accessibility criteria are colored in red on each related column, where as the universities which had not provided the accessibility criteria of a certain column are left empty. Then the number of columns that are colored in red, are added to each other in each university and the total number is listed to the end of the table.

The universities, which considered most of the accessibility criteria out of 10, are selected as the most successful campus patterns. As the total number of colors in red decrease, the success of the campus pattern on accessibility criteria becomes less effective. For the generalization, the universities, which provided at least 6 out of 10 accessibility criteria, are accepted to have successful campuses. They are colored in green in the table. There are only 15 out of 38 universities, which provide more than 6 accessibility criteria. They are listed in another table, table 4. 18, according to their degrees of success in campus design.

University of Muğla, Balıkesir, Kocaeli and Middle East Technical University have the most successful campus settlements. They almost provide all the needed circumstances for an ideal campus settlement. There are two dominant patterns in the 15 success campuses, these are linear type of expansion, horizontal zoning of the major functions and the combination of these two patterns with other patterns.(See Table 4.18.)

On the other hand, if 15 universities with successful campus settlements are compared with their student/staff population ratios, which gives the academic quality in higher education system, then it may be possible to find the number of universities

which are successful both on idealized campus settlements and education quality in Turkey.

In the evaluation of question 4, it was accepted that the ideal ratio on the number of students per academic staff should be less than 15 students in order to have the needed quality in higher education. In Table 4.19. the universities which had provided this ratio are colored in blue. There are only 7 universities out of 15 universities with successful campuses that which has this success both on higher education quality and their campus settlements.

These universities are University of Gaziantep, University of Pamukkale, University of GaziOsmanpaşa, University of Koç and Middle East Technical University. Finally it may be stated that out of the 59 universities that are established in Turkey by 1997 only 7 universities provide their students a livable accessible and an ideal campus environment as well as the academic quality on their higher education programs. (See Table 4.19.)

**Table 4. 19. Analysis of the universities which have the most successful campus settlements and ideal academic staff ratios.**

Universities which have most successful campus settlements	Success on the number of accessibility criteria	Number of students Per academic staff ratios	Success on campus design plus aca. staff ratios of the university.
Muğla University	9 out of 10	23 student/staff	
Balıkesir University	9 out of 10	20 student/staff	
Kocaeli University	9 out of 10	20 student/staff	
M.E.T.U	9 out of 10	7 student/staff	Most successful university
Kırıkkale University	8 out of 10	9 student/staff	Most successful university
Koç University	8 out of 10	10 student/staff	Most successful university
Bilgi University	8 out of 10	44 student/staff	
Gaziosmanpaşa University	8 out of 10	15 student/staff	Most successful university
Pamukkale University	8 out of 10	10 student/staff	Most successful university
Uludağ University	8 out of 10	20 student/staff	
Celal Bayar University	7 out of 10	19 student/staff	
Kahramanmaraş Sütçü İmam University	7 out of 10	10 student/staff	Most successful university
Gaziantep University	7 out of 10	10 student/staff	Most successful university
İzzet Baysal University	6 out of 10	20 student/staff	
İnönü University	6 out of 10	20 student/staff	

Dark yellow represents universities that have ideal campuses and aca. staff ratios.

After the evaluation of the survey on existing Turkish Universities , in the next chapter one of the existing Turkish Universities with campus design problems will be analyzed as a case study for the thesis. In this case study it will be aimed to design a redevelopment project for the existing campus site. First of all the existing problems of the campus and the accessibility conditions for pedestrians will be investigated. Then as a continuation of this chapter the findings of the survey which were determined from the existing Turkish Universities such as the most appropriate campus patterns and accessibility conditions for ideal campus settlements will be applied on this selected case study example. The case study will result with the most suitable alternative campus model for Turkish Universities.



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## CHAPTER FIVE

# EVALUATION OF AEGEAN UNIVERSITY AS A CASE STUDY

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### 5. Case Study: Aegean University

Throughout the analytic analysis made in the previous sections briefly the effects of variations in architectural structures of higher-education systems in developed countries were compared. At present the definition of a university concept and the requirements of a university campus are generalized under the principles and criteria of ideal campus design. From this section on however, all the previous chapters will be concluded by the examination of an existing campus from our immediate environment, İzmir. The case study aims to measure all the given design and accessibility criteria and their degree of success in the existing campus settlement. After the comparison of the ideal design and accessibility criteria with the present social, economical and cultural circumstances of Turkish universities, alternative solutions of space organizations, and land-use plans which may be appropriate for Aegean University, will be proposed on the idealized schemes.

#### 5.1. Definition of the Case Study.

In defining the case study problem, it is considered that the selected example should have specific locational features that may be important for its immediate environment. It should also have certain design problems in the campus, so that it would be much easier to make a comparison with the given ideal standards. It is found out that Aegean University is the most suitable campus. So, before determining the major problems of Aegean University in detail, reasons for its choices should be evaluated. They can be stated under six headings as the following;

\* Aegean University is considered as one of the six major Turkish universities, which are identified by having an international statue among the major developed countries' universities.

\* It is unique for having the only major permanent campus, which is located within the borders of İzmir City. Other universities and institutes in İzmir are established at more than one temperate campuses located away from each other.

\* Campus planning concept had first emerged by Aegean University. Since then it has been a model to the other universities.

\* The university was established in 1955, which can be stated as one of the oldest universities after the Revolution Period. It is important on comparing the new government's educational ideals with the ideals of the Western world.

\* The campus was designed under the principles of a regional university concept and the location of the campus site was selected according to these conditions at that time. It was outside the city of İzmir within the fields of Bornova, a suburban settlement close to İzmir. At that time, it was aimed to encourage agricultural studies of the region and first Faculty of Agriculture was established. Through time the total floor-space of the campus site had increased rapidly by the addition of the new faculties. Then as the city-center grew to the outer parts of the city new roads and parcels were opened in Bornova as well as in many other districts and the campus site became congested between those new land-uses. This limited the enlargement of the campus site and created problems in the campus plan, which gave this campus a kind of specialness to evaluate.

\* In spite of many negative locational factors, location of the university creates economy both on time and access for students from the neighborhood settlements. The ease of accessibility had helped the students from different suburbs that are close to this university in Aegean region. This has created an increase on the

student demand, which developed the academic curriculum of the university through time.

## **5.2. Method of the Case Study.**

The evaluation of the case study will be followed by two analytic approaches. After the examination of its present design and planning problems, a synthesis will be made in relation with the future demands and requirements for future changes. Then the first analytic approach will refer to the existing conditions of the campus by proposing a redevelopment project.

As a design principle in the first analytic approach, most of the existing buildings are conserved. However outdoor space uses such as pedestrian axis and traffic networks are redesigned to solve the present problems of the campus. Additional buildings are established where they are required in the plan. The aim of this redevelopment study is to put forth a guide plan during establishing additional facilities on the proper locations of the campus so that the campus inhabitants can reach to these facilities in accessible distances.

The second analytic approach, refers to the idealized conditions of the Aegean University Campus by proposing a new schematic land use plan for the existing academic program within the existing campus site. It accepts the assumption of re-organizing the places of buildings in the whole campus site according to have the most satisfactory physical and interdisciplinary conditions for its academic curriculum. Here it is assumed as the whole campus is empty and brand new land use plan is developed for the existing campus.

## **5.3. Evaluation of the Existing Conditions of Aegean University.**

Aegean University, which considers the largest student population among universities in the Aegean region, was established in 1955. It first gave education on Faculty of Agriculture and on School of Nursing. Then the university continued to give education in all branches until 1982. By that year, some branches were



separated and transferred into the academic program of another university, which was born out of Aegean University. At that time, total student number was 20,607 and academic staff number was 2100. After this separation, these numbers were decreased to 9307 and 1144.

However this ratio had increased up to 30,000 students with an increasing (rate) today. Now, the total academic staff is 2150, total staff is between 6000-7000. Students living in the dormitories are about 6200, which is the 1/5 of the total number. The total floor space of the main campus is a 370 hectare. There are various education programs within the campus such as there are 10 faculties, 11 higher-education schools, 7 institutes, 19 research and application centers and 5 departments.

Apart from the main campus, there are other educational programs that belong to the university, but scattered around Aegean region. These is 38 hectare area of an education and practice station in Mordoğan, a 429 hectare area of research study ranch in Menemen, a total of 1800 hectare area of Fish trap in Urla, Tuzla and Homa regions. An additional campus, which is called the west campus in Çeşme is composed of an area of 12957 square meters. Again there is a research study ranch in Tire-Bergama and Ödemiş regions.

However, the present campus of the university does not provide the idealized circumstances of an effective campus life. Utilization should be made for the present land-uses in the present campus site. A redevelopment on the existing campus facilities may be helpful for utilizing the inactive capacities of the empty spaces in the campus. Before that, an evaluation of the major design problems, which put out the existing conditions of the campus, should be stated as the following;

\*. The university has a scattered type of campus pattern, which impedes continuity and unity of campus life. There is a low built-up ratio in the academic and student housing, and wide-open spaces appear between buildings. As in the most of the scattered type of campus patterns, indoor and outdoor space uses of this campus

lack a basic design concept that is the environmental perception of a campus inhabitant. With regard to the academic load in different disciplines, a certain uneven pattern is noted. As a result, a visitor or a student who is unaware of the main access roads cannot find her path in reaching to certain facilities of the campus.

\*.This scattered pattern does not satisfy the required accessibility criterion, which is defined as 10 minutes of walking. A student walking from the center of the campus to the farthest edge of the campus cannot reach there within 10 minutes. Therefore she cannot improve her socialization and academic relations between interdisciplinary programs. In addition to this, student dormitories are located far away from the center of the campus. Long walking distances between campus facilities and the dormitories do not guarantee the security of the students. This provokes the concept of 24-hour university system.

\*.The establishment of Dokuz Eylül University some administrative and academic buildings within the campus of Aegean University interrupts the continuity of the campus facilities.

Therefore the physical structure of the campus, pedestrian and vehicular networks that connect the units which altogether comprise the campus should be redeveloped for Aegean University. It can be stated that the most suitable campus pattern that may emphasize easy orientation and ideal accessibility criteria is primarily a linear type of settlement in relation with a secondary. (See Map 5.1)

#### **5.4. A Redevelopment Project for the Aegean University.**

The redevelopment project which is explained below can be stated as the most simple, practical and economic method for re-organizing the existing campus with idealized standards of a livable campus. This re-organization method mainly outlines a new guideline for the administrators of the university on gaining more profit from the existing circumstances through a detailed evaluation method. The redevelopment study is basically based on the three design concepts which are applied on the existing plan of Aegean University.

In the first design concept an alternative pedestrian and vehicular network is proposed for ease of circulation instead of the existing pedestrian and vehicular roads. This helps the circulation system of the campus, which is cut into two parts by a major road the Bornova College Road. By this way. It gains continuity and unity throughout the campus site.

Secondly, all the existing buildings that are located in the campus are converted between various academic programs. In order to do those, faculties that require laboratories, lecture rooms or both of these facilities under the same building are determined. Then they are converted with the faculties, which satisfy these conditions for that proposed faculty. On the other hand, while the ones which do not need any locational changes are kept still, some of them are converted to places that are more closer to their relative faculties. This design concept emphasizes the locational closeness of the relative academic faculties in order to encourage interdisciplinary programs between them and to share common academic spaces in the campus.

In the third design concept, on the other hand, the establishment of additional buildings units for some campus facilities which do not satisfy the requirements of the campus inhabitants are proposed. In order to apply the new building proposals on the campus , major accessibility criteria that were determined on the previous chapters are taken into consideration. Then the locational distances of each new unit

to the major groups of functions are measured according to the optimum standards of pedestrians on urban network.

#### **5.4.1. A New Network for the Campus Circulation.**

It is difficult in the absence of trends and patterns to project the needs of the existing campus. As it was mentioned before Aegean University has a scattered type of expansion. One of the most definite problems of this scattered type of expansion is that there is no major network that can be defined in vehicular and pedestrian accessibility and students who enter from the main entrance cannot reach their destination in short and direct roads. The same problem is encountered in the existing plan of the Aegean University. There is chaos in the accessibility system. There are no major pedestrian axis, which can direct the pedestrian movement in the campus. Also parking areas are not defined clearly. These two distinct elements, vehicle and pedestrian traffic, require a system that will make them independent of each other. The system must recognize primary and secondary pedestrian connections between the components of the campus.

In the overall synthesis of the campus by incorporating the existing network wherever possible, new pedestrian and traffic roads were suggested. Before evaluating the proposed network it should be emphasized that the whole campus site is divided into new plots and these are named alphabetically in capital letters in the plan. This is required because it may be much easier to follow the changes that are proposed in each plot. In addition to that it may be helpful for defining the location of each additional facility as a part of a specific plot in the conversion of the academic programs.

First of all, two types of loop systems are established in the existing campus, where each two starts from the main entrance and finishes there. This is mainly because there is more demand of student movement to and from the main entrance, rather than the second entrance, entrance of Aegean University hospital. One of these loop systems is established as an **outer loop**, which can circulate throughout the

whole campus. This outer loop passes through areas that are close to the boundaries and reserved empty spaces. In establishing it, most of the existing vehicular traffic is conserved with some additional road connections.

It starts from the main entrance, turns left after the first junction it continues horizontally in front of the buildings of Natural Applied Science Faculties. It follows the existing road that passes behind the student dormitories. It uses the existing roads of the campus until it reaches the Museum of Faculty of Agriculture. Then it continues by an additional vehicle road, that is proposed to pass on the same horizontal axis, from the middle of the agricultural fields until it reaches the existing road on the other part of the campus. That existing road, which starts in front of the Nursery Vocational School on this same axe, turns right from the T-junction towards Surgery Departments. Then it connects to the main entrance of the campus by the help of the Hospital-Faculty of Medicine road, that is located parallel to the İzmir-Ankara highway.

The main aim of this outer loop network is to provide campus inhabitants continuous accessibility conditions between the farthest points of the campus. Before this loop network, agricultural fields located in the middle of the campus had avoided the accessibility from eastern to western side, which defines a horizontal axe on the lower part of the campus. Some recreational facilities and departments of Faculty of Agriculture on both sides of it enrich this connection of the outer loop, then this may help to create a livable environment, not just a transition area for the pedestrians and drivers.

The other loop network, which is the **inner loop**, mainly gives service to the campus facilities that are located in the middle of the campus site. Similar to the outer loop it starts from the main entrance, it turns left towards the indoor swimming pool, passes in front of the proposed concert hall and turns right downward in a 90 direction to the existing road, that is between Plot K and Plot L. Then it faces Faculty of Textile Engineering and follows the proposed vehicle road on the same parallel axe until it reaches the Nursery Vocational School. There it separates itself from the

outer loop road, it turns to the right side and continues upward through a line that cuts this road in 90 direction, while it passes through the rest of the departments of Faculty of Medicine such as children hospitals and lecture rooms. Then this inner loop turns right in front of the kinder-garden of Faculty of Medicine. After then it connects to a new proposed road which may serve for the inner loop network. The aim of proposing a new road in parallel direction just below the existing minor road which is called the inner road of Faculty of Agriculture and canceling this road is explained as the following;

First of all in the existing site plan the plot which starts from the hospital-Faculty of Medicine road on the northern side and ends towards the southern end of the campus considers only one minor road which passes parallel to the major road above it in a very close distance. From these two roads, the major one is conserved because it forms the outer loop network. On the other hand, the minor one, which is the inner road of Faculty of Agriculture only, serves for a small group of students on that area. It is not a vital road for the campus network. Secondly when this minor road is cancelled then no other pedestrian or vehicular connections exist within 525 meters distance on north-south direction until the proposed loop networks on the southern part of the campus. So the plot is divided into two by replacing this new road as the continuation of the inner loop 175 meters below the major Hospital-Faculty of Medicine road. By this way the proposed plots C and E are enlarged into 175 meters of width. The inner loop network continues in this horizontal direction until it faces the cafeteria of the closed swimming pool. Then it turns and reaches to the main entrance of the campus. It finishes its rotation at this point.

Both of the two loop systems are mainly designed to have easy access for the vehicle traffic and separated pedestrian traffic. On the other hand they provide special parking lots, cul-de-sacs for the drivers. This minimizes the vehicle access into the major zones of the campus. By placing new pedestrian roads and by changing some of the existing roads into new pedestrian roads at strategic locations necessarily exterior spaces can be defined. As an example, proposed loop systems cancel most of the existing vehicular connections between the zones that are located

in the middle of the campus, in north-south direction. Therefore, there is a requirement to define major pedestrian axes that may maintain the pedestrian movement between these two loop systems in 90 vertical direction.(See Map 5.2.)

#### **5.4.1.1. Proposed Pedestrian Axis.**

As the continuation of this design concept, after segregating vehicular and pedestrian traffic by the help of the two loop network, now it is appropriate to re-organize the pedestrian axis according to these loop networks. Proposed pedestrian axes for the existing plan are basically developed at two phases. At the first phase of the pedestrianization process is developed on the north-south directions of the campus, which are the vertical pedestrian axis. At the second phase however this process is developed on the east-west direction of the campus, which are called the horizontal pedestrian axis.(See Map 5.2.)

At the first phase of the pedestrianization process, three present vehicular roads that lie parallel to each other between Plots F, H, J, and K are re-arranged as the major pedestrian axis on vertical direction (north-south direction). These three roads which are cancelled by the establishment of the loop networks are re-designed to connect the pedestrian flow between northern and southern sides of the campus. In addition to them, another pedestrian axis on vertical direction is established between Plots F and D where agricultural fields are located at present. On the existing plan there is a long cul-de-sac that ends in the middle of the fields.

However on the redevelopment plan both of the loop networks are proposed to pass across the agricultural fields to connect the two parts of the campus into each other. Since there is already a proposed vehicular connection that passes just below this cul-de-sac, then this cul-de-sac may be redesigned as a passageway for the pedestrians. As another pedestrian axis on the north-south direction, it is vital for that area because there is no other pedestrian connection in this direction until the Bornova College Road. If this axis would not be established then there would be a long walking distance for pedestrians between the Bornova College Road and the

pedestrian axis that lies between Plots F and H. This pedestrian axis on the other hand may even be efficient on students who walk between the agricultural fields by feeling the natural environment, rather than feeling the monotonous building blocks of the campus.

The idea that stands behind the frequency of establishing four pedestrian axes on vertical direction is that the campus site has an irregular rectangular shape. The east-west development axe is three times longer than the north-south development axe. So there is a need of establishing more pedestrian axes on north-south direction to shorten the distances between each parcel that lie on the horizontal direction.

At the second phase of this pedestrianization process, there is only one major pedestrian axis that is proposed to be established on the east-west direction. This major pedestrian axis is located in the middle of the shortest side (north-south direction) of the campus. It is located between the two loop networks. It aims to connect the two parts of the campus, which is separated by the Bornova College Road. It to provide a continuous and safe walking routes for pedestrians. This linear pedestrian route starts from the existing dormitory buildings of the campus on Plot L. It passes through Plots K, J and H. then after it passes in front of the Cafeteria of Faculty of Agriculture, it connects with the vertical pedestrian axe and rotates downward to the southern side of the campus. It unites with the two loop networks and it continuos on the east-west direction parallel to the loop networks.

The reason for breaking this continuous linear axis downwards when it comes to Plots D and F is that on these parcels there are the Research fields of Faculty of Agriculture. Even though there is already a pedestrian axis that cuts the parcels on north-south direction, there is no need to cut them by another pedestrian axis on opposite direction. This would damage the unity of the parcels. So this major pedestrian axis on east-west direction continuos below the Plots D and F. It ends in front of the Health Services.



Apart from these major pedestrian axes on two opposite directions, a minor pedestrian axis is also proposed on the redevelopment project. This minor axis is designed as a part of the inner loop network, which starts from the main entrance and rotates throughout the campus. Here the pedestrian axis acts like a safety walkway for students. It does not consider squares, kiosks or minor socialization centers on it. Instead it follows the inner loop network and goes parallel to it. But it is separated from it by the differentiation on the ground level. It is higher than the vehicular network on the ground.

#### **5.4.1.2. Pedestrian Bridges.**

As a design principle, the development project proposes to conserve the north-south artery that traverse the university. Therefore, in order to unify the campus and to permit an unobstructed circulation of pedestrian traffic within it, pedestrian bridges should enrich pedestrian axes where the loop networks intersect these pedestrian axes. There are mainly 7 pedestrian bridges that are proposed on the existing campus site in relation with the loop networks. Five of them, which are named as bridge 1, bridge 2, bridge 4 bridge 5 and bridge 6, are proposed to connect the pedestrian flow between northern- southern sides of the campus.

The other two on the other hand, which are named as bridge 3 and 7 are proposed to connect the pedestrian-flow between the eastern and western sides of the campus. All of the pedestrian bridges can be designed as underground bridges or they may be established on an upper level where the vehicular traffic may pass below them. The location of these pedestrian bridges are shown in Map 5.2.



**Table 5.1. Conversion of the academic programs between the existing buildings of Aegean University campus.**

<b>GROUP 1</b>	<b>GROUP 2</b>
<b>The present use of the existing buildings below</b>	<b>The proposed use of the existing building in the first column</b>
Faculty of Pharmacy	Faculty of Foreign Languages
Faculty of Pharmacy	Faculty of Economic & Administrative Sciences
Faculty of Density	Faculty of Computer Sciences
Faculty of Foreign Languages	Computer Research Center
Computer Research Center	Faculty of Pharmacy.
Faculty of Computer Science	Faculty of Dentistry.
Faculty of Economic & Administrative Sciences	The Laboratories of Faculty of Dentistry
Conservation & Wine Units of Faculty of Agriculture	The Laboratories of Faculty of Dentistry.
**	All the Conservation & Wine Units of Faculty of Agriculture are moved to Parcel C.
Dining Hall of Faculty of Agriculture	The Laboratories of Faculty of Dentistry.
**	Dining Hall of Faculty of Agriculture is moved to Parcel C.
**	Administrational Buildings are moved to Parcel I in the campus.
Existing place of the administrative buildings located outside the campus	A guesthouse for foreign academic staff.
All the Buildings of Sept 9 <sup>th</sup> University are Removed from the Campus	No reserved place for the buildings of Sept 9th University.

\*\*The present uses of the existing buildings in group 1 are changed into new uses of academic programs in group 2.

The table above mainly gives the converted academic programs between the present uses and the proposed uses of the existing buildings that are planned to create interdisciplinary building groups. This conversion system brings easiness to the access of the students who take courses from the interdisciplinary faculties and they share the same seminar rooms and laboratories for common courses. It also helps to develop the quality of education by an efficient land-use plan. The academic programs in this table are converted according to basic locational criteria. They are explained as the following.

First of all, the academic programs, which give education on various branches of Health Services, are collected on the western part of the campus. The area separated by the Bornova College Road, which considers Plots A, B, and Plot M is called the Medicine Campus. According to that, Faculty of Pharmacy and Faculty of Dentistry are moved to the western part of the campus, into the present buildings of Computer Research & Application Center and Faculty of Computer Sciences. In addition to them, some of the laboratories of Faculty of Dentistry are moved into the present buildings of conservation units, winery units and social club (local) of Faculty of Agriculture in Plot A.

On the other hand, there is another group of faculties, the various branches of social sciences, which should be located close to each other. These are Faculty of Literature, Faculty of Letters, Faculty of Foreign Languages and Faculty of Economics & Administrative Sciences. However in the existing plan Faculty of Pharmacy, which is not related with social sciences, is located within one of the building blocks of these faculties. In the redevelopment plan, Faculty of Pharmacy is proposed to be moved into the present building of Computer Research Center and its previous existing building is proposed to be designed for the academic programs of Faculty of Foreign Languages and Faculty of Economics & Administrative Sciences. By this way these four faculties are located in connection with each other.

Another specific building group that needs to change its location in the existing campus site is the administrative buildings of the university, These

buildings are located outside the main campus in the district of Bornova. Although the area is very close to the university site, a major highway, Ankara-İzmir highway passes through and it cuts all pedestrian accessibility between them. However in most successful campus settlements, administrative buildings are always located at the most prestigious and valuable place of the campus. Generally they are either located in front or near the main entrance of the campus. So, a visitor can easily find out the location of the administration. Therefore a conversion between some campus facilities that are located near the main entrance and the administrative buildings is required. By taking a quick look at the campus site, it can be noticed that the second parcel, Plot I, on the left side of the main entrance is the most suitable area to locate the administrative buildings. It is a prestigious parcel because it can be seen easily from the main entrance and it is on the intersection point of the two proposed loop networks. The administrative units can be located as proposed additional buildings in Plot I. Then their present buildings outside the campus site can be re-used as a guest house for the academic staff from other universities.

#### **5.4.3. New building Proposals for the Existing Campus Plan.**

The third design concept of the redevelopment plan mainly examines the establishment of additional building facilities which do not satisfy the requirements of the whole campus. The main object of these additional buildings on the existing campus is to provide the ideal accessibility circumstances for students on reaching these major groups of functions. Before establishing the new facilities on the campus site it should be remembered that during the conversion of the academic program, as a design principle the academic programs that belong to Dokuz Eylül University on Plot K were removed from the campus site. In place of these units some of the academic programs and recreational facilities were moved into this parcel.

After reminding these two important changes that were already made in the existing plan up to this point, now it is appropriate to evaluate new building proposals accordingly. In order to locate them at the proper places of the campus, the accessibility criteria that were previously determined from the optimum standards of

the pedestrians are applied in the existing campus plan. By taking these accessibility criteria into consideration, first of all the maximum distance between the two farthest points of the campus is measured. It is found out that this distance is 2800 meters on east-west direction. In the redevelopment plan vehicular and pedestrian traffic is accepted to be separated from each other by the loop networks.

According to this design criterion, as it was previously explained, the maximum diameter of a campus plan for a population of less than 30000 people should be less than 1800 meters distance. This means that in less than every 1800 meters a new major center should be established. In addition to that major groups of functions should be repeated in less than every 1800 meters. This 1800 meters distance, which comes from the addition of two radii that go on opposite directions from the center of a development circle, is accepted as the standard distance for this redevelopment project. In the existing plan, maximum length of the campus is far over than 1800 meters distance. Since the largest side of the campus is more than 1800 meters, then the required accessibility criteria are not provided on the existing plan and there is a need of establishing additional units where needed.

One of the most needed building group that lacks is a major center which may act as the main socialization and recreational area. The establishment of such a multi-purpose center is vital for Aegean University, which has a scattered type of campus pattern. Ideally such a major center is should be located in the middle of campus in order to be accessible for students the from various points of the campus. However in the existing campus plan there are already Research Fields of Faculty of Architecture located in the middle of the campus and it is almost impossible to remove these research fields from the campus. Besides that the campus facilities are already divided into two parts by Bornova College Road, the campus acts like two small campuses. At this condition it is much more realistic to establish two major centers that may gather the students of each campus.

**First major center** is proposed to be located on the eastern side of the campus on Plot L. This is both close to the existing student dormitories and it is the

starting point of the major pedestrian axis that continues on east-west direction. This major center should consider a central library, student clubs, food halls, a small shopping center and other recreational facilities within it. To unite this major center with other facilities on the neighborhood parcels, a new concert hall is proposed to be established on Plot K. It is needed because the present concert hall of the university is located outside the borders of the campus and it does not overcome the present demands of the university. Therefore a new concert hall is needed within the campus site.

The location of this proposed major center to the farthest academic building on the western side of the campus is 2225 meters. This distance is more than the defined ideal accessibility criteria. This means that there should be another major center in less than 1800 meters distance to the first proposed major center. The appropriate area which suits to the required conditions on the western side of the campus is selected on Plot B. This area which is defined as Plot B in the proposal plan, was reserved for new developments in the existing plan. So, as a continuation of this idea, **the second major center** is designed on Plot B. Since Plots A, B and M are previously defined as the Medicine Campus, then this second major center may act as the gathering place, the recreational center for the Medicine Campus.

Another accessibility problem that should be solved between the major groups of functions in the existing plan is witnessed on the location of the dormitory buildings. At present all of the dormitory buildings are located on the eastern end of the campus. However the maximum locational distances of these dormitories to the farthest academic units on the western side of the campus, are more than 10min. walking period for a student who walks with an average walking speed. They are located 2600 meters away from each other. Just as in the case of major centers the frequency of repeating these major groups of functions (dormitories, libraries, and laboratories) should be in less than 1800 meters. The appropriate area which corresponds to 1800 meters distance from the existing dormitory buildings is again found on Plot B. So, additional dormitory buildings are proposed on this plot. By this way the new dormitory complex which may unite with the new proposed major

center of the Medicine Campus may serve for the students studying on this area. The establishment of additional sports halls that may be located on Plot M may enrich these dormitory buildings and the major center on Plot B.

Apart from all these new building proposals for the redevelopment project of the existing plan there is also a need to establish some squares, which may act as the minor centers at the strategic locations of the main pedestrian axis. The main reason that is hidden behind this concept is that in most of the urban settlements there is a desire to break the monotony of the scattered patterns and to give architectural identity to open spaces and to nourish the pedestrian flow by designing squares.

Among the proposed vertical and horizontal pedestrian axis the major horizontal pedestrian axis that lies on east-west direction is found as the longest route that needs to have some squares and kiosks established on it. On this long and continuous axis, one of the four accessibility criteria, which were determined earlier, is adapted to the existing plan. This accessibility criterion proposes to locate a minor center that may either be a square, a sub-social club or a cafeteria on every 450 meters distance. It was defined as the average walking distance for a pedestrian that walks without a pause until she gets a short break for feeding and socializing purposes.

On the redevelopment plan these minor centers are placed mainly on 3 strategic points. One of them which is called minor center 1, or **Square 1** is located 450 meters distance away from the first major center. Here since major centers are designed to comprise all the required facilities of the minor centers the max repeating distance will be measured by considering these two major centers as activity points. So, the first minor center is located on Plot J. where there are indoor swimming pool and the main dining hall at present. The second minor center, which is called **Square2** is located 450 meters away from the first minor center on Plot F. Here two proposed pedestrian axis on east-west direction and north-south direction cross each other. Square2 also connects these two pedestrian axes with the loop networks that go parallel to the horizontal axis on west-east direction. It aims to nourish the



pedestrian flow to various directions. It is the only gathering place on this continuous pedestrian axis until this axis reaches to the major center located on the Medicine Campus.

However the maximum walking distance between major center of the Medicine Campus and this minor center square 2 is more than 450 meters. It is about 600 meters. It's because a pedestrian bridge that continues on an upper level at the bottom of the Bornova College Road separates the axis. It's thought that this is an extraordinary condition only for this campus plan. So, during repeating these minor centers in each 450 meters distance since the next 450 meters distance corresponds to Bornova College road the next minor center which is **Square 3** is located on Plot M. However, here is no need to establish a minor center because there is already a major center proposed on Plot B, which may consider the same types of facilities with the minor centers. Then the last minor center which is the last gathering square of the continuous pedestrian axis is established at most 450 meters distance from this second major center on the western direction. So the last minor center which is called Square3 is established at the western end of this pedestrian axis on Plot M. In each of these three squares, a reserved area in dimensions of less than 100m X 100m is reserved for the recreational facilities. This is because above 100meters distance the social vision of a pedestrian can be lost. See Map 5.3

### **5.5. An Idealized Scheme for the Existing Academic Program of the Existing Aegean University Campus.**

The second analytic approach mainly analyzes the existing campus of the Aegean University from a different point of view. It accepts the assumption of re-designing the whole campus site according to the most satisfactory physical and interdisciplinary conditions for its academic curriculum. This proposed alternative scheme is mainly based on deciding the appropriate location of each academic program in this existing site. In order to have a coherent land-use plan the existing academic programs is classified under five main groupings. Each grouping collects the academic units in relative branches, which have similarities between their academic curriculum and which should be located in the same zone. By this way faculties which follow common courses and share common facilities such as laboratories and seminar halls may be designed in coordination- with each other. These five compositions of building groups can be matched with each other as the following:

#### **GROUP A:**

- \*Faculty of Medicine, Aegean University Hospital.
- \*Faculty of Dentistry.
- \*Faculty of Pharmacy
- \*School of Nursing.
- \*Institute of Health Sciences.
- \*School of Physical Education and Sports.
- \*Atatürk Medical Technology School.
- \*Medical Technology Schools.
- \*Family Planning and Infertility Research and Application Center.
- \*Biotechnology Research and Application Center.
- \*Drug Research and Development Center & Pharmaco-kinetics Research and Application Center.
- \*Cancer Surveillance and Research Center.
- \*Health Research and Application Center.

**GROUP B:**

- \*Faculty of Letters.
- \*Faculty of Communication.
- \*Faculty of Economic and Administrative Sciences.
- \*Institute of Social Sciences.
- \*Department of Foreign Languages.
- \*Department of Fine Arts.
- \*Audiovisual Research and Application Center.

**GROUP C:**

- \*Department of Principles of Atatürk and Recent Turkish History.
- \*Department of Turkish Language.
- \*Institute of Turkish World Researches.
- \*The State Conservatory of Turkish Music.
- \*Turkish Teaching Center.
- \*İzmir Research and Application Center.
- \*The principles of Atatürk and Recent Turkish History Research and Application Center.

**GROUP D:**

- \*Faculty of Agriculture.
- \*Agricultural Research and Application Center.
- \*Department of Chemistry.
- \*Department of Textile Engineering.
- \*Textile and Apparel Manufacturing Research and Application Center.

**GROUP E:****Group E1**

- \*Faculty of Science
- \*Institute of Natural and Applied Sciences.
- \*Institute of Solar Energy.
- \*Institute of Nuclear Sciences.

**Group E2**

- \*Faculty of Fisheries.
- \*Submarine Research and Application Center.

\*Environmental Studies Research and Application Center.

### **Group E3**

\*Faculty of Engineering.

\*Institute of International Computer Research.

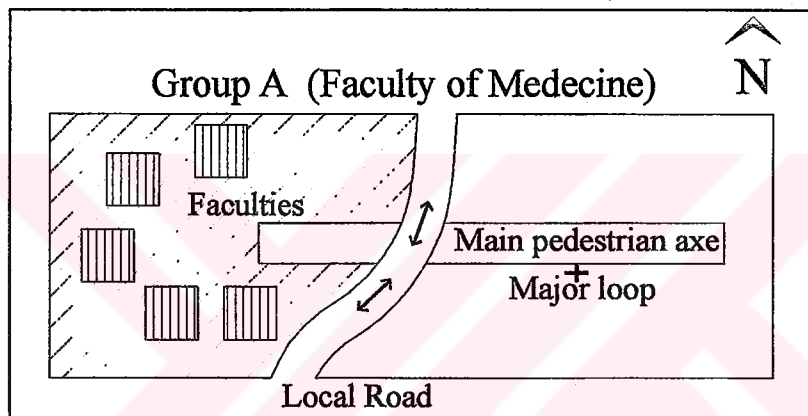
\*Computer Research and Application Center.

The location of the above groupings should follow a system, which may bring interdisciplinary education in the physical structure. If the required spaces of the existing academic programs in the Aegean University are compared with each other, it can be noticed that there are two primary faculties that constitute the highest percentage of space in the whole campus. These are Faculty of Medicine and Faculty of Agriculture. In the grouping of the relative faculties, they belong to Group A and Group D. Both of the two faculties consider laboratories and research study areas much more than the other faculties. They both follow common programs with other interdisciplinary faculties and with undergraduate schools. As a result they consider the highest densities of the existing site. They create a kind of specialized academic zone. These specialized territories create a separate campus life within their group area. This provokes the easy access of pedestrian, perception of the whole campus and free flow and the unity of students from various faculties.

However in the existing plan these two faculties are almost located close to each other and they create problems on the location of the less populated faculties in the campus. This problem can be generalized for all universities where the high populated faculties are located close to each other. Therefore a new locational criterion is proposed for effective land-use plans of university campuses. It emphasizes to locate the highly dense faculties at the two opposite ends of the main pedestrian axe towards the outer parts of the given campus site. Besides that less dense faculties which require less space are placed on both sides of the main pedestrian axe towards the middle of the campus site.

If this criterion is applied on the existing site of the Aegean University, then Faculty of Agriculture and Faculty of Medicine should be located on the two

opposite ends of the campus, on the east-west direction. Here Faculty of Medicine should be conserved on its existing place because there is already a major local road that cuts the campus area into two parts. This unfortunate separation should be used as an advantage on emphasizing all this separated area for locating all the academic programs that belong to group A, in other words to Health Services. Actually this separation of Health Services from the other faculties is mostly advanced in many campus settlements. This is because there is always a research university hospital, which completes the education of the students that study Medicine. However it is desired to keep the hospital entrance and the main campus entrance away from each other. By this way other campus inhabitants are not effected from the hospital life.

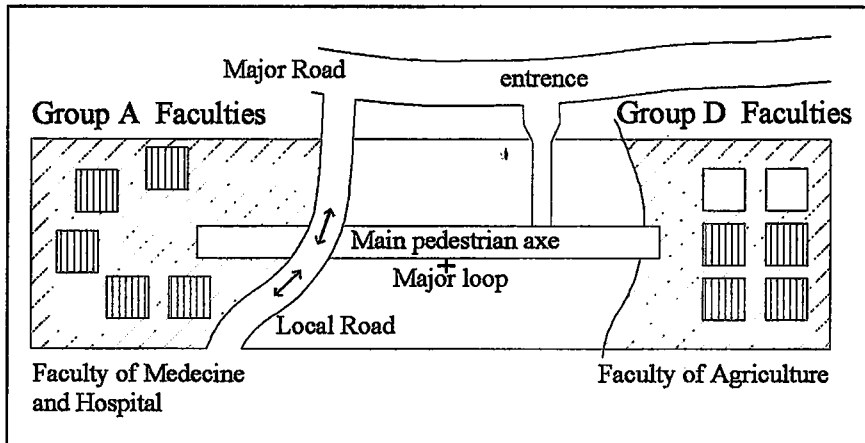


**Figure 5.1. An Idealized Scheme for the Medicine Campus Existing Aegean University Campus.**

On the other hand, Faculty of Agriculture should be placed on the opposite end of the main pedestrian axis, on the eastern side of the campus. In the existing plan the location of the Faculty of Agriculture in the middle of the site divides the campus facilities. But, if it is placed at the eastern end, then the facilities of this faculty such as research fields and laboratories do not disturb the unity of campus.

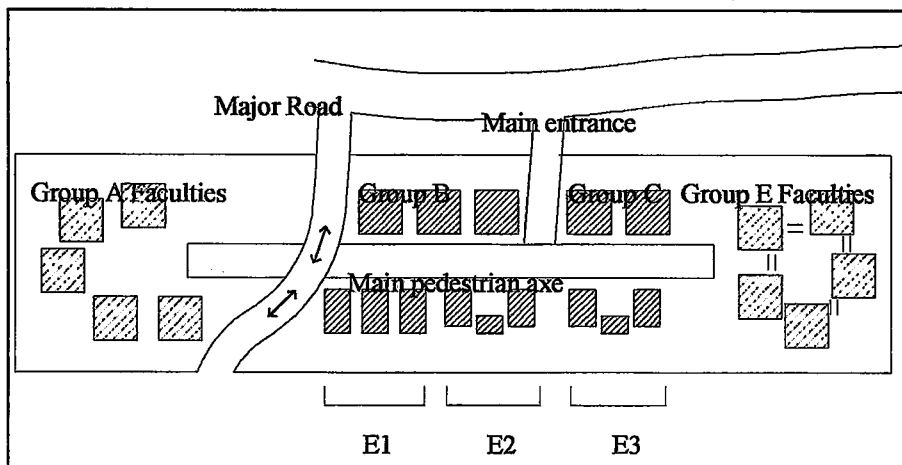
From the rest of the existing academic programs the ones which belong to Group B and Group C should be placed on the other upper side of the proposed main pedestrian axe that lies horizontally on east-west direction. This part of the campus faces the major İzmir-Ankara highway. In addition to this, this area is the most suitable place for locating the main entrance of the campus. Then the faculties

located in this part of the campus need to be the faculties that are more concerned with social sciences and socio-cultural life of Bornova. Therefore the faculties that belong to Group B and C can be placed on the two sides of the main entrance.



**Figure 5.2. An Idealized Scheme for the Group D Faculties on the Existing campus Site of Aegean University.**

On the other hand the faculties of Group E that are related to various branches of science and engineering need more quite and low dense spaces for the research studies and laboratories. So, they should be located in coordination with each other, on the lower side of the main pedestrian axe towards the southern ends of the campus. By this way the faculties in each sub-group of Group E can grow in a vertical direction to the main pedestrian axe.



**Figure 5.3. An Idealized scheme for the Group B and C Faculties on the Existing Campus Site of Aegean University.**

In the case study First of all existing problems of the selected university ,the Aegean University were investigated. It was found out that scattered type of expansion and the limits of the campus, which were above the defined standards on the average walking distances of pedestrians,were the most specific problems of the university. Then two types of development projects were proposed in order to overcome these problems.

First one was a redevelopment project which comprised of a new circulation network with inner and outer loop systems, new pedestrian bridges, pedestrian axes , squares and major centers where needed in the existing site. The aim of this project was to guide the administrators of the university for future demands.

Second development project was designed as rather an utapion project. It was an idealized project for the existing campus of the Aegean University. It proposed a new land use plan for the existing academic program of the university by assuming to remove all the existing buildings in the campus. In this idealized project all the findings of the survey on present circumstances of Turkish universities are taken into consideration. Linear type of expansion with an axial order was selected as the dominant campus pattern. Secondary campus pattern among the most appropriate other three patterns grid type, radial type or horizontal zoning were left to the choice of the planners. As a result all the discussions made on the requirements of pedestrians in campus settlements were concluded in this case study example.

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## CHAPTER SIX

# CONCLUSIONS

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### 6. Conclusions.

Sixth Chapter which considers the conclusions for the thesis summarizes the primary assumptions accepted to be applied as the standards for idealized campus settlements. It collects them under four main headings. After explaining each primary assumption that are needed to provide accessible campus settlements, it results with the ideal development schemes in arial and linear solutions for campus patterns that are given schematically.

#### 6.1 The Higher Education Policy.

With the establishment of YÖK, the educational policy of Turkish universities had changed from faculty mode of organization to departmental mode. This had effected the major design criteria of new universities. University of Istanbul and University of Ankara were among the major universities that were once built in faculty mode of organization. Their common feature was the decentralization of their administrative units within a hierarchical system throughout the campus site. This had influenced the organization of the academic units to develop in rigid and separate blocks of buildings. This system, which prevented flexibility and growth of new buildings between the existing building groups, had created problems on the expansion of the campus facilities during increasing student population and new academic programs. Consequently, when these university campuses became inefficient then new attempts were made for establishing additional campuses for each one of them in separate regions.



However the situation is different in universities which adapt departmental mode of organization. In this case, the centralization of the administrative units, which is the main divergent feature from the other alternative, provides the organization of the academic units to be arranged in coordination with each other. This brings flexibility and micro growth possibilities for interdisciplinary graduate programs. University of Atatürk and Middle East Technical University are the specific examples of this group. In most of these universities, their existing campuses do not require additional campus spaces as in the previous ones. This is because the unity of a centralized administrative structure is directly reflected to the space organization in the campus. In addition to that, the adaptation of departmental mode of organization had stressed the vitality of designing compact and coherent campus patterns to increase the effectiveness of the interdisciplinary education. Therefore it may be stated that departmental mode of organization is the best Alternative Education Policy for campus planning in Turkish conditions.

## **6.2. Alternative University Models .**

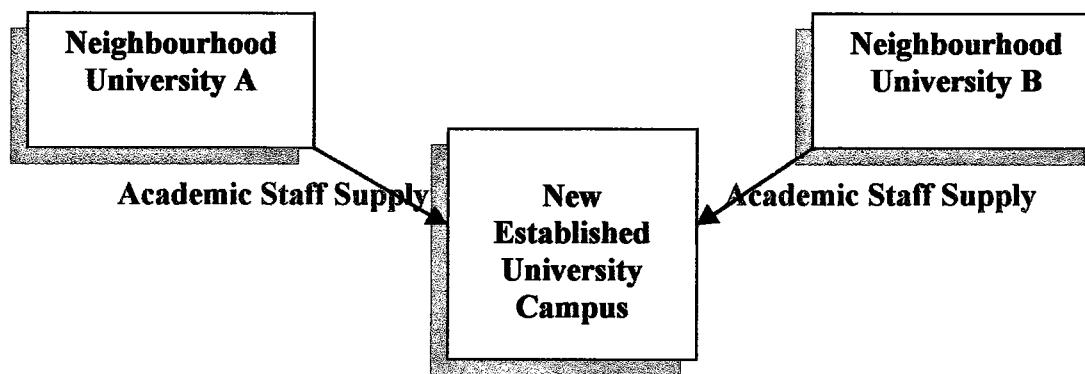
Through the evaluation of the existing Turkish universities from an analytic point of view, we come to a conclusion that Turkish planning authorities had become deficient on adapting the fact of campus planning on higher education system as a long-term project. Even though there are 38 universities out of 59 universities that have either established or proposed one main campus site, by 1997 however the number of successful campus settlements decrease when these campuses are examined according to the previously determined design and accessibility criteria. **The number of successful campus settlements which obtain most of the required accessibility criteria and which consider all of their university facilities under one main campus site are only 15 out of 38 university.** This means only 1 out of every 4 university among the 59 universities by 1997 has adapted the ideal standards of campus planning concept.

On the other hand, it's interesting that the desire for collecting all the university facilities under a main campus site increases as it's gone towards the

eastern and less developed regions of the country. In other words, the universities located in sub-regional and regional settlements are more opportune on having one major campus than the ones located in metropolitan settlements. In metropolitan settlements, the universities are distributed to the various parts of the city. It's true that wherever a university is established, it needs a campus environment for effective education and only good architectural design may form the basis of a unique campus settlement.

This outcome points out an interesting situation for the higher education system of the universities, which have more than one campus site. There are many disadvantages of scattering the administrative, academic and recreational units to different areas. Decentralization of the facilities should be managed beforehand, because decentralization creates both financial problems on the separation of university services and inefficiency on providing the required types of facilities to each campus area. Also, in decentralized universities social and cultural activities of the students from various branches of educational programs, which motivate interdisciplinary relations, are avoided. To overcome this problem in Turkey, planning authorities of the government should develop a new educational program, which may comprise different alternatives of university models according to the changing social and economical, environmental and physical conditions of the proposed university site. These alternative models are classified under three main groupings.

**Group 1.** This is a university model where the proposed university has the authority of controlling its administrative programs. However it belongs to the neighborhood universities on maintaining the required quantity and quality on various academic staff for the university. Because these newly built universities lack of the required social and economical conditions, so they share other universities academic staff. In most cases, these universities have problems of performing livable campus environments. Some of the campus buildings such as staff dormitories and staff rooms are highly minimized. They are not located in the campus. These university settlements should not be appreciated for campus planning.

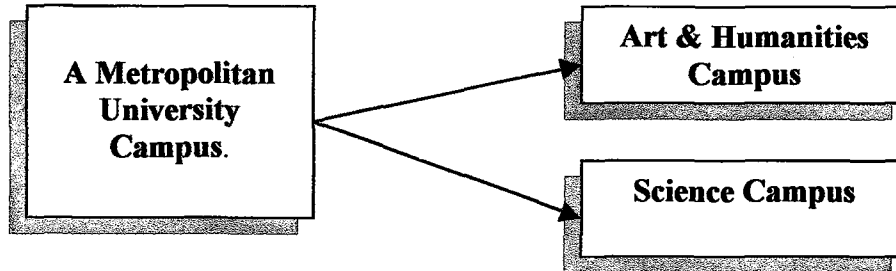


**Figure 6.1. Least Advised Campus Model for New Established Universities.**

**Group 2.** This is a university model where the proposed metropolitan university has the authority of controlling all administrative programs of the faculties and institutes that are decentralized into specialized minor campuses. The main idea of this model is, there is a requirement for alternative site plans, which may answer the physical segmentation of space organizations between different branches of higher education in small university campuses. For example, some faculties that follow similar educational programs require common spaces in their academic zone, such as laboratories, workshops, studios, lecture and seminar rooms. In addition to that, they usually share the same academic staff for certain periods of time during education. So they have to be located close to each other in the campus site. It brings a cooperation between their students, which adds much more to their social and cultural relations. On the other hand there are faculties, which do not have any common physical facilities, and it's not desired to locate that type of the faculties close to each other. As an example, faculty of Fine arts and faculty of Medicine are the academic programs that both have specific needs and design concepts where it becomes hard to formulate them in the same area.

As a result, the decentralization process of the academic programs in a big university campus into minor campuses in various urban and sub-urban settlements should be made under two basic educational groups of higher education system. First group of campuses should consider faculties where education is based on the various branches of science and mathematics. On the other hand second minor group should

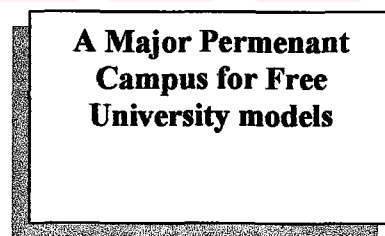
consider faculties and institutes of arts & humanities. That kind of an educational approach on decentralization of campus facilities motivates designer to develop effective land use programs for each for campus group.



### **Division of the Big University Campuses into Specialized Minor Campuses**

**Figure 6.2. Advised Campus Model for Metropolitan Universities.**

**Group 3.** This is a university model where the proposed university has all the authority on its administrative and academic programs. University constitutes the required amount of academic staff within itself. They are usually big and private universities that are supported by foundations. Their theoretical bases encourage a major permanent campus that may comprise all the requirements of a campus life. New development programs and reserved spaces for future demands are mostly planned in the beginning of the campus plan studies. These university models are beneficial on improving the design phases of permanent campus concepts in Turkey.



**Figure 6.3. Most Advised Campus Model for Ideal University Settlements.**

Above these three university models that may be developed for the present conditions of Turkish universities, there is a much more important situation which needs to be controlled by the application of a new educational policy. The fact is that, after the establishment of YÖK, the total number of existing universities in Turkey

has reached up to 71 universities with an accelerating degree in a short period of time. Until the present time, the planners of higher education system had not taken into consideration the requirements on various human sources, which may become the most needed fields of professions in the near future. Instead, higher education programs that did not require more than a certain amount of student quota are being opened almost in every university and this had creates a problem of unemployment among the graduates of various professions.

As an example, there are already more than 20 faculties of architecture in these 71 established universities by 1998. In accepting a minimum of 50 graduates from each faculty total graduate student number adds up to approximately 1000 new graduate architects for every year. However the existing circumstances of our country do not satisfy the required amount of working circumstances for the employment of each 1000 graduates every year. In this case there exists a question that why do the planners still insist on opening the same academic programs with the same student quota in every university of the country? Why don't the planners try to minimize this standard student quota of specific faculties in some regions?

First of all, the establishment of new state universities should be prevented for at least five years period of time. During that time, the academic programs of the present universities should be developed and their proposed faculties, departments and higher education schools should be completed. Secondly it should be concentrated on the establishment of private universities that are supported by the foundations. It should be encouraged to open these private universities specifically on the settlements, which have population of less than 500,000 people. This may support the development of these settlements more rapidly. On the other hand, in settlements which have more dense population, no more new universities should be opened, instead the number of vocational schools and undergraduate schools in their existing universities should be increased. Because there is a need for vocational schools which may train technicians to our country.

This specialization on various branches of programs in some of the universities may be helpful to improve the educational circumstances of the needed profession in certain places of the country. This type of a planning approach at the theoretical scale of campus design may effect the academic curriculum and the establishment of the physical structure of the university. Therefore higher education authorities have to be aware of the requirement of human sources both on graduate and undergraduate programs throughout the country. They have to be conscious of their goal on higher education system.

In order to do that, **higher education authorities have to put forward a new educational strategy that is called “Man Power Strategy” in coordination with Government Planning Institution.** After then, the total quota of students for each faculty in each university should be calculated according to the findings of the present conditions in Turkish higher education. By the help of this **man power strategy** on higher education system, campus designers may be aware of the population changes for that proposed university in the future. They may design the campus settlement according to the specific type of additional academic programs that may be needed in the future. Then they may reserve the required amount of space for macro and micro growth possibilities in the campus site they can be more successful on the organization of the campus faculties.

### **6.3 Compact Nucleated Structures with an Axial Order.**

On the evaluation of various types of campus patterns in Turkey, a comparative analysis was followed by the help of a survey study among the 59 Turkish universities that were established by 1997. The success of each campus pattern was evaluated by the help of the campus plans of the universities, which had one major existing, or proposed campus sites. From the survey study it was found out that the most consistent land use patterns were naturally energy and time efficient ones which had relatively low physical separation of activities achieved by moderately high densities of facilities.

Today, there are various types of campus patterns, which emphasize a different design concept on the configuration of the given site. However, their degree of success on providing the ideal accessibility circumstances in a campus settlement decreases as their total space increases. This is because, as the total space of a proposed campus site increases there exists a problem of controlling the structural variables that effect the energy/spatial structure relationship on that settlement pattern. These variables which are the size and the shape of a settlement, the nature of the communications network, density, interspersed activities and students mobility require a significant link between student energy and land use patterns which is always identified by the concentration of form. Concentration of form, which is the tendency of certain functions that pile up together, indicates close-knit physical linkages at the experience of campus space.

This assumption which emphasizes concentration of form for successful campus patterns indeed, has been supported by the present conditions of university campuses that are evaluated in the survey study. According to the findings of the survey study, all the campus patterns with total spaces of less than 2,000,000 sq. meters were effective on providing the required accessibility criteria. However, among the existing university campuses with total spaces of between 2,000,000 sq. meters. 13,000,000 sq. meters, the degree of success on these campus patterns had decreased to only one pattern, which is the linear type of expansion. Besides that, when the total spaces of campuses had exceeded the 13,000,000 sq. meters up to a maximum of 45,000,000 sq. meters it was found out that none of the campus patterns alone were sufficient enough to configure the given site according to the principles of accessibility criteria. These campuses had required a secondary campus pattern in addition to their primary pattern in order to provide concentration on the configuration of their campuses.

Among these campuses, the ones where the planners had combined two types of patterns into each other during the design process were found as the successful campuses. Once more it's founded out that, linear type of expression was the most dominant and appreciated pattern that was combined with an additional campus

pattern in creating successful physical linkages within the campus. The combinations of linear type of expansion mainly with horizontal zoning pattern, radial type of expansion and grid type of expansion had provided the most ideal accessibility criteria on big scale campus designs.

The theoretical basis that stands behind the success of the linear patterns is that, the association between space configuration and natural movement, which are the main determinants of urban form, stress the viability of an axial order. This axial order in a settlement pattern most definitely defines itself with the concept of linearity. Therefore when urban space and form are considered from the individuals point of view that experiences and uses it, it can be stated that axial order and linearity are the key morphological properties of urban space and function for individuals. Then the principles of campus planning should mainly emphasize axuality in addition to the two dimensional compact, nucleated structures for livable campus environments.

#### **6.4 The Organization of the Major groups of Functions and the Frequency of Repeating Them**

The success of a proposed campus pattern mainly depends on the degree of providing the ideal accessibility circumstances, which minimize the time spent for circulation between the major groups of functions. The ideal accessibility circumstances vary according to the user groups of a given project. In a campus settlement, the most important user group is the university students between the age of 18-25. This means that university students should be able to use their free time between the academic hours more effectively during reaching to their destination within the limited periods of time. Timing directly effects the max. locational distances of the primary functions between each other and the frequency of repeating them in organizing the land-use patterns.

In this thesis, it's accepted that there are two factors that effect the timing of the student activities in campus settlements. These are the optimum standards for



pedestrians in urban space and the use of class break periods during the academic hours. Each one of these two factors determines two accessibility criteria for an idealized campus settlement. From the optimum standards for pedestrians in urban space it is found out that a pedestrian, a student, with an average walking speed can only walk 5 minutes time without a pause. **In the evaluation of this thesis, it's accepted that on a continuous pedestrian route short breaks areas which may either be a square, a socialization center or a kiosk should be repeated in less than every five minutes distance (450 meters distance) for the students.**

Another optimum standard for pedestrians in urban space states that when a pedestrian with an average walking speed walks more than the 10 minutes time on an open space on a horizontal line, even if she takes a short break during this walking period it becomes tiring and monotonous for her to move further on. This distance corresponds to 900 meters when there is a traffic separation in the campus settlement, and it increases to 1350 meters distance when there is no traffic separation. Since a pedestrian can only see and perceive that there are people standing there between  $\frac{1}{2}$ km-1km distance in horizontal direction, a pedestrian cannot concentrate to move more to her destination point above these given distances. This means that if a student stands in the middle of the campus, she should be able to reach the farthest destination point, which may be one of the major groups of functions, within the 10 minutes walking period of time.

This period also defines the maximum locational distances of the major groups of functions between the major center of the campus. **Then it may be stated that each development axe should be repeated in less than 1800 meters diameters or 2700 meters diameters according to the traffic separation in the campus. This diameter distance defines the frequency of repeating each new major center in the campus.** It may also define the frequency of repeating the new major functions such as additional dormitories, libraries, and administration buildings, recreational and sports centers.

The second effecting factor that directly determines the timing of the students is the 15 minutes class break period. As it is explained earlier, it's accepted that ideally students spend two and a half minutes time for circulation from indoor spaces to outdoor spaces. This period spent during entering or leaving building is very critical for students on using their 15 minutes class break period effectively. These are basically two types of activities student follow which characterize the other two accessibility criteria on campus settlements. They either use this time to reach to a social center and turn back to their classroom within the same class break or they use this time only to reach to another academic unit and enter another lesson in that building, such as an interdisciplinary course, seminar hall or a laboratory.

Since a student already spends five minutes to leave and to enter a building, then she has only 10 minutes to use for access outside of her origin building to the destination building. In an academic zone, where access is provided by pedestrian axes, this corresponds to 900 meters. **It can be stated that the maximum locational distance of an academic unit and to another academic unit, where students share courses, laboratories, or interdisciplinary programs should be in less than 900 meters distance. Relative academic buildings should be repeated in less than every 900 meters distance.**

But if the student wants to reach to her destination and turn back to her origin area, the class room, within the same class break period for feeding and socializing purposes, she already spends five minutes plus five minutes equals to 10 minutes for circulation within the two buildings. Then she has only five minutes time to use outside the buildings. This corresponds to 225 meters max distance from an academic building to the closest social center in horizontal direction. **Then it can be stated that academic units should be placed in max 225 meters distance to the minor centers.**

Below schemes are related with the alternative campus development models according to Linear and Ariel development circles that are determined from the four accessibility criteria. In linear development circles it is accepted that the frequency of

repeating the major functions of a campus settlement should be emphasized on a one major axis. On the other hand in Ariel development circles it is accepted that the frequency of repeating the major functions of a campus settlement should be emphasized on two major, opposite axis. First of all , the meanings of development circles in the alternative aerial and linear solutions are explained in Figure 6.4. Then in the below schemes each of the alternative campus development models are evaluated according to the case of traffic separation or no traffic separation within the given campus network. (See Figure 6.4.)

#### **For Linear Development Circles:**

It is found out that in one linear development circle in the case of traffic separation there should be at least 1 Major Center, 2 Minor Centers, 4 Academic Units, 1 Interdisciplinary Academic Unit or a Common Laboratory in every 1800meters diameter distance.(See Figure 6.5.)

In the case of no traffic separation within the given campus network in one linear development circle there should be at least 1 Major Center, 4 Minor Centers, 6 Academic Units, Interdisciplinary Academic Unit or a Common Laboratory in every 2700meters diameter distance.(See Figure 6.6.)

#### **For Aerial Development Circles:**

It is found out that in the case of traffic separation within the campus network in one Ariel development circle there should be at least 1 Major Center, 4 Minor Centers, 8 Academic Units, 2 Interdisciplinary Academic Units or Common Laboratories in every 1800meters diameters distance on two directions.( Figure 6.7.)

In the case of no traffic separation within the given campus network in an arial development circle there should be at least 1 Major Center, 8 Minor Centers, 12 Academic Units, 4 Interdisciplinary Academic Units or Common Laboratories in every 2700meters diameters distance on two directions .(See Figure 6.8.)

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## APPENDICES

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### **APPENDIX NO 1 :Survey Question Form.**

**Question 1:** The Organization of the Faculty Buildings in the University

- A) They are all located within a major campus site.
- B) Most of them are located within a major campus site but some of them are scattered around the region.
- C) There's no major campus site; instead they are collected in multiple campuses that are scattered throughout the region.

**Question 2:** Type of the Educational Hinterland the University is Located.

- A) It is located at a metropolitan educational hinterland.
- B) It is located at an urban educational hinterland.
- C) It is located at regional educational hinterland.
- D) It is located at sub-regional educational hinterland.

**Question 3:** The Present Student Population of the University.

**Question 4:** Numbers of Academic Staff in Turkish Universities.

**Question 5:** Numbers of Academic Institutions in the Universities.

- A) ..... number of faculties.
- B) ..... number of undergraduate schools.
- C) ..... number of institutes.

The following questions refer to the universities have only one major existing or proposed campus site.

**Question 6** Type of the Campus Pattern Adapted for the Existing or Proposed Campus Site of the University.

- |  |  |
|--|--|
| A) Linear type of campus pattern with          | a.a. Compact density<br>a.b. loose density |
| B) Grid type of campus pattern with            | b.a. Compact density<br>b.b. loose density |
| C) Scattered type of campus pattern with       | c.a. Compact density<br>c.b. loose density |
| D) Radial type of campus pattern with          | d.a. Compact density<br>d.b. loose density |
| E) Molecular type of campus pattern with       | e.a. Compact density<br>e.b. loose density |
| F) . Horizontal zoning of campus pattern with  | f.a. Compact density<br>f.b. loose density |
| G) Vertical zoning of campus pattern with      | g.a. Compact density<br>g.b. loose density |
| H). Mega structural grouping of campus pattern | h.a. Compact density<br>h.b. loose density |

**Question 7:**Existing Conditions of the University Campus on the Requirement of Accessibility Distances for A Pedestrian between the Center and the Farthest Edge in Less Than 10-15 Minutes Walking Period.

- A) It does provide the accessibility conditions. They are located in less than 10-15 min walking distance in horizontal direction.
- B) It does not provide the accessibility conditions. They are located in more than 10-15 min walking distance in horizontal direction.

**Question 8:** Total Space of the Existing or Proposed Major Campus Site.

**Question 9:** Accessibility Possibilities between the City and the Campus Site.

- A) Accessibility by train
- B) Accessibility by ring system
- C) Accessibility by private car
- D) Accessibility by pedestrian routes.
- E) All above.

**Question 10:** Most Dominant Circulation Network within the University Campus.

- A) The campus is planned on the basis of a major ring network either by buses or by train. In addition to that there's also vehicular and pedestrian network.
- B) The whole campus is designed for only pedestrian network. No other circulation network is established.
- C) The campus is designed on the basis of both vehicular and pedestrian network where it is needed.

**Question 11:** Degrees of Traffic Segregation within Each Circulation Network of the Evaluated Campuses.

- A) There is a complete segregation between each other.
- B) There is a segregation of vehicular traffic only in the major zones, which are only used by pedestrians.
- C) There is segregation of vehicular traffic only in the academic zone and other areas are accessible by motorized traffic.
- D) There's no segregation between each other; they both use the same circulation axes in the campus site.

**Question 12:** Location of the Socialization Centers of the University Either Inside or Outside the Campus Site.

- A) They are all located in a specific zone within the campus site.

- B) Some of them are located inside the campus site whereas the other recreational facilities are located outside the campus site.
- C) They are all located outside the campus site; but within the borders of the city center.
- D) They are all located outside the campus site; but within the borders of the region.

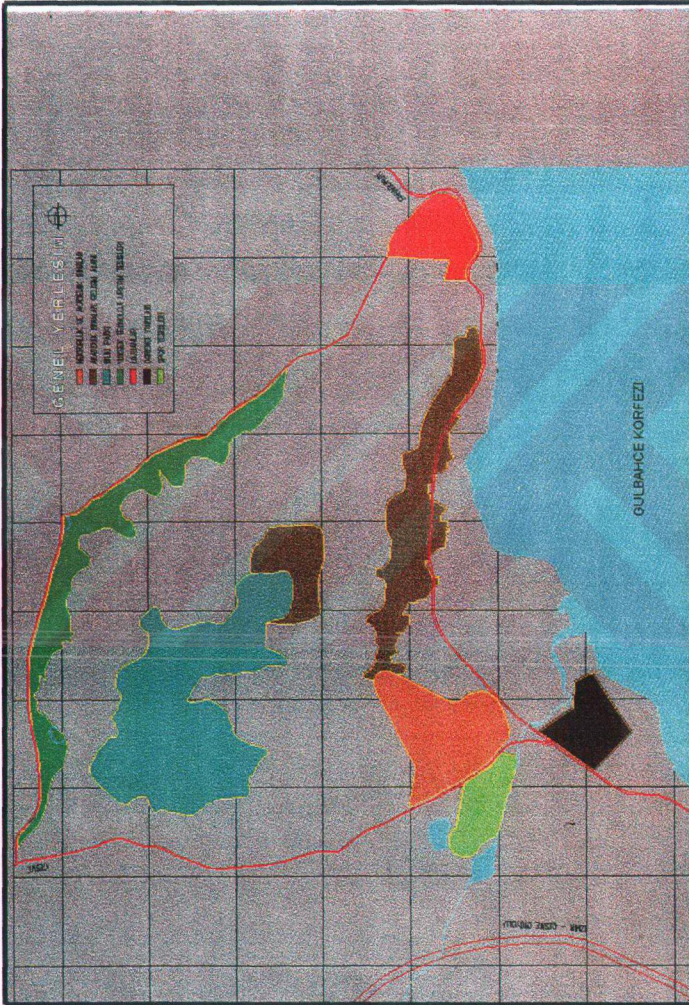
**Question 13:** Location of the Dormitory Buildings in the Major Campus Site.

- A) They are located in a specific zone in the campus site.
- B) They are located in the campus site, but they are scattered into different parts of the campus.
- C) University does not have any dormitories established, yet.

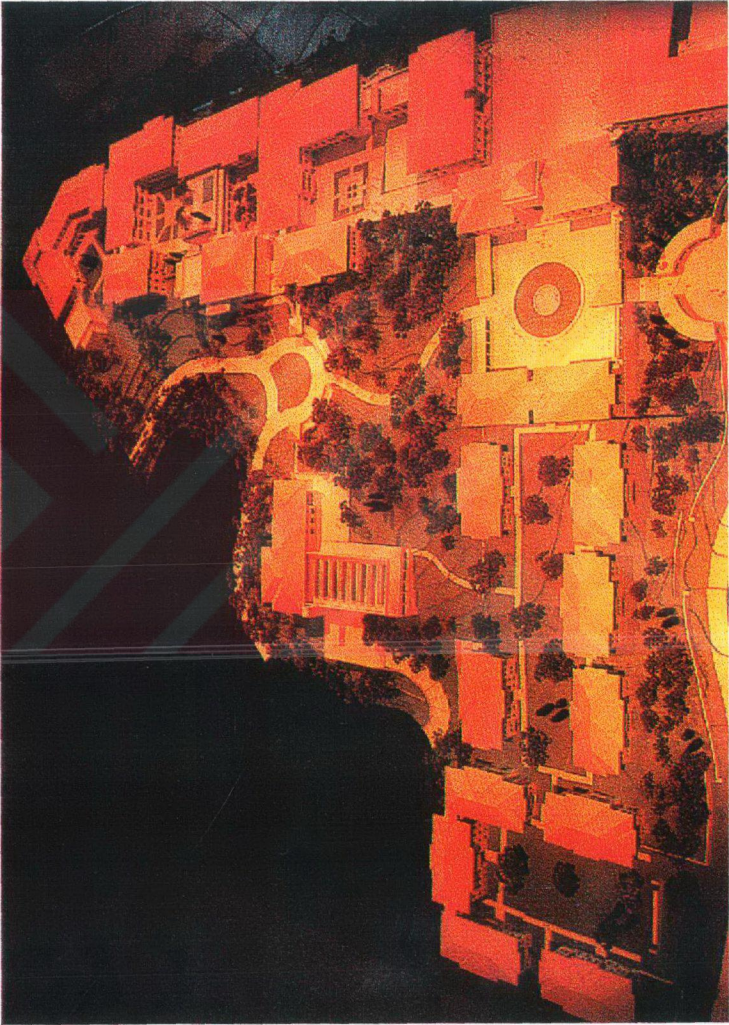
**Question 14:** Location of the Library Halls in the Major Campus Site of the University.

- A) The university has one main library hall located in the middle of the campus site.
- B) The university has one main library hall located at one side of the campus site.
- C) The university has more than one main library hall; there are minor libraries in almost each faculty building.
- D) The university's central library is located outside the borders of the campus site, located in another area.

## APPENDIX NO 2: Campus Plan of Izmir Technology Institute

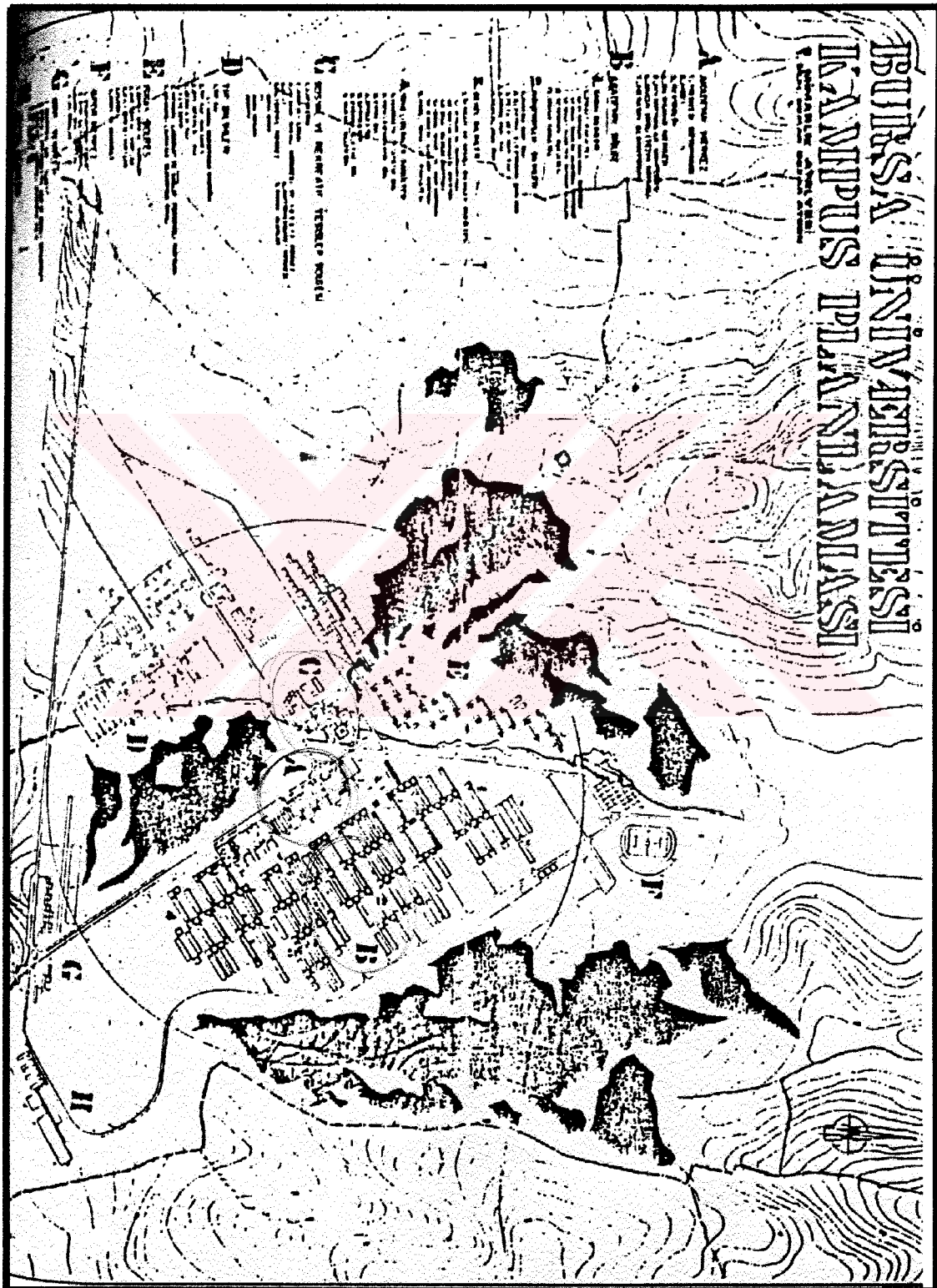




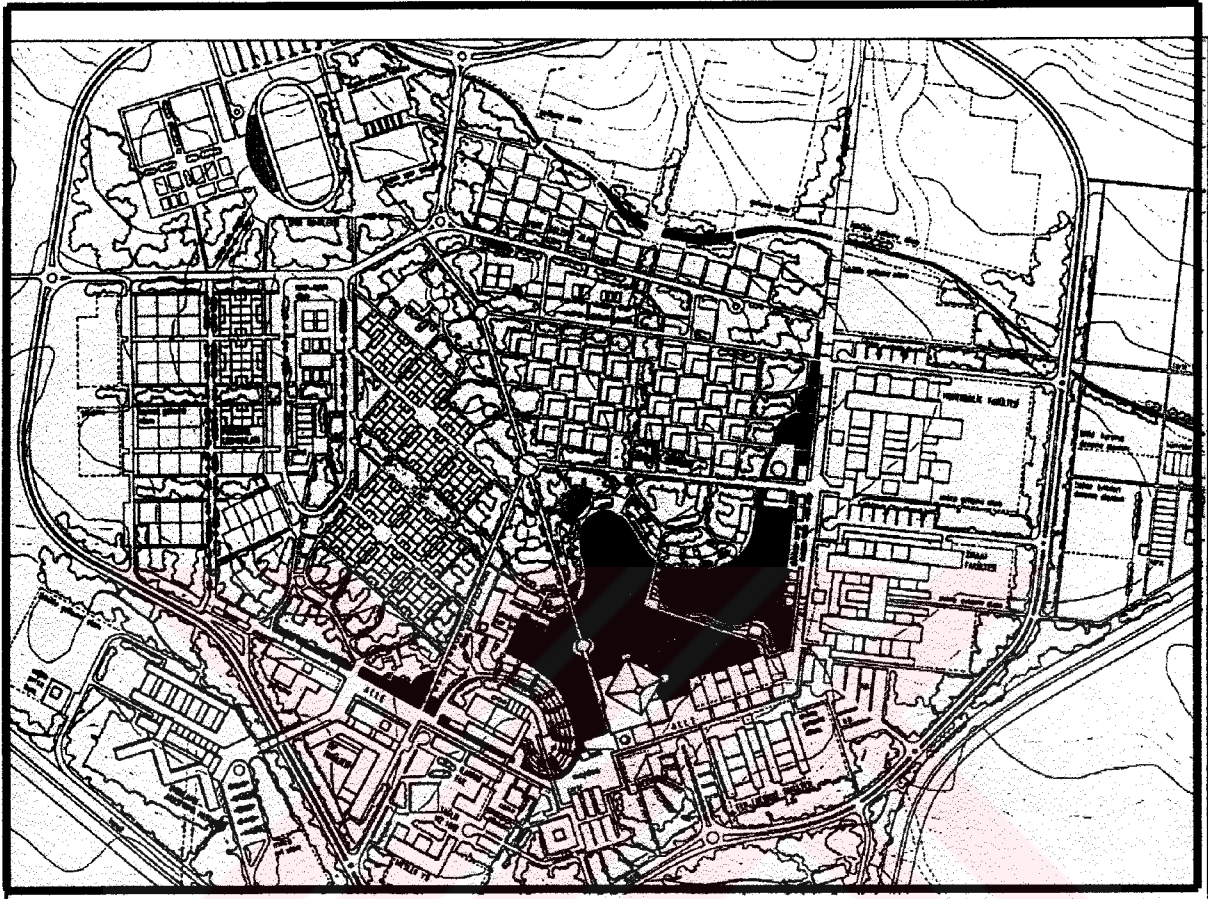
**APPENDIX NO 3: Campus Plan of Koç University**



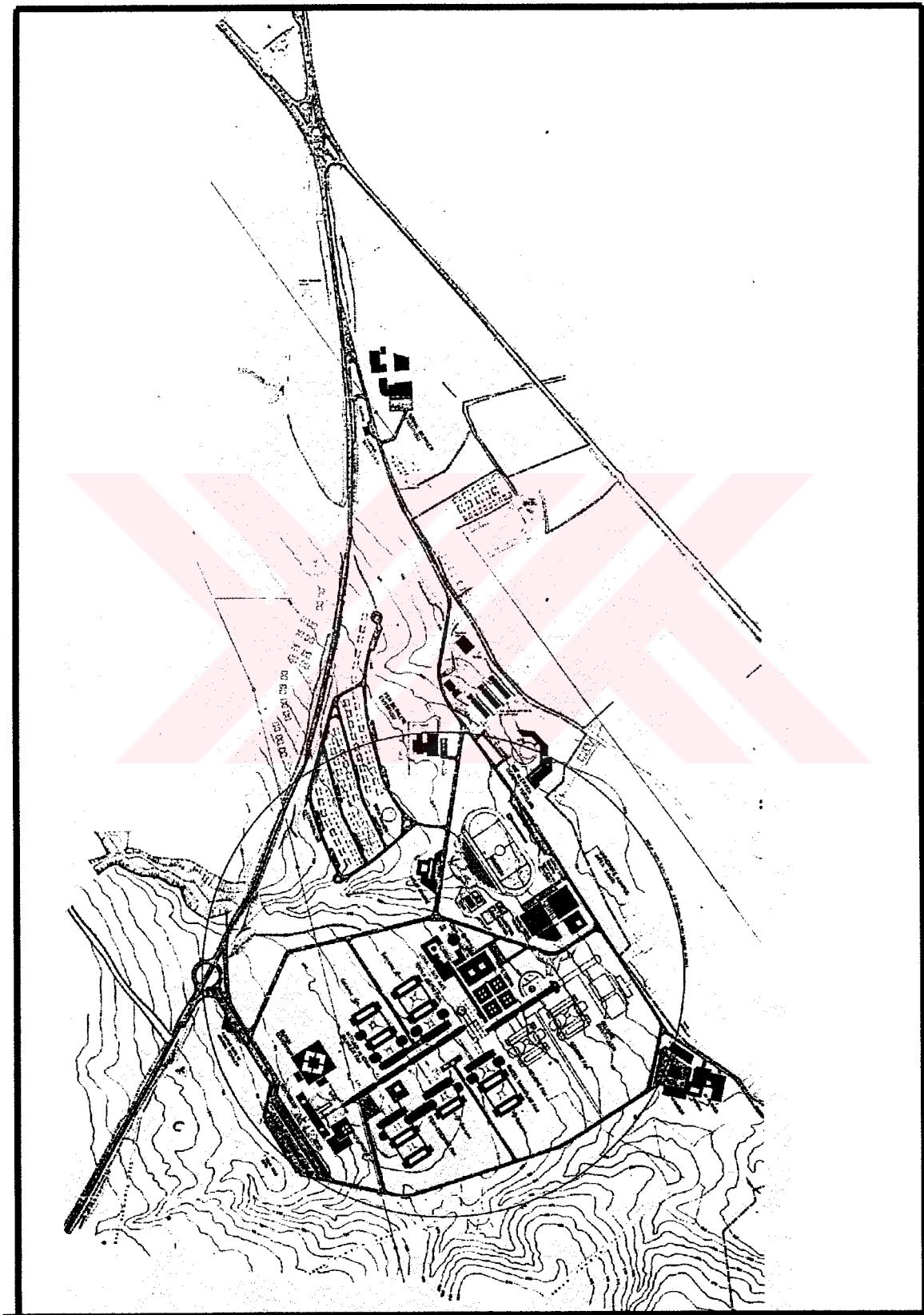
APPENDIX NO 5 : Campus Plan of Uludağ University.



**APPENDIX NO 6: Campus Plan of Harran University.**

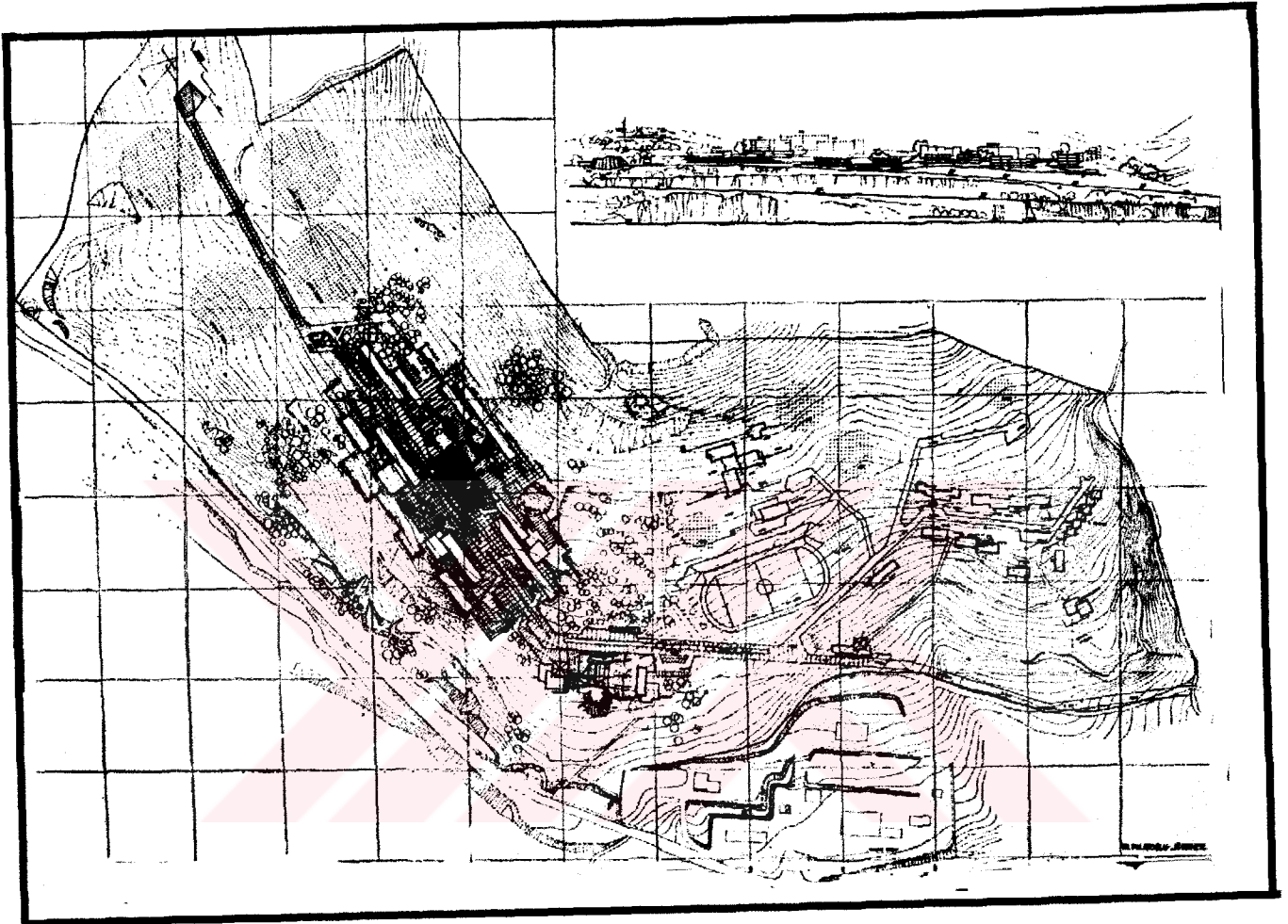


**APPENDIX NO 7: Campus Plan of Muğla University**

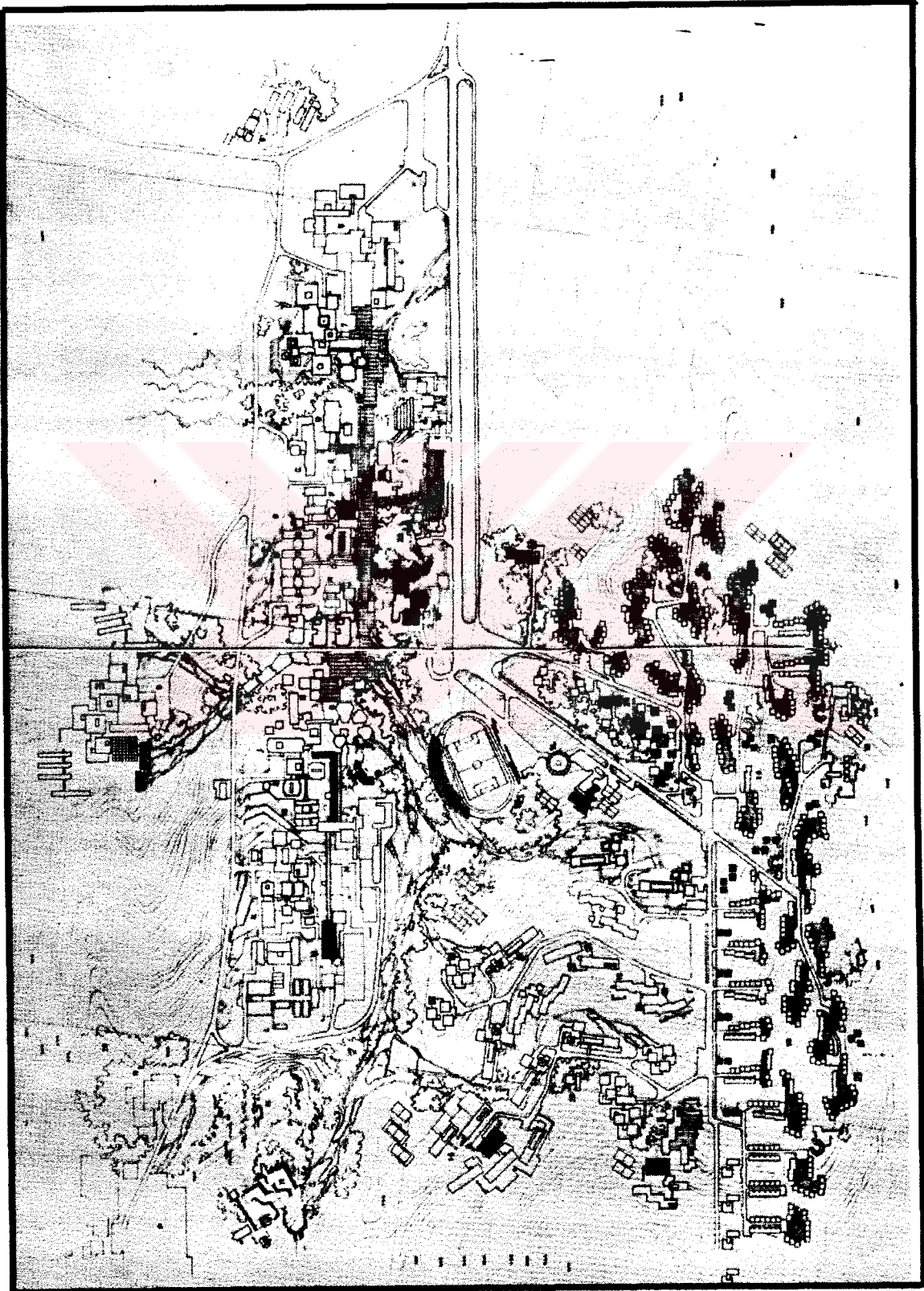


## APPENDIX NO 8: Campus Plan of Gaziantep University



**APPENDIX NO 9: Campus Plan of Karadeniz Technical University**

APPENDIX NO:10 Campus Plan of M.E.T.U.





APPENDIX NO:11 Campus Plan of Istanbul Technical University/Ayazağa Campus

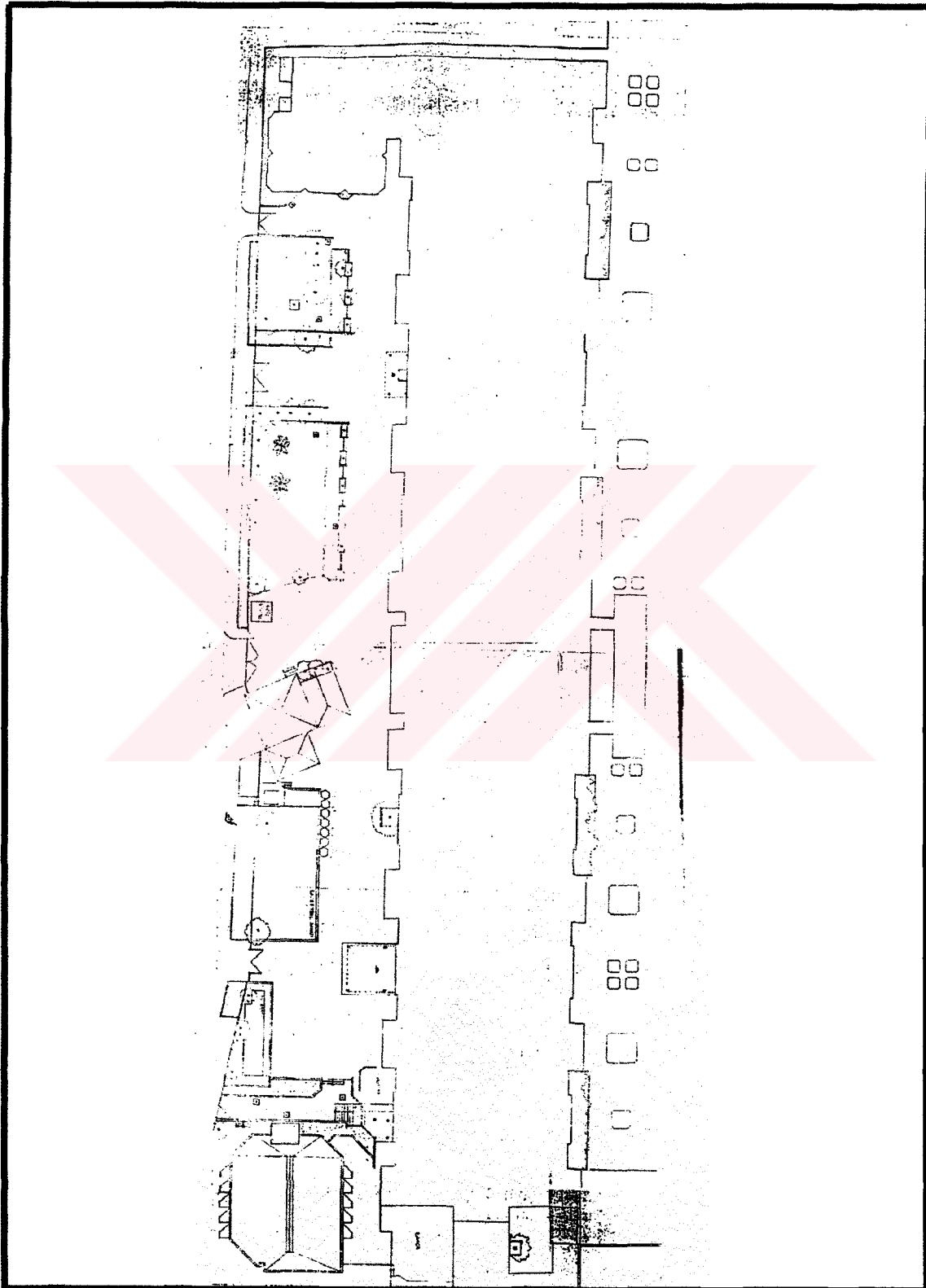


T.C. MİLLÎ EĞİTİM BAKANLIĞI  
TEKNEĞİTİM MERKEZİ

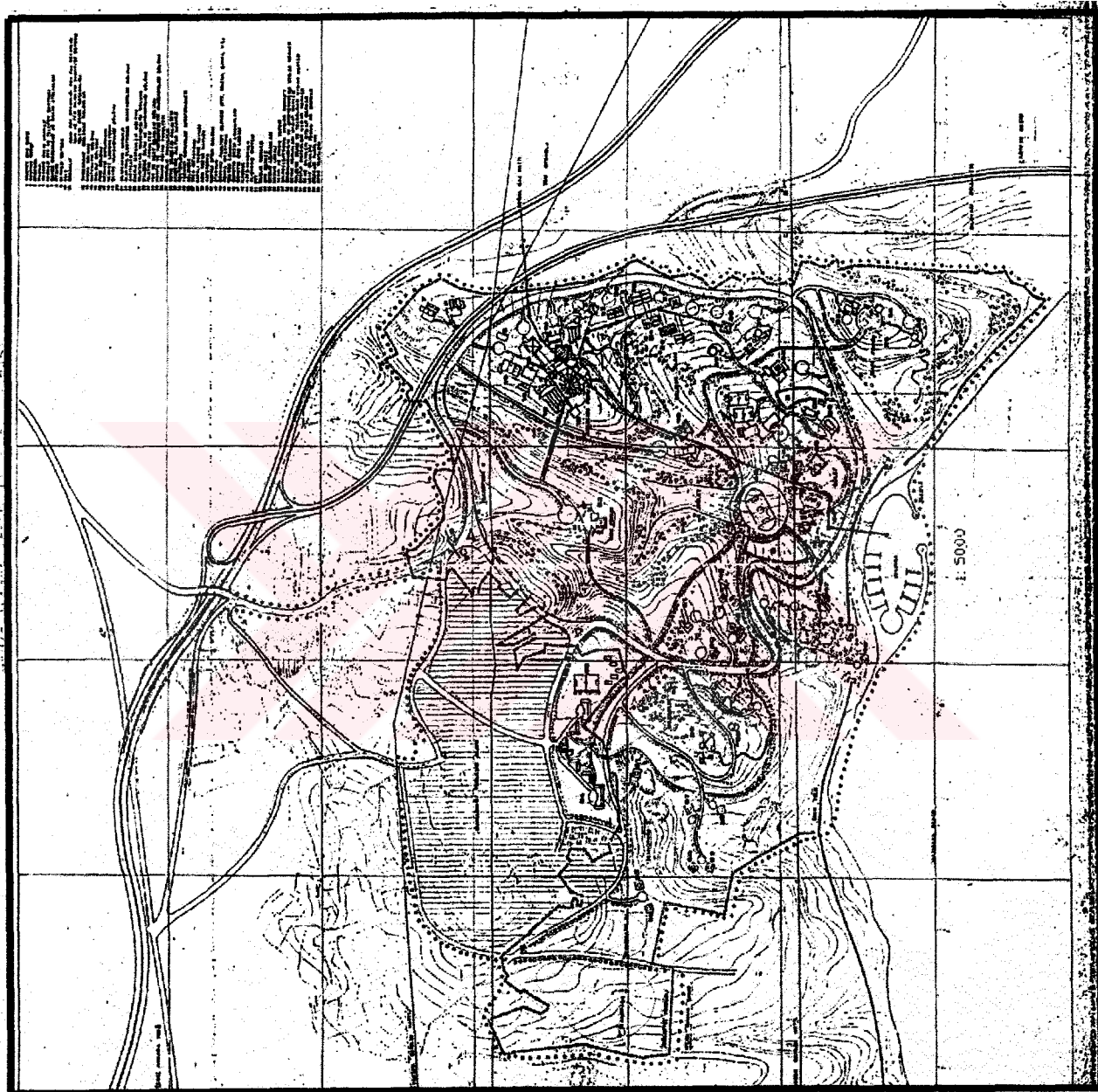
APPENDIX NO 12: Campus Plan of Celal Bayar University.



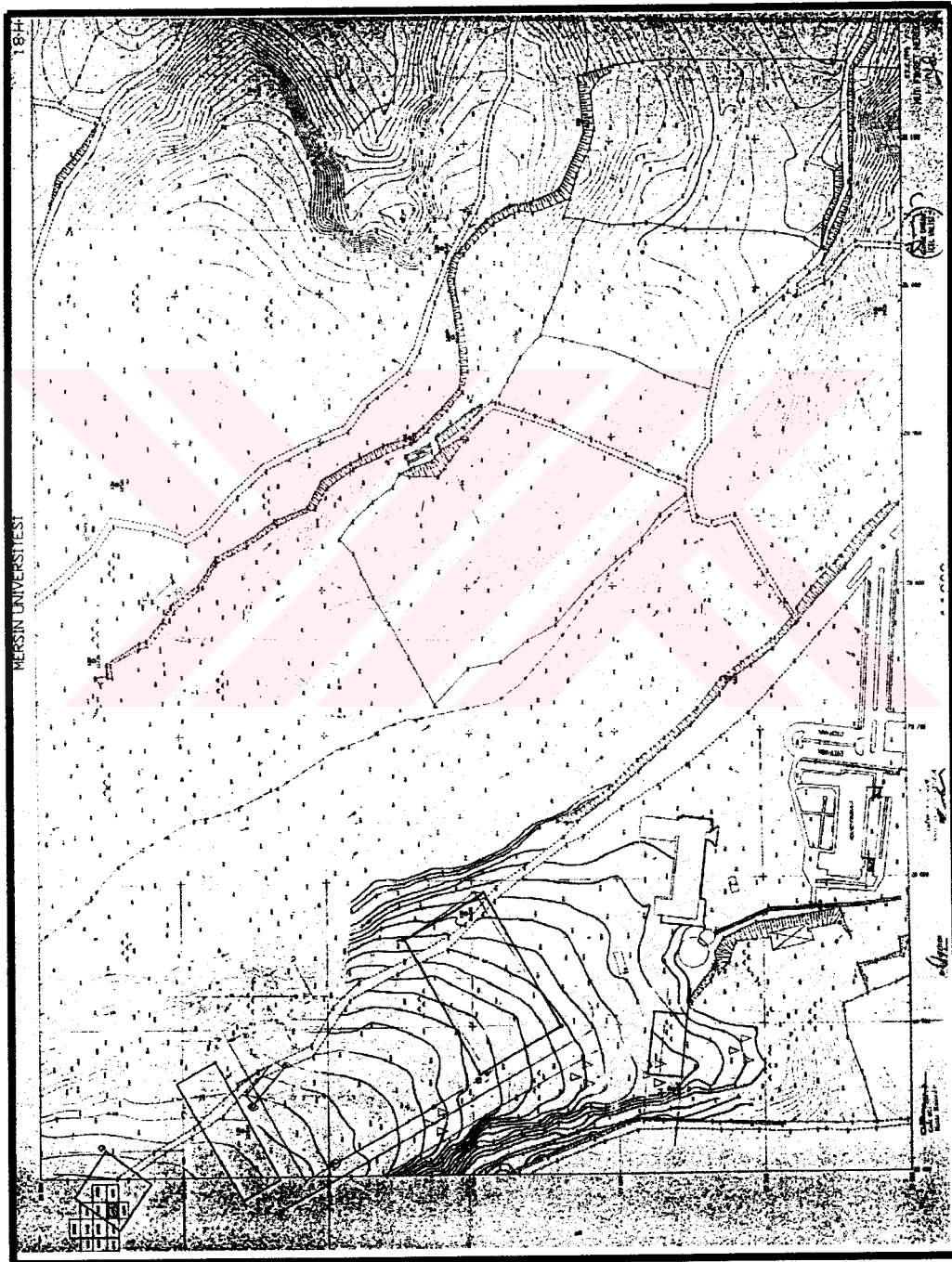
**APPENDIX NO 13: Campus Plan of Mimar Sinan University**



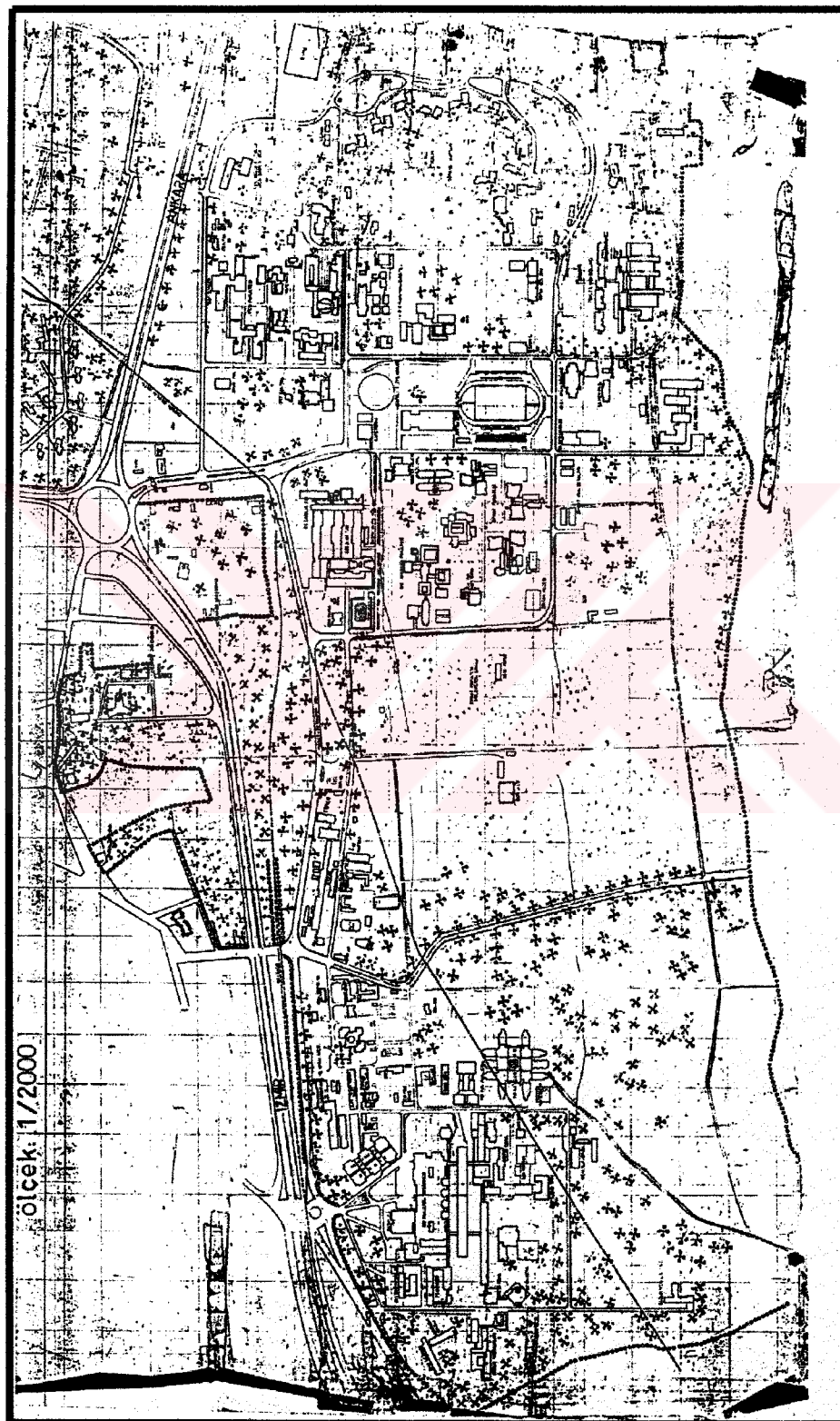
APPENDIX NO 14 :Campus Plan of Gebze Y T E



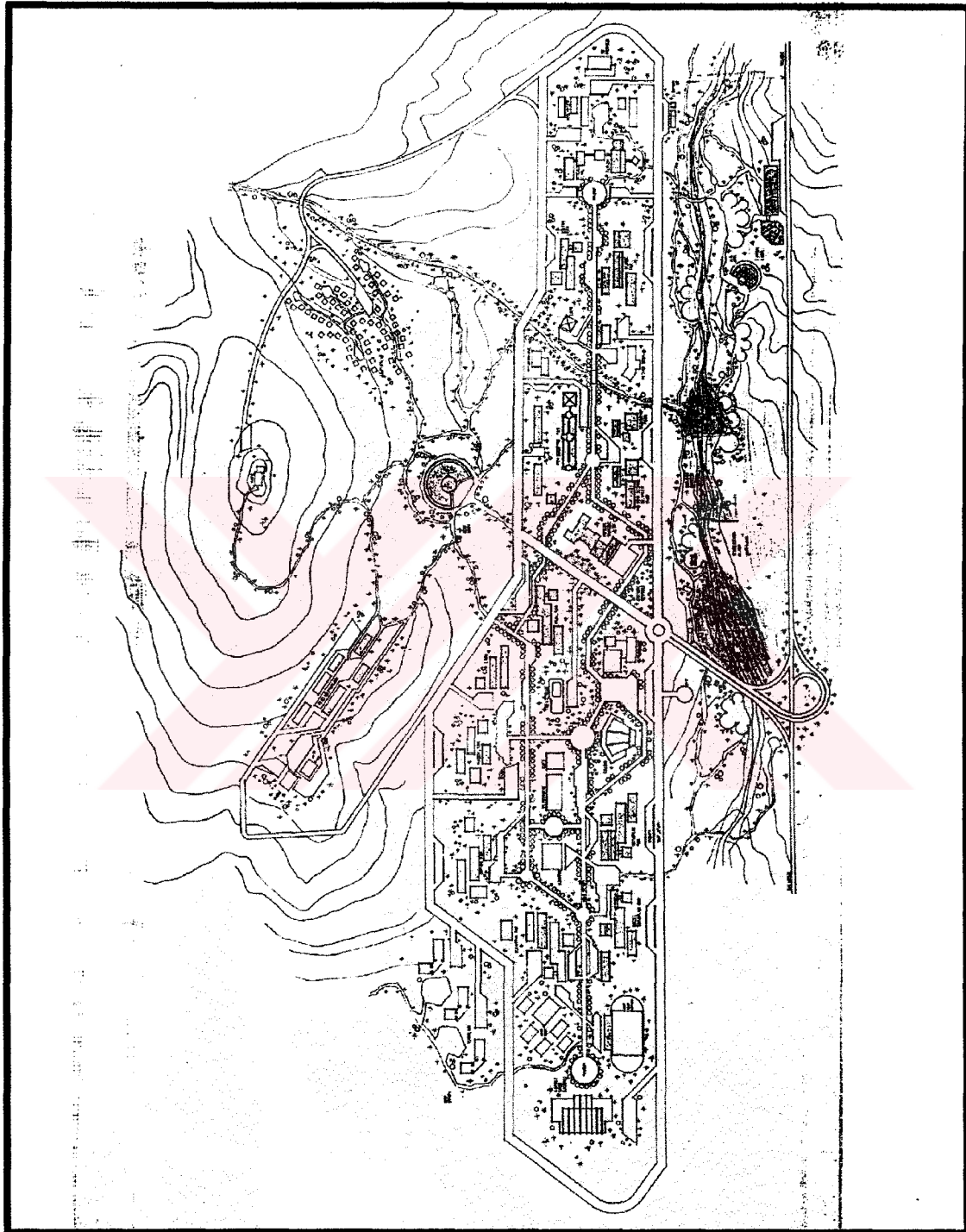
APPENDIX NO:15 Campus Plan of Mersin University.



APPENDIX NO 16: Campus Plan of Aegean University



**APPENDIX NO 17: Campus Plan of Balıkesir University**

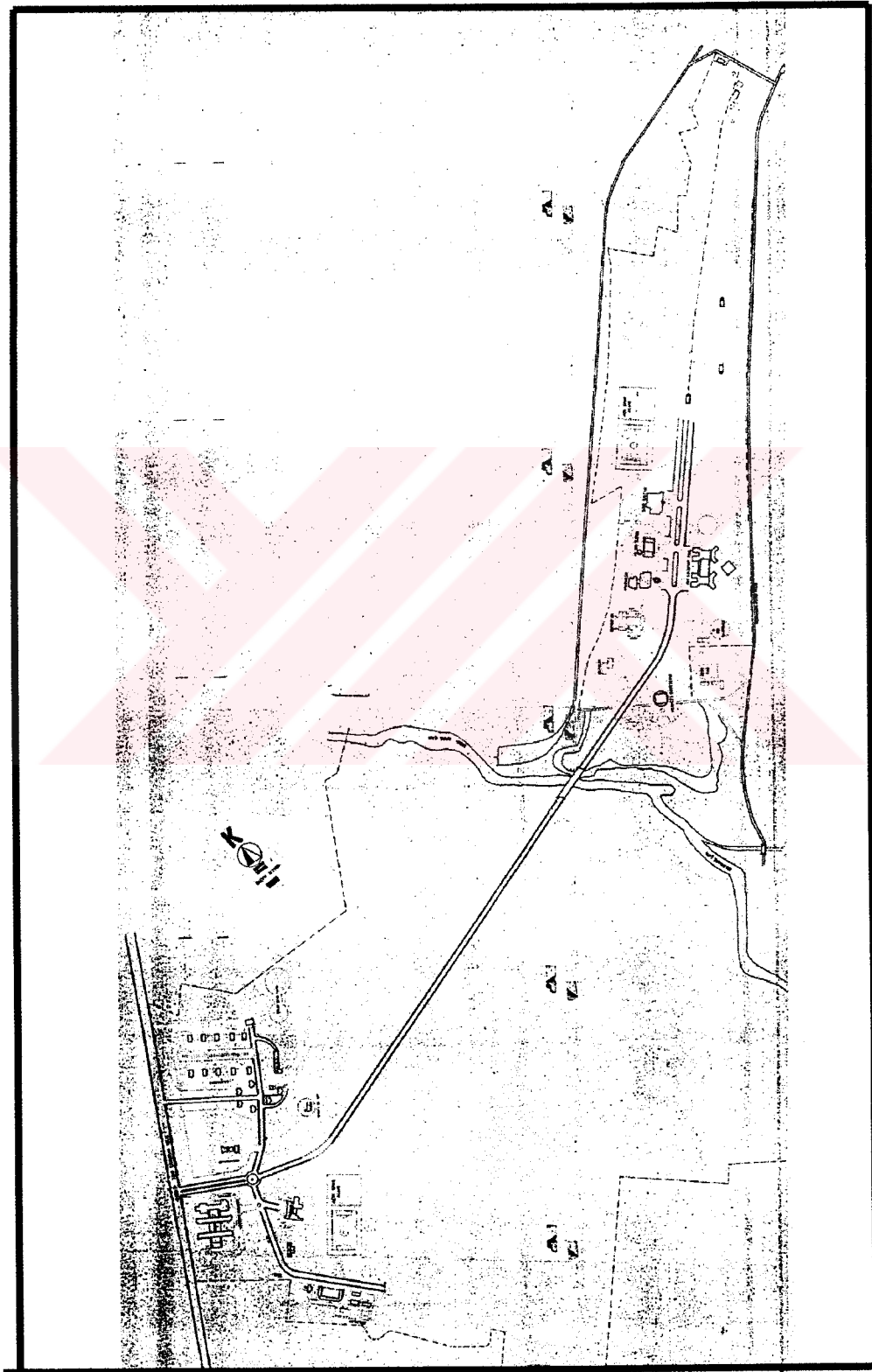


APPENDIX NO 18: Campus Plan of Kahramanmaraş Sütçü İmam University

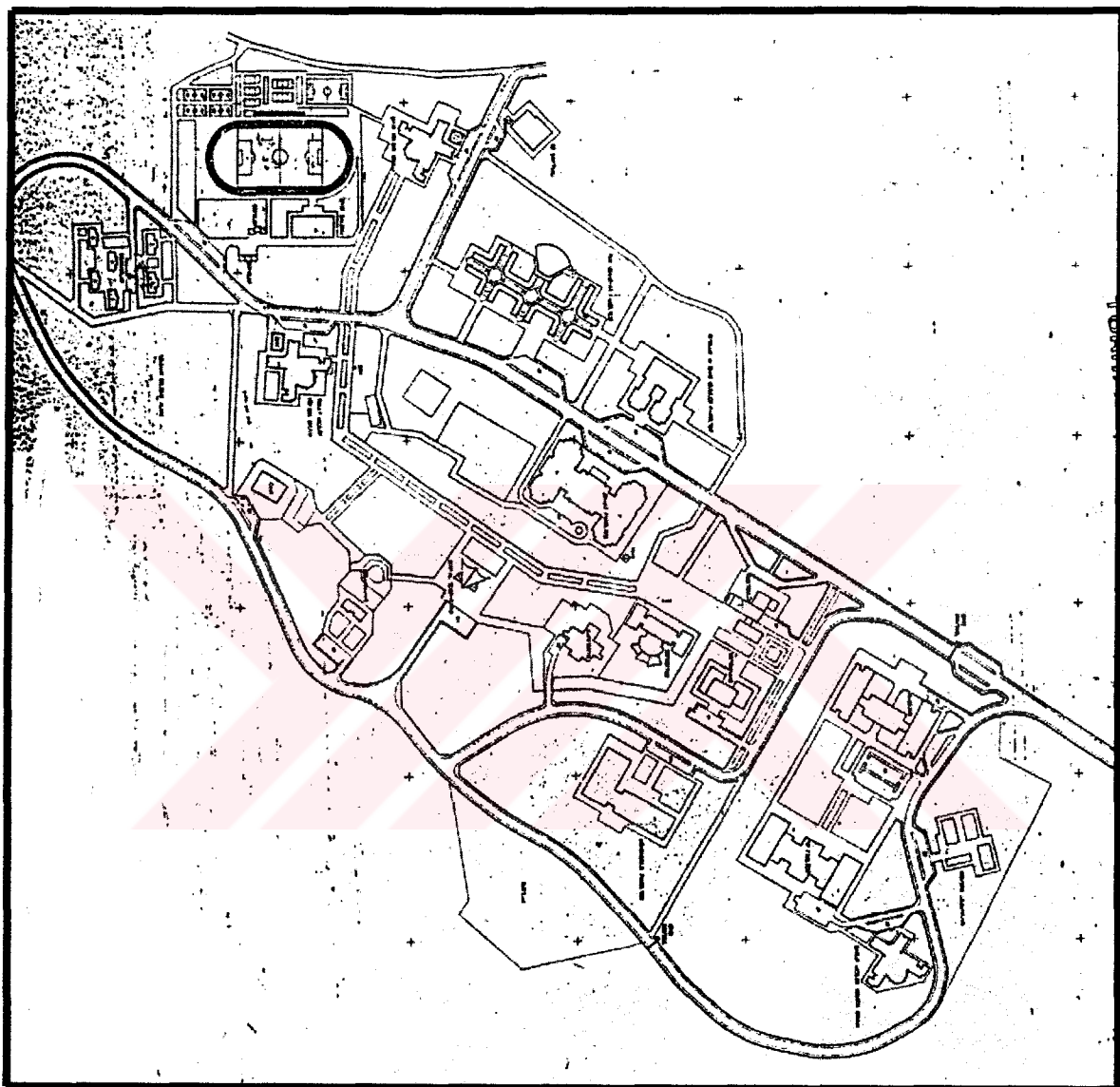




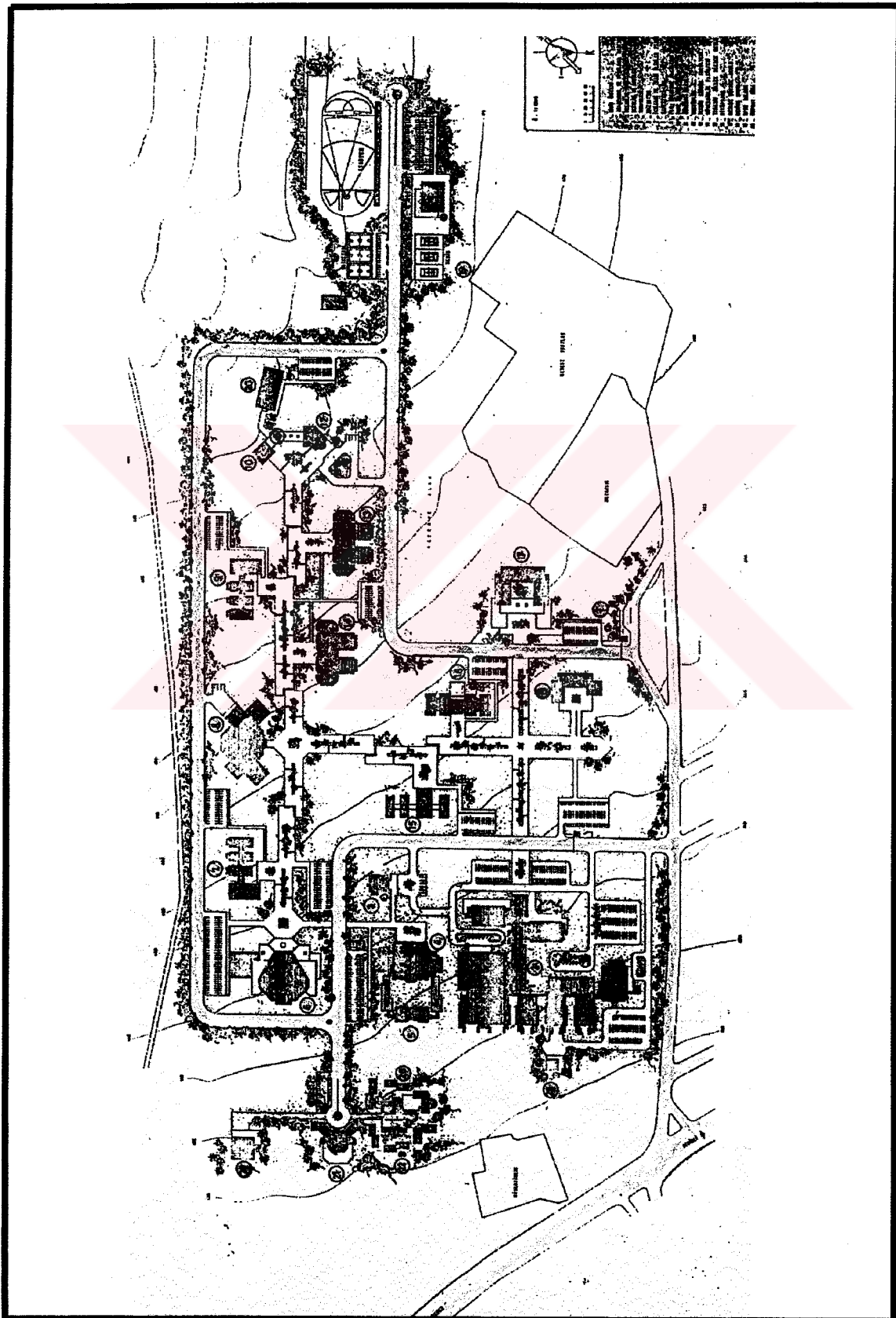
**APPENDIX NO 19: Campus Plan of Kafkas University.**



**APPENDIX NO 20 : Campus Plan of Tokat Gaziosmanpaşa University**



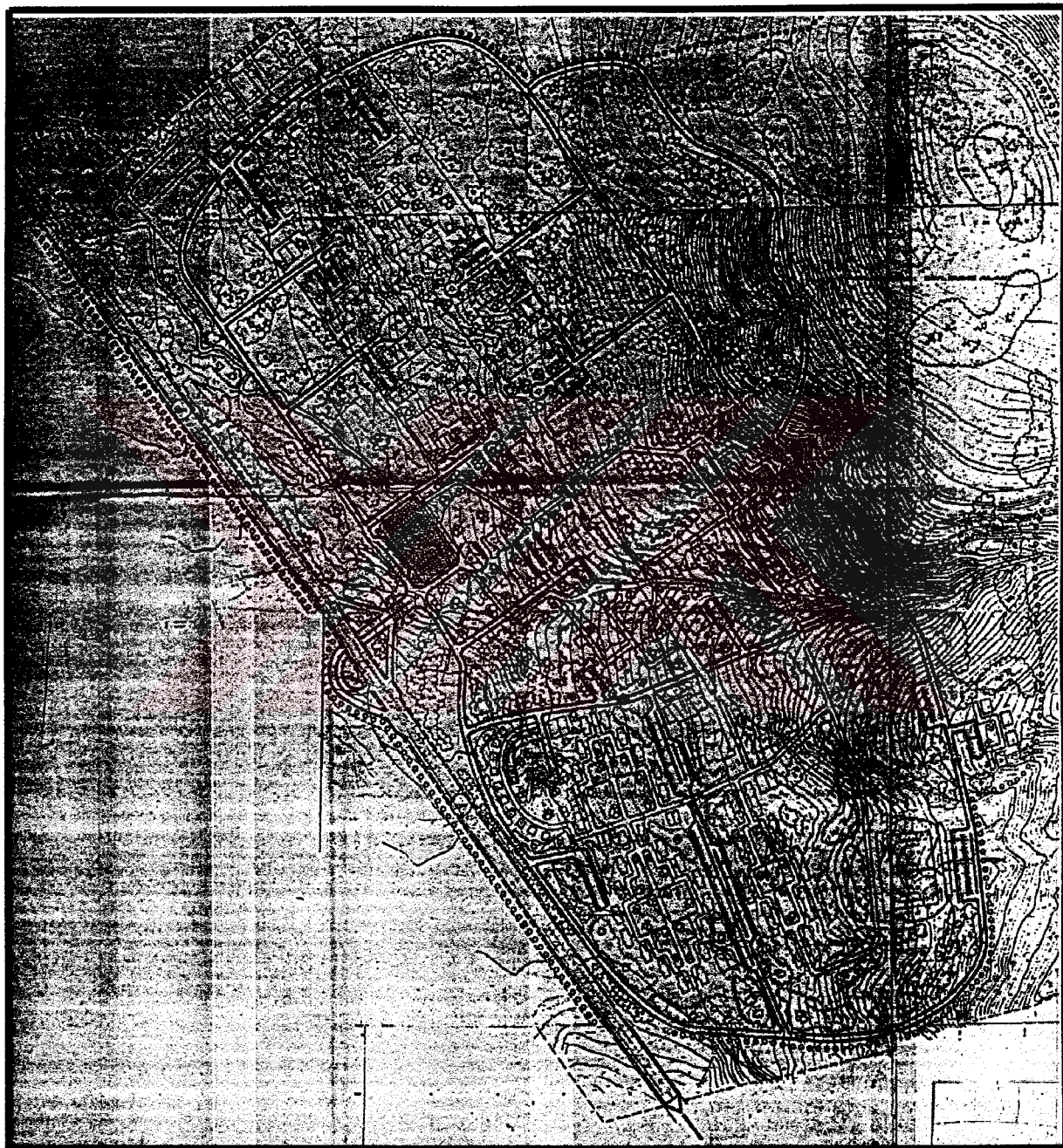
APPENDIX NO 21 :Campus Plan of Pamukkale University



**APPENDIX NO 22 :Campus Plan of Kütahya Dumlupınar University**

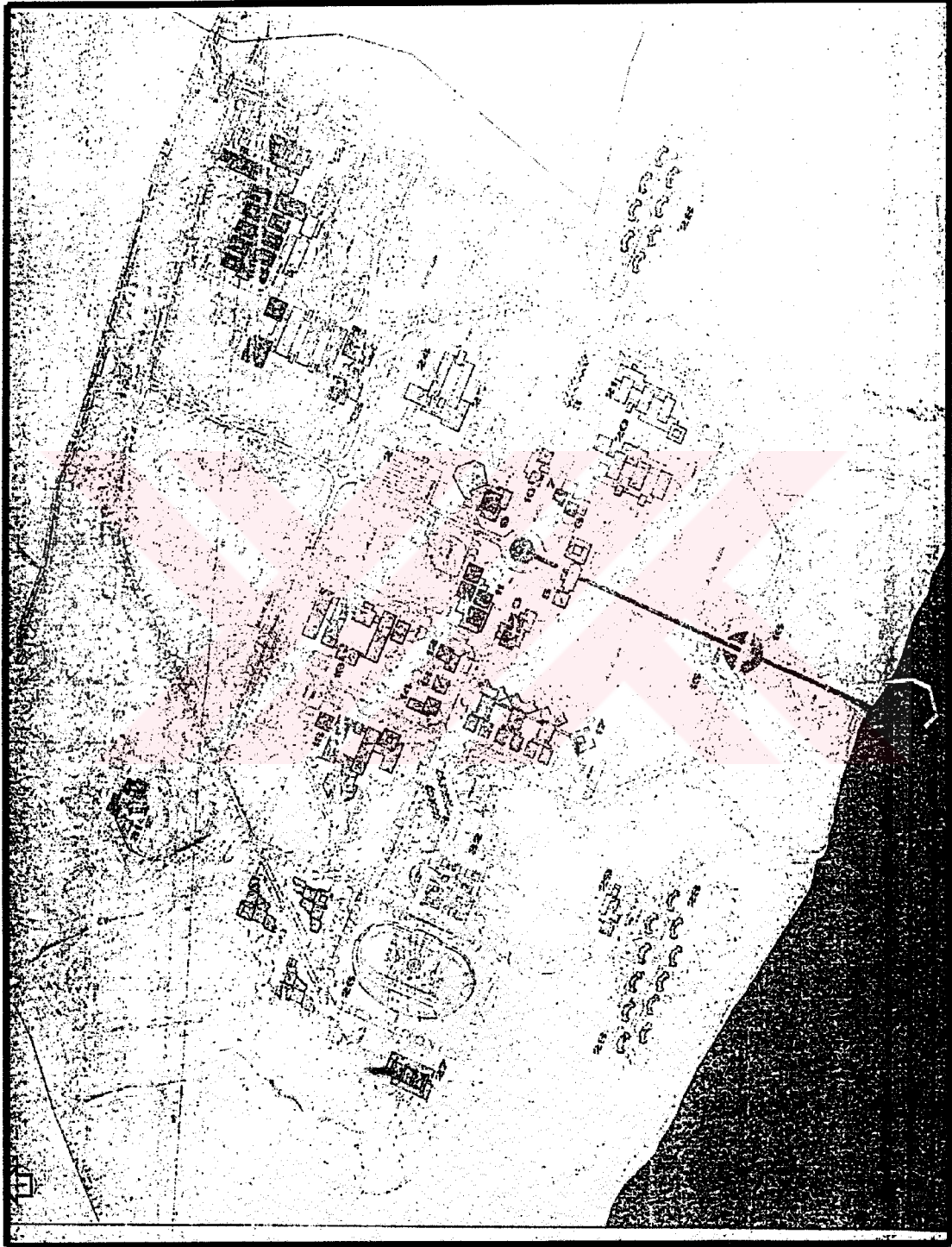


**APPENDIX NO 23: Campus Plan of Kırıkkale University**

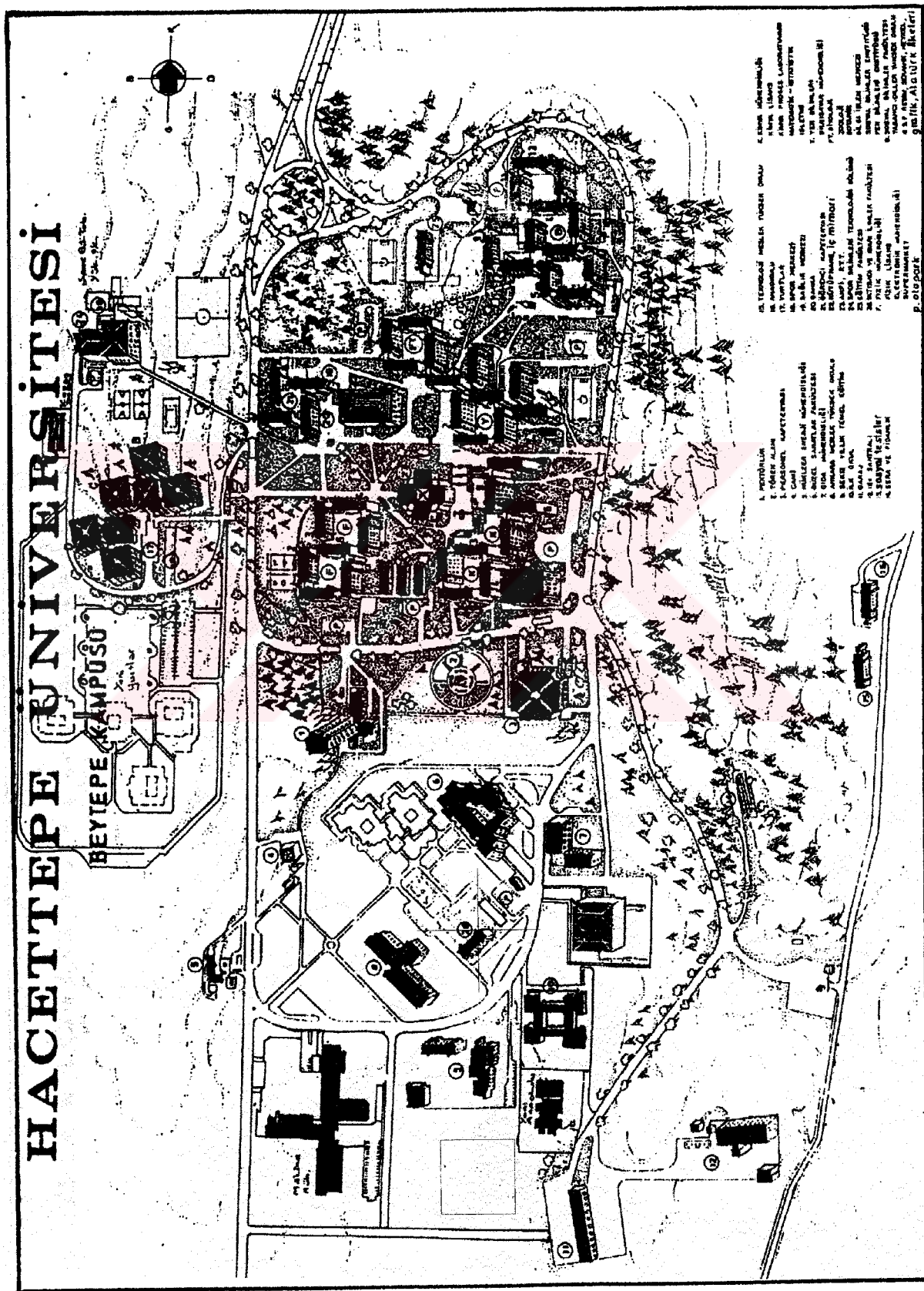




**APPENDIX NO 25 :Campus Plan of Yüzüncü Yıl University**



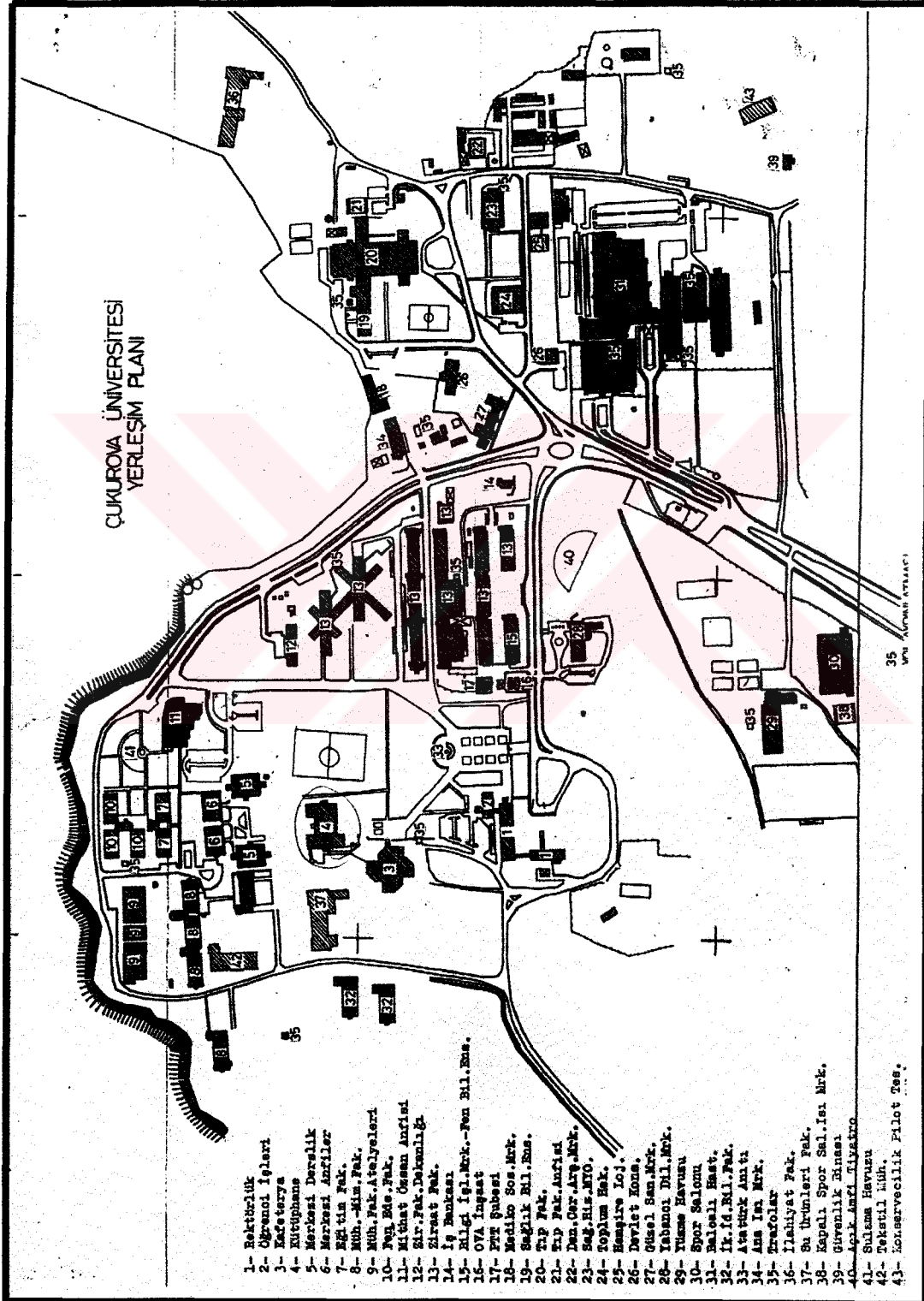
APPENDIX NO 26: Campus Plan of Hacettepe University (Beytepe Campus)



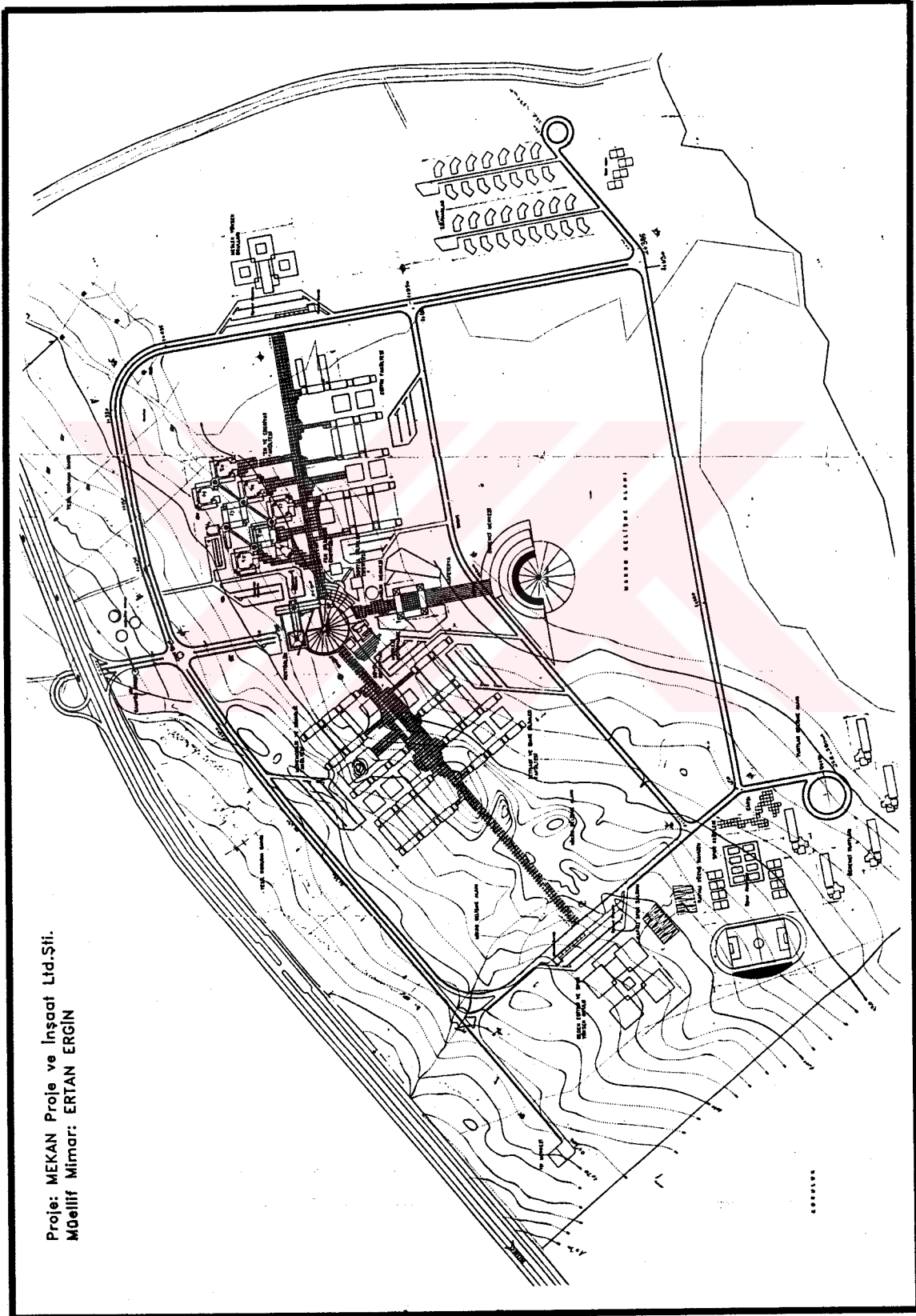




## Appendix no 28 :Campus Plan of Çukurova University

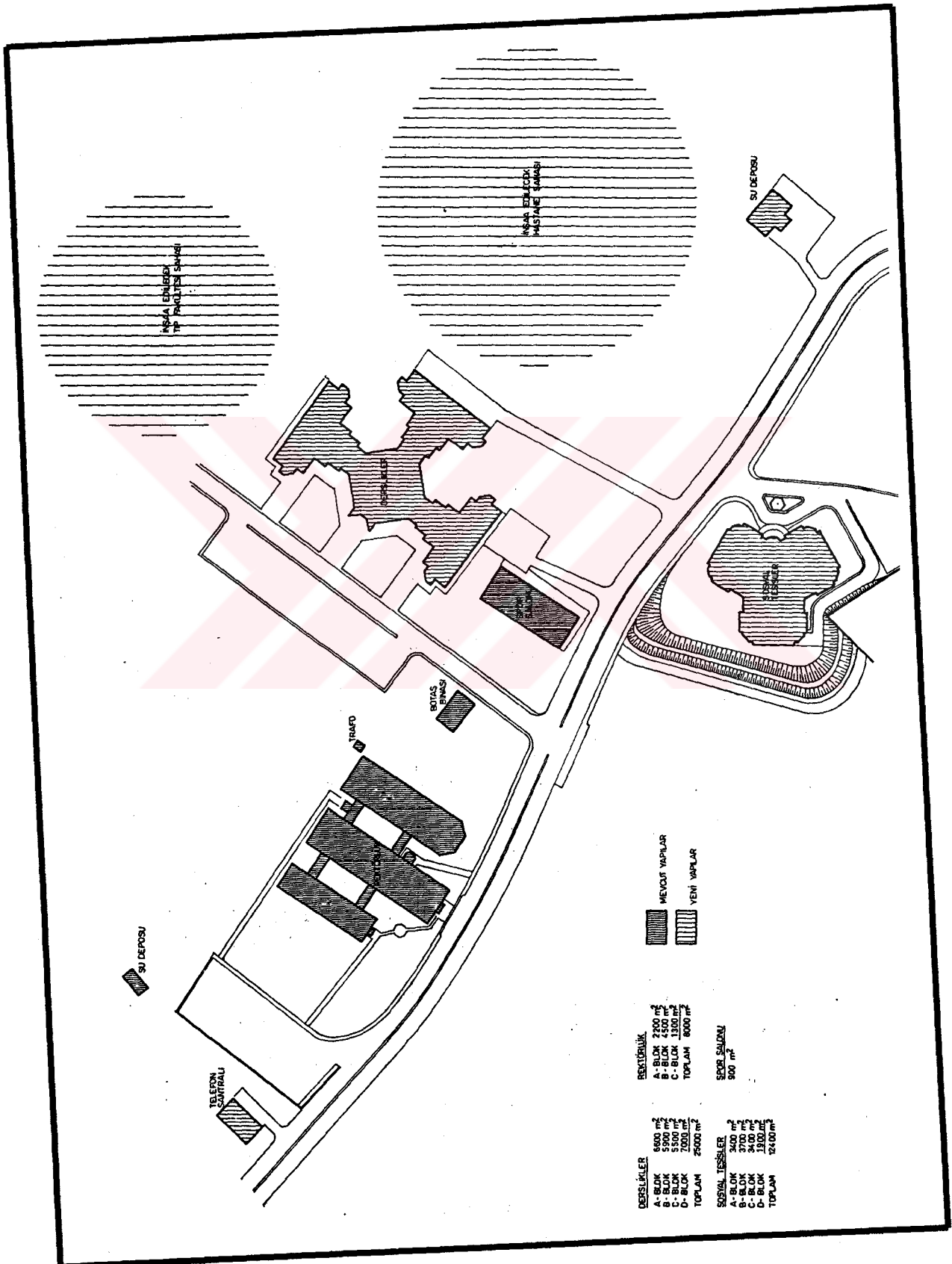


## APPENDIX NO 29 : Campus Plan of Niğde University

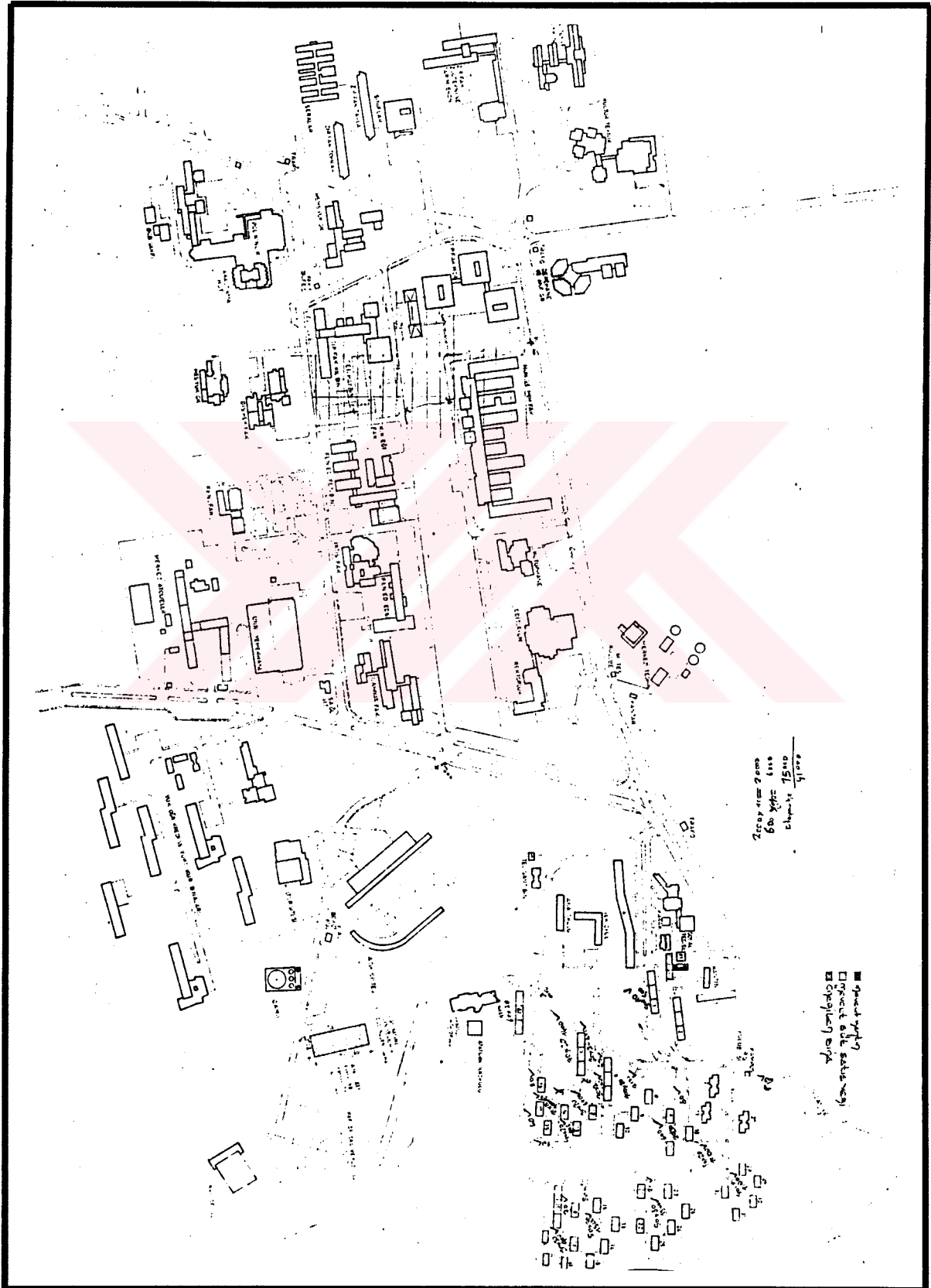




APPENDIX NO 31 : Campus Plan of Başkent University



### APPENDIX NO 32 : Campus Plan of Atatürk University



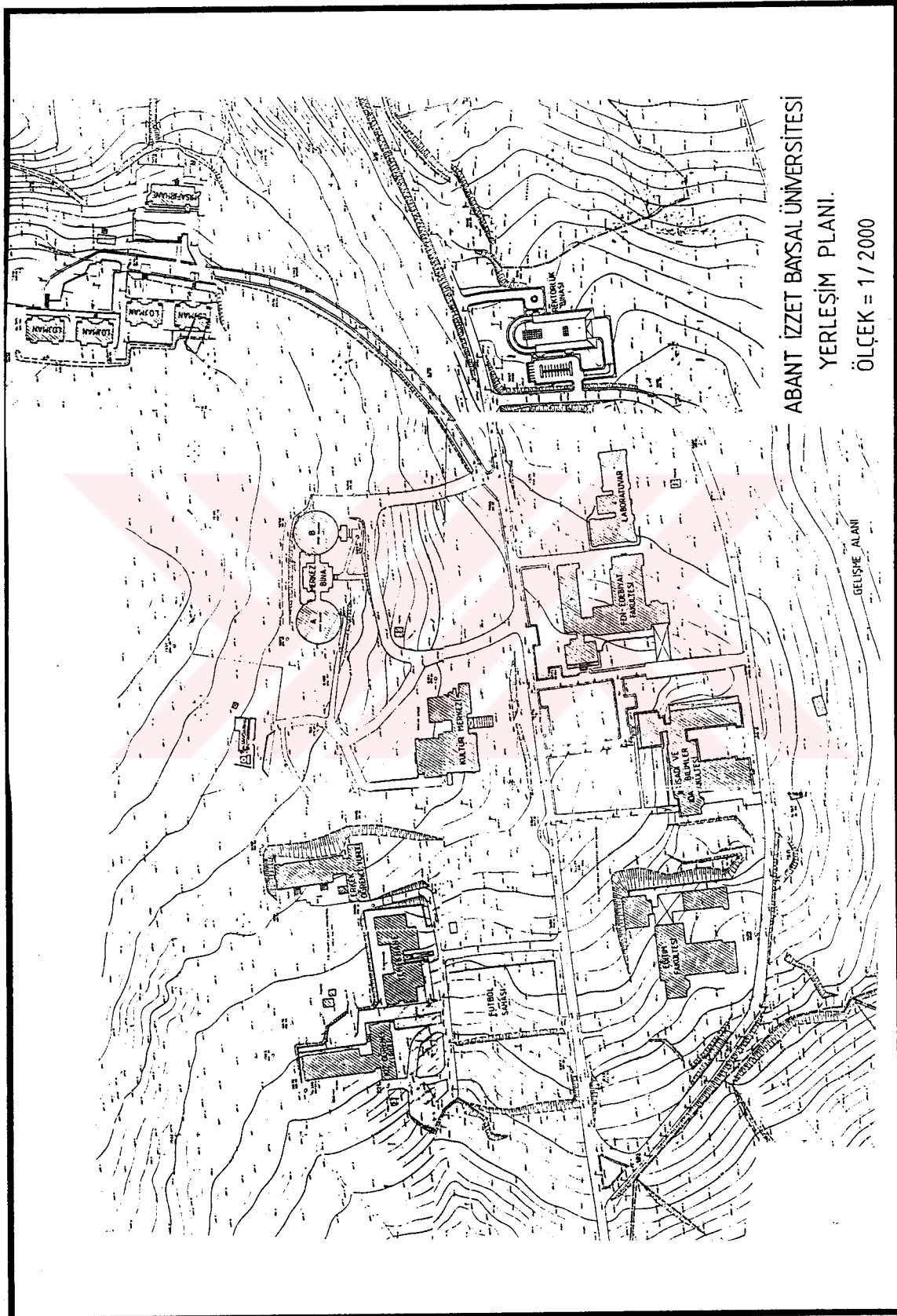




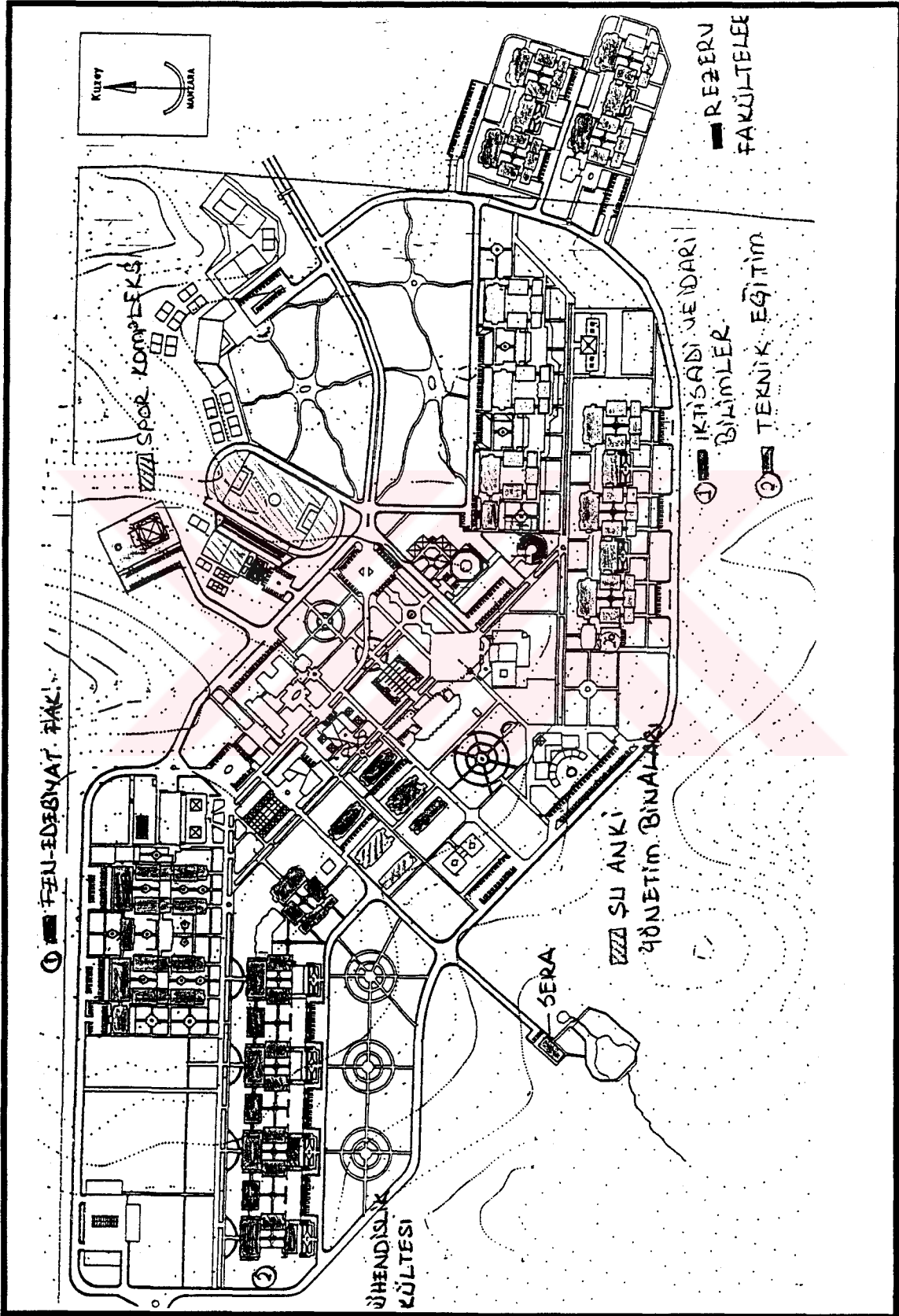




APPENDIX NO 36 :Campus Plan of Abant İzzet Baysal University

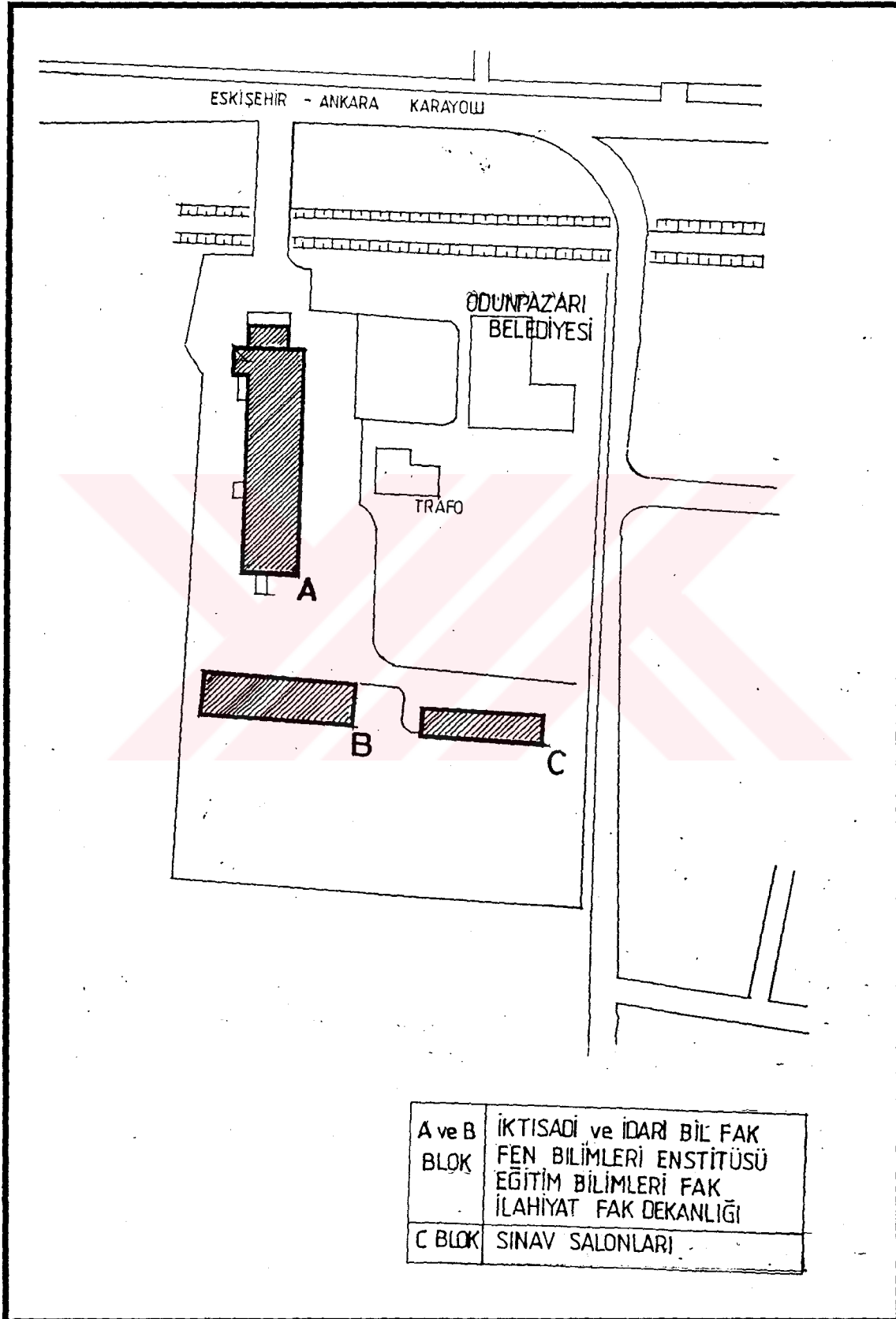


APPENDIX NO 37 :Campus Plan of Sakarya University

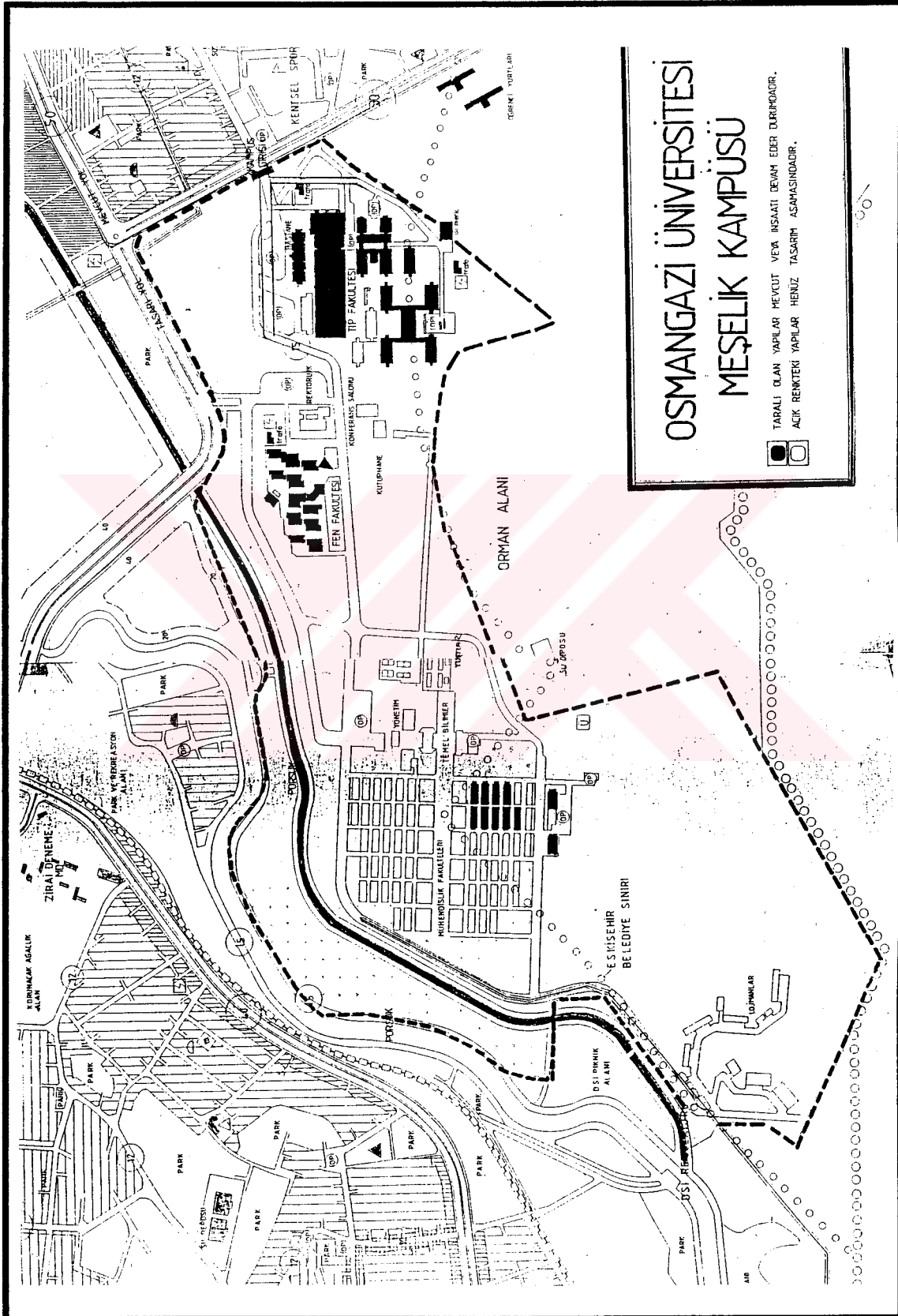




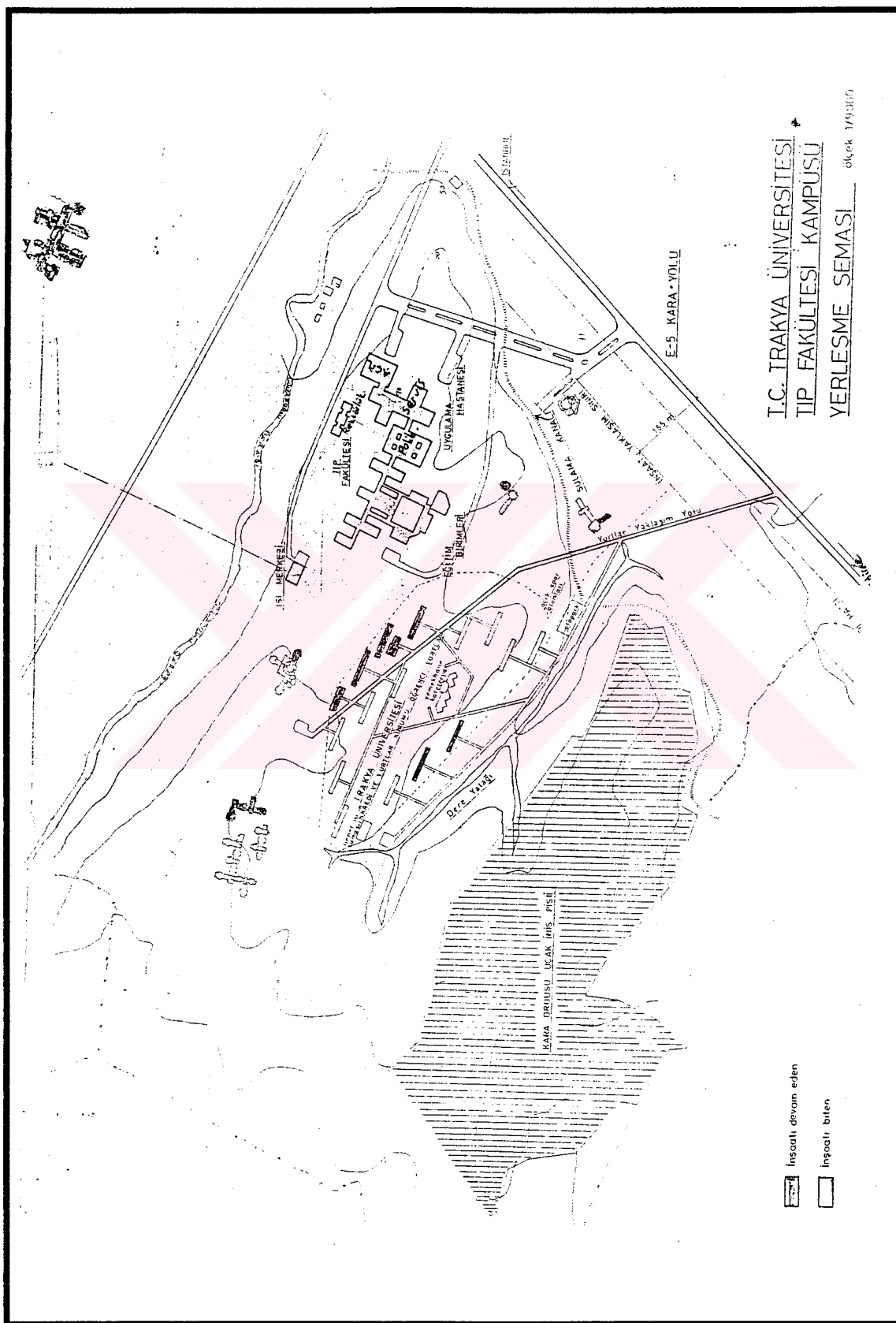
APPENDIX NO 39 :Campus Plan of Osmangazi University (Çamlık Campus)



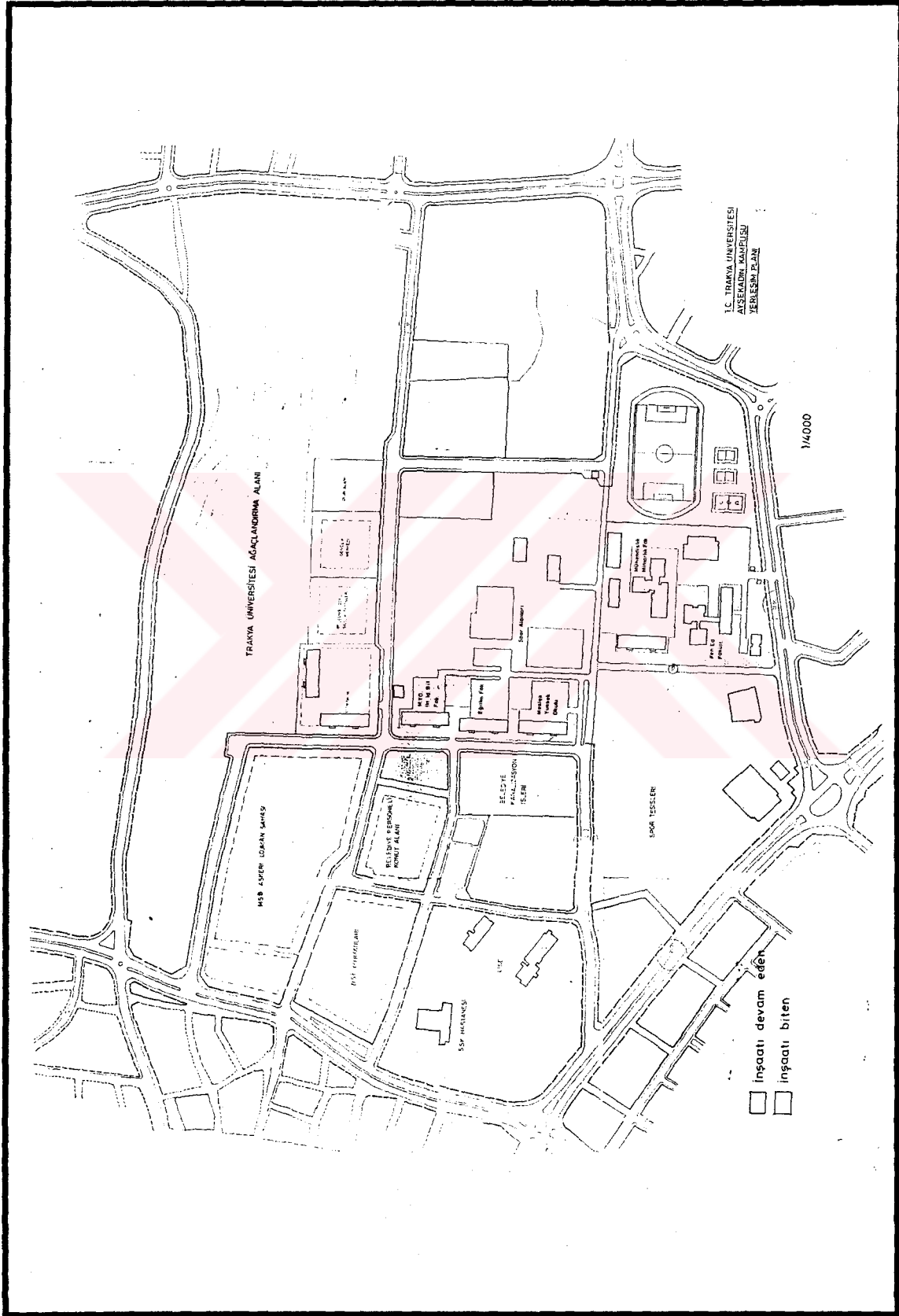
## APPENDIX NO 40 :Campus Plan of Osmangazi University (Meşelik Campus)



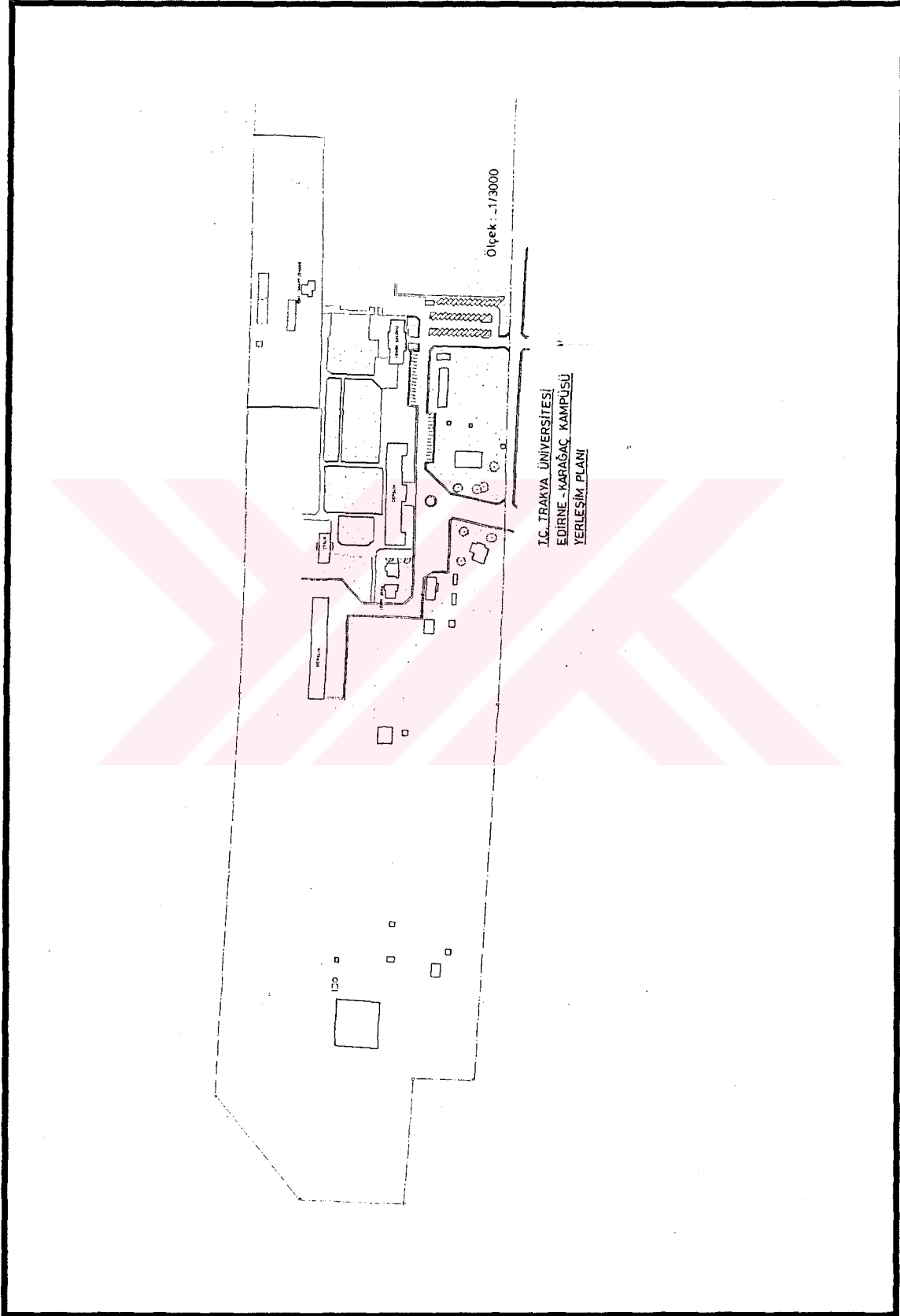
APPENDIX NO 41: Campus Plan of Trakya University (Medicine Campus)



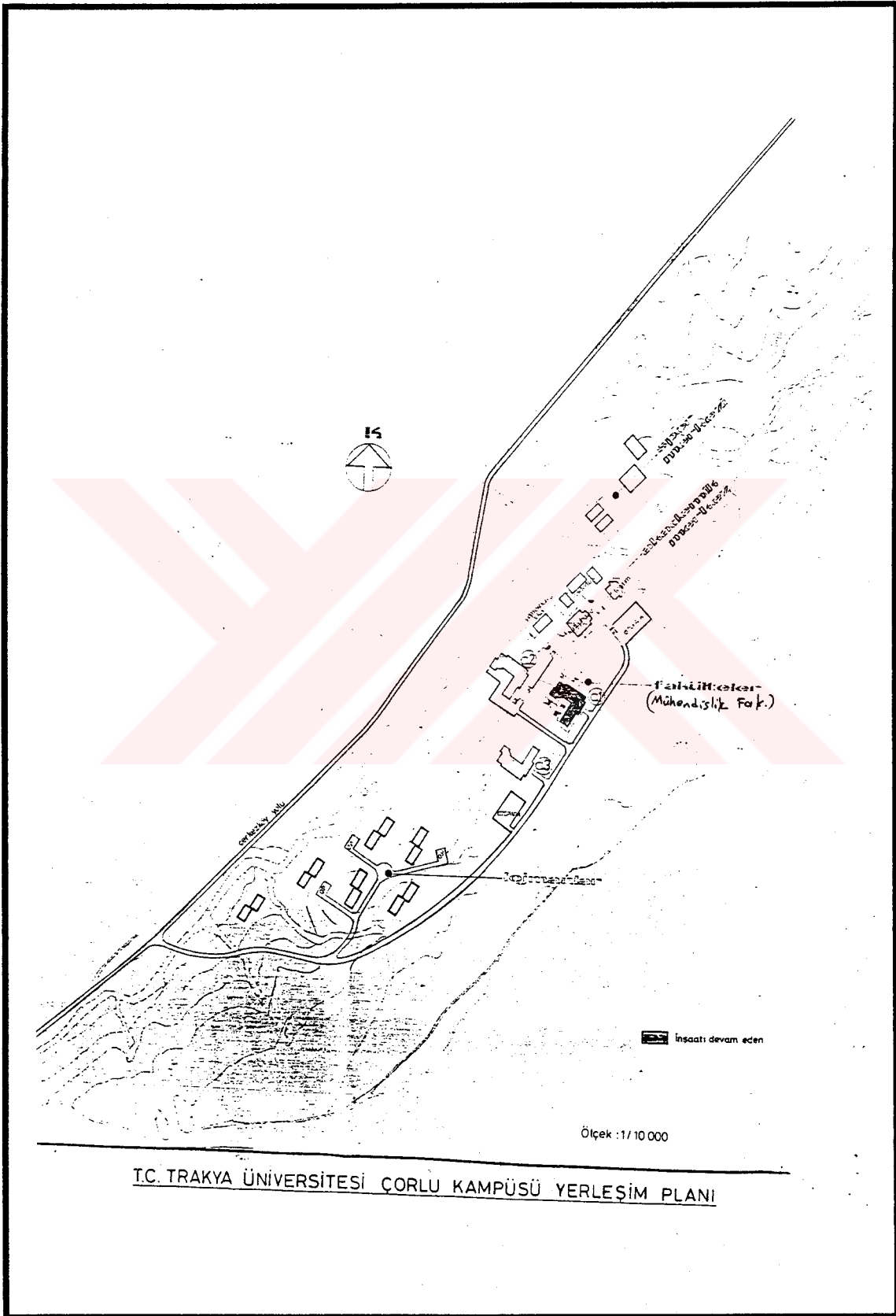
**APPENDIX NO 42: Campus Plan of Trakya University (Ayşekadın Campus)**



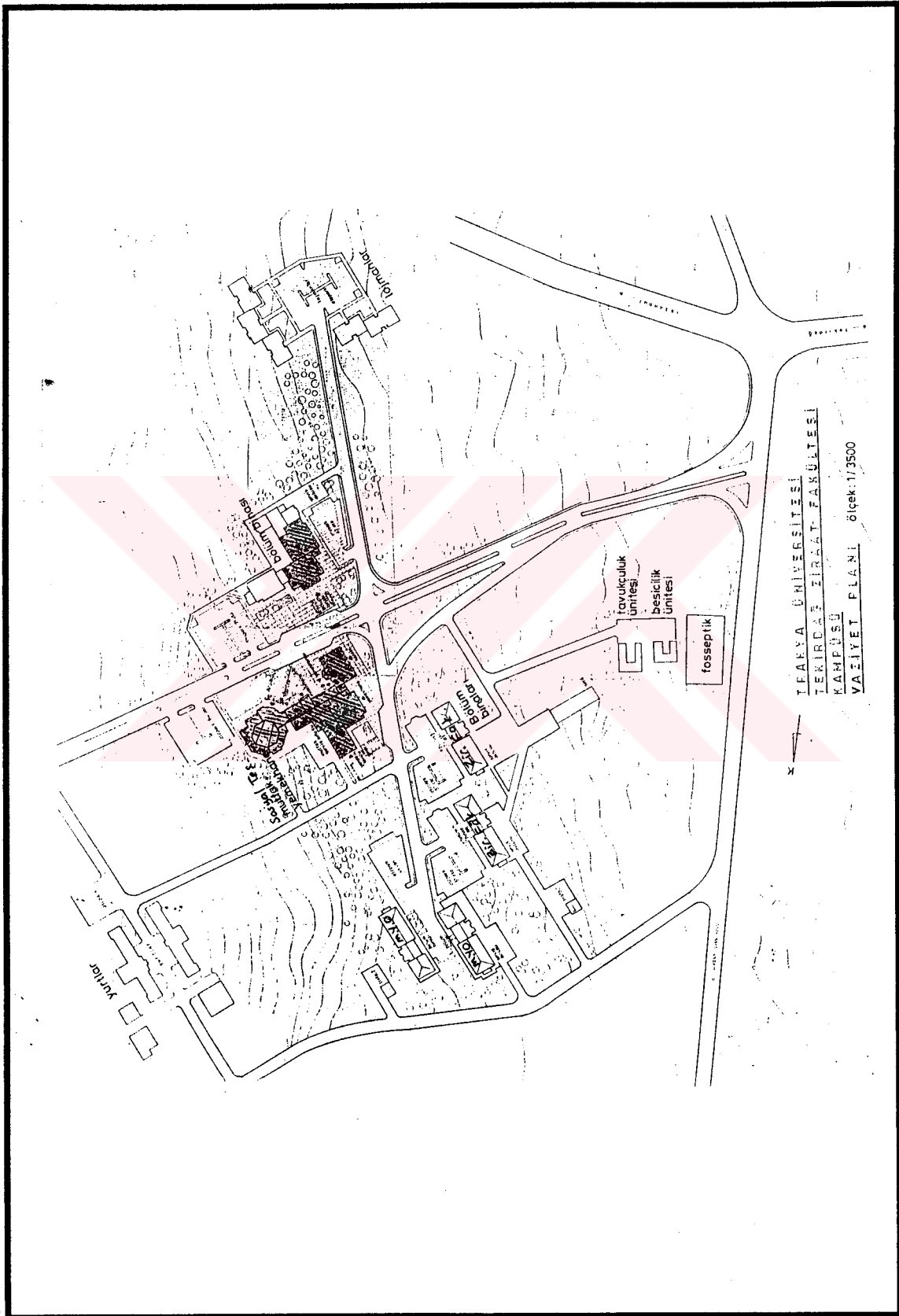


**APPENDIX NO 43: Campus Plan of Trakya University (Karaağaç Campus)**

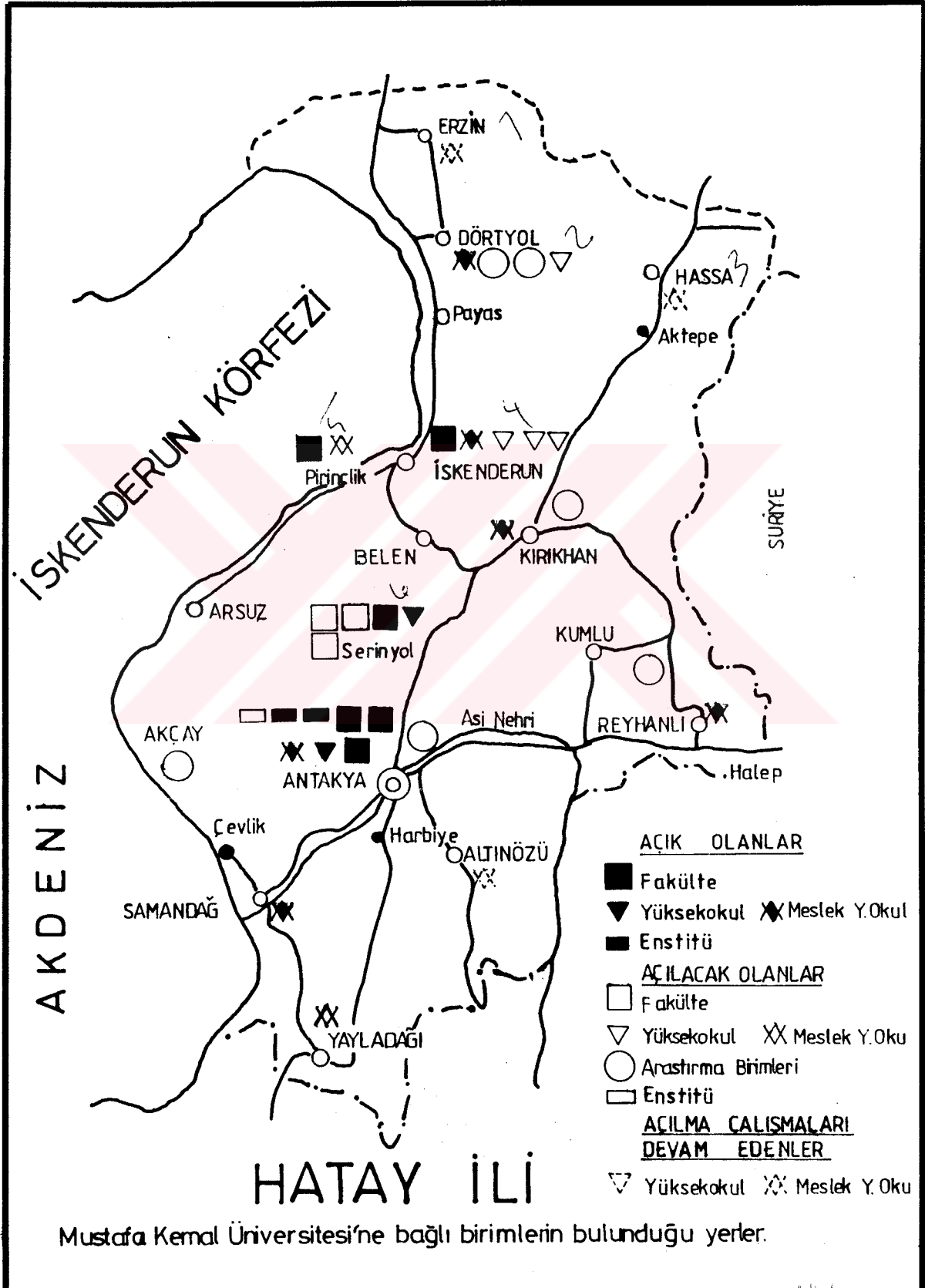
**APPENDIX NO 44: Campus Plan of Trakya University (Çorlu Campus)**



**APPENDIX NO 45 :Campus Plan of Trakya University (Tekirdağ Campus)**



## APPENDIX NO 46; Campus Places of Mustafa Kemal University

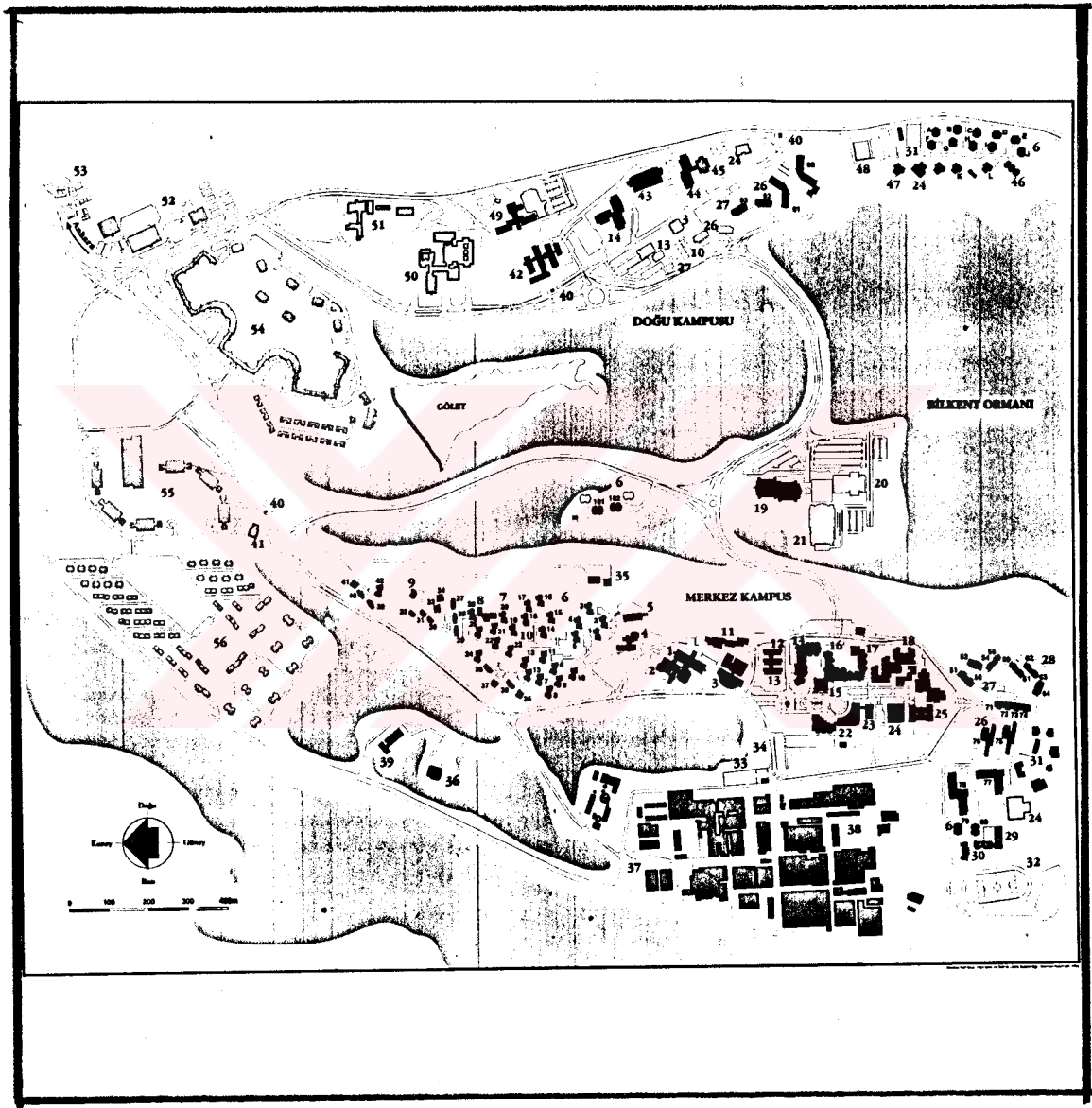


**APPENDIX NO 47: Campus Plan of Erciyes University**



**EC YÜKSEKÖĞRETİM KURULU  
DOKÜMANTASYON MERKEZİ**

APPENDIX NO 48: Campus Plan of Bilkent University.





## APPENDIX NO 50: Campus Places of Yıldız Technical University

**YILDIZ TEKNİK ÜNİVERSİTESİ  
KAMPÜS ALANLARI**

**KULANILAN ALANLAR**

<b>MERKEZ KAMPÜS</b>	<b>118.000</b>	<b>m2</b>
<b>ŞİŞLİ KAMPÜSÜ</b>	<b>5982</b>	<b>m2</b>
<b>AYAZAĞA KAMPÜSÜ</b>	<b>8844</b>	<b>m2</b>
<b>LOJMAN</b>	<b>6950</b>	<b>m2</b>
<b>TOPLAM</b>	<b>139.776</b>	<b>m2</b>

**KULLANILMAYAN ALANLAR**

<b>K.BAKKALKÖY KAMPÜSÜ</b>	<b>642.201</b>	<b>m2</b>
<b>SİLİVRİ KAMPÜSÜ</b>	<b>181.538</b>	<b>m2</b>
<b>KAĞITHANE KAMPÜSÜ</b>	<b>211.480</b>	<b>m2</b>
<b>TOPLAM</b>	<b>1.035.219</b>	<b>m2</b>
<b>GENEL TOPLAM</b>	<b>1.174.995</b>	<b>m2</b>