THE NORTH CAMPUS, A FUNCTIONAL DESIGN AND LANDSCAPE FOR AN ADDITION TO VIRGINIA POLYTECHNIC INSTITUTE

by

Caddy (Rowan) Meekins III

Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute
in candidacy for the degree of

MASTER OF SCIENCE
in
Ornamental Horticulture

APPROVED:

Director of Graduate Studies

Dean of Agriculture

APPROVED:

Head of Department

Major Professor

June, 1958

Blacksburg, Virginia

TABLE OF CONTENTS

Page

INDEX TO TABLES AND PLATES

Tables

Plates

ACKNOWLEDGMENTS

The writer wishes to express her sincere appreciation to the following persons for their assistance and guidance in this thesis project: to Professor A. S. Beecher, Department of Horticulture, for his general supervision of the project, suggestions and constructive criticisms, and for his guidance in developing the problem; to Associate Professor H. H. Wiss of the Department of Architecture, for his help in locating recent literature on University Design, and for his assistance in various phases of architectural design; to Mr. H. P. C. Vandenburg, the Planning Engineer for Virginia Polytechnic Institute, for devoting his time to discussing with the writer the problems of expansion of this school, for providing her with the plans of Alfred Hopkins and Associates, with topographical maps, and with some of the technical data required by the writer in order to make projections of space requirements; to Dr. W. P. Judkins, Head of the Department of Horticulture, for assistance in outlining the thesis project, and for reviewing the manuscript; and to Dr. J. H. Tinga of

the Department of Horticulture for reviewing the lists of plant materials, and for assistance in editing the thesis manuscript.

INTRODUCTION

Object of the Investigation

Since the early years in the development of our colleges and universities, buildings and campuses were designed to accommodate an enrollment which was normal for the times. Very little, if any plans were ever made to allow for the growth of student populations to the tremendous proportions encountered today. In 1875, only 0.1 per cent of our population attended a school of higher learning, and by the 1900's this figure had increased only to 4 per cent. In view of this, it was not foreseen by our school planners that there would be need one day for colleges capable of accommodating anywhere from two to twenty thousand students.

According to projections made by the Census Bureau, the number of college-age persons (18 to 24 years) will increase by nearly two-thirds between now and 1970. While this does not mean an equal increase in college enrollments, it indicates a substantial rise in the expected enrollments. The

Office of Education has estimated that by 1970 enrollments in schools of higher learning will be double what it is today.

The Census Bureau concludes that while the pressure for new facilities will not be the same in all parts of the nation, certain areas can be termed "pressure spots". Among them is Virginia.

Plans for the expansion of Virginia Polytechnic Institute have been prepared by Alfred Hopkins and Associates based upon the requirements set forth by the Building Committee of V. P. I. These plans are based on an axial design focused upon Burruss Hall and the Drill Field.

The object of this thesis is to present an alternative design for the northwest part of the campus in anticipation of future growth of the student population and the necessary expansion of the college facilities. The approach to this design is a deviation from the more conventional manner of site planning in which the designer prepares a completed plan with the various building units interdependent upon each other and upon the

plan as a whole. The writer proposes to offer instead a plan which is not "complete" in that it may be altered or expanded without effect upon the substance of the design. The building units are not interrelated by design, only by function; the whole design may be thought of as a series of interlinking units, each a separate entity but held together by functional continuity like many charms on a bracelet.

Statement of the Problem

It is felt by the writer that the axial approach to the expansion of the V. P. I. campus may be inconsistent with the size of the institution and with the topography of the site.

The Building Committee, in their report, fixed a limitation of the ultimate student body of 6,000 and it was with this figure in mind that the Hopkins studies were made. The Hopkins Report (Hopkins, 1946), however, states that, "It has been impressed upon us that in line with the present rate of growth, ten or fifteen years may see an expansion well beyond

this figure." The writer concurs in this opinion, and has based all plans proposed in this thesis upon an ultimate student population of 15,000.

The writer contends that to attempt to expand V. P. I. axially on from Burruss Hall poses three major drawbacks: first, the design is static; that is, it must of necessity be formal in character and cannot easily be adjusted to future needs. Second, an axial design defies the topography. Third, such a design is constricting to the planners of the future, both as to the architecture of the buildings and the landscape of the campus.

This thesis proposes a master plan based on a series of interlinking smaller units which may further be developed as a continuing process as the program of the institution is readjusted through the coming years and as the forms of architecture are developed with the times. The building shapes and their location are determined by the natural land configurations. Visualizing the campus as a small town, the writer has dispensed with the somewhat archaic grid-system plan and has attempted

to make the campus more suburban in character by incorporating several different outdoor areas. The purpose of this is to provide areas of pleasure and quiet within and in close proximity to the various functional units. The overall design is informal and fluid, capable of being utilized in whole or in part, and capable of adjusting to future needs, styles of architecture, and the emotional temper of the times.

Location and Description of the Site

The site of the proposed development and extension of the campus of Virginia Polytechnic Institute lies to the northwest of the present college buildings. Exactly, the area is bounded on the south by the extension of Turner Street; on the west by Route 314; and on the north and east by Prices Fork Road. The area comprises approximately 54 acres of mostly undeveloped land.

Facing Turner Street Extension are the following college buildings: at the southwest end, buildings 365, 364, and 361 which are

temporary wooden structures for the R. O. T. C.; directly behind Burruss Hall is a group of small buildings used for storage; Randolph Hall for Mechanical and Aeronautical Engineering lies to the right of these buildings, followed by a few private homes; between Stanger Street and Prices Fork Road is the V. P. I. Laundry, the Police Station and the Heating Power Plant; and on the southeast corner is the coal yard. The area directly behind the Heating Power Plant is comprised of privately owned lots and residences and a small store.

Roughly, one half of the site in question is presently owned by the college and in addition, several of the lots on the northeast side of the site. It is assumed for the purposes of planning that the college will continue to purchase the residential lots so as to own all the property to Prices Fork Road. Plate 1 shows the relationship of the V. P. I. campus and the site in question to the Town of Blacksburg, Virginia, in which the school is located. Plate 2 shows the relationship

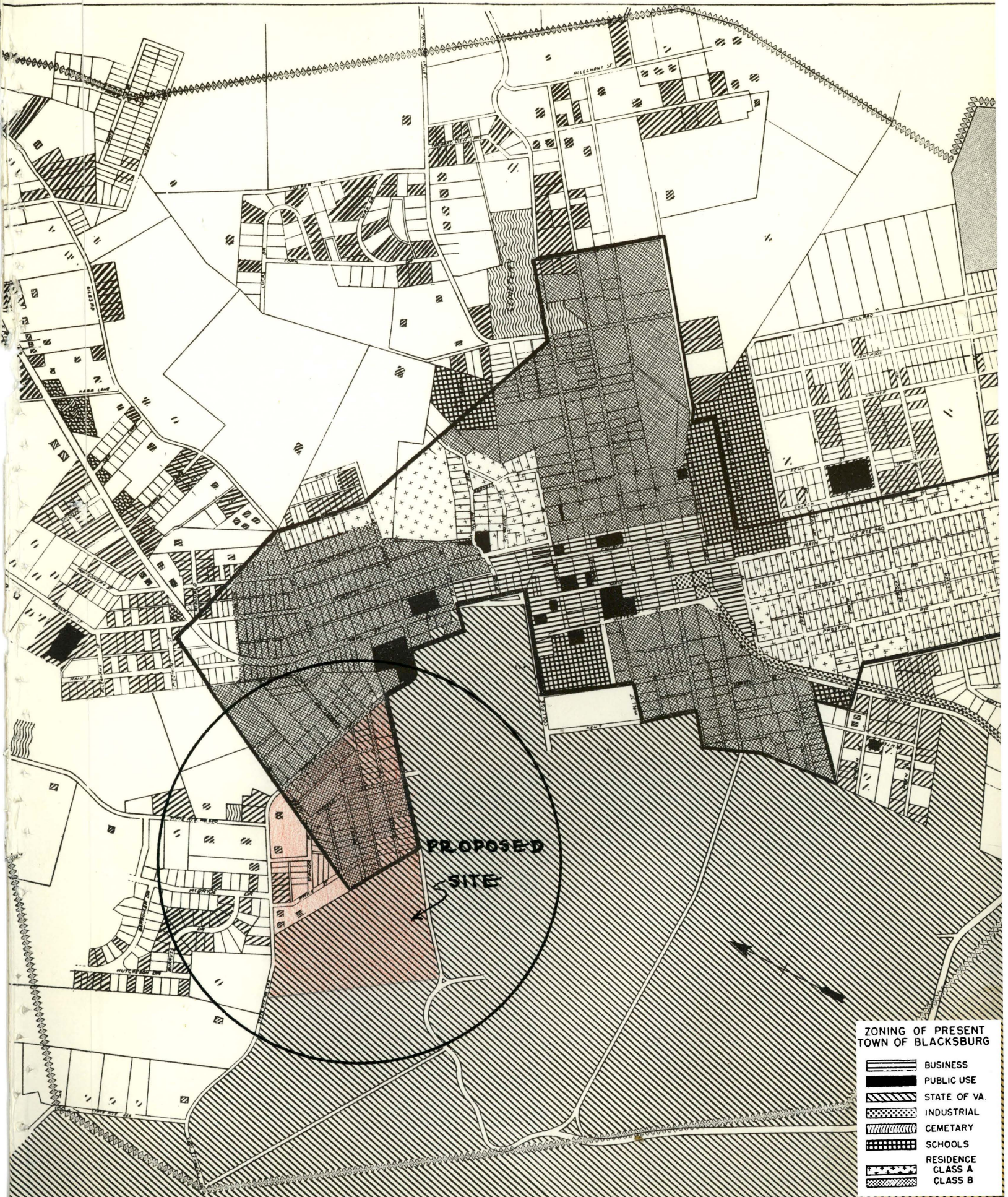


Plate 1. Plan Showing Relationship of Site to Town of Blacksburg, Virginia

of the proposed site to existing college buildings. *

Historical Background of the School

Establishing the College

In 1872, the Virginia Agricultural and Mechanical College was established after a prolonged fight had been waged in the General Assembly by the various colleges (Eggleston, 1918). Each was trying to get a share of the land provided by Congress through the Land-Grant Act which was signed by Mr. Lincoln on the 2nd of July in the year 1862. Mr. Harvey Black, President of the Board of Directors of the Preston and Olin Institute, played an important role in getting the General Assembly to vote in March 1872 to devote two-thirds of the land-grant scrip to the establishment of the Virginia Agricultural and Mechanical College. The Hampton Institute for

---

* Plates 3 to 6 are contained in the Appendix.

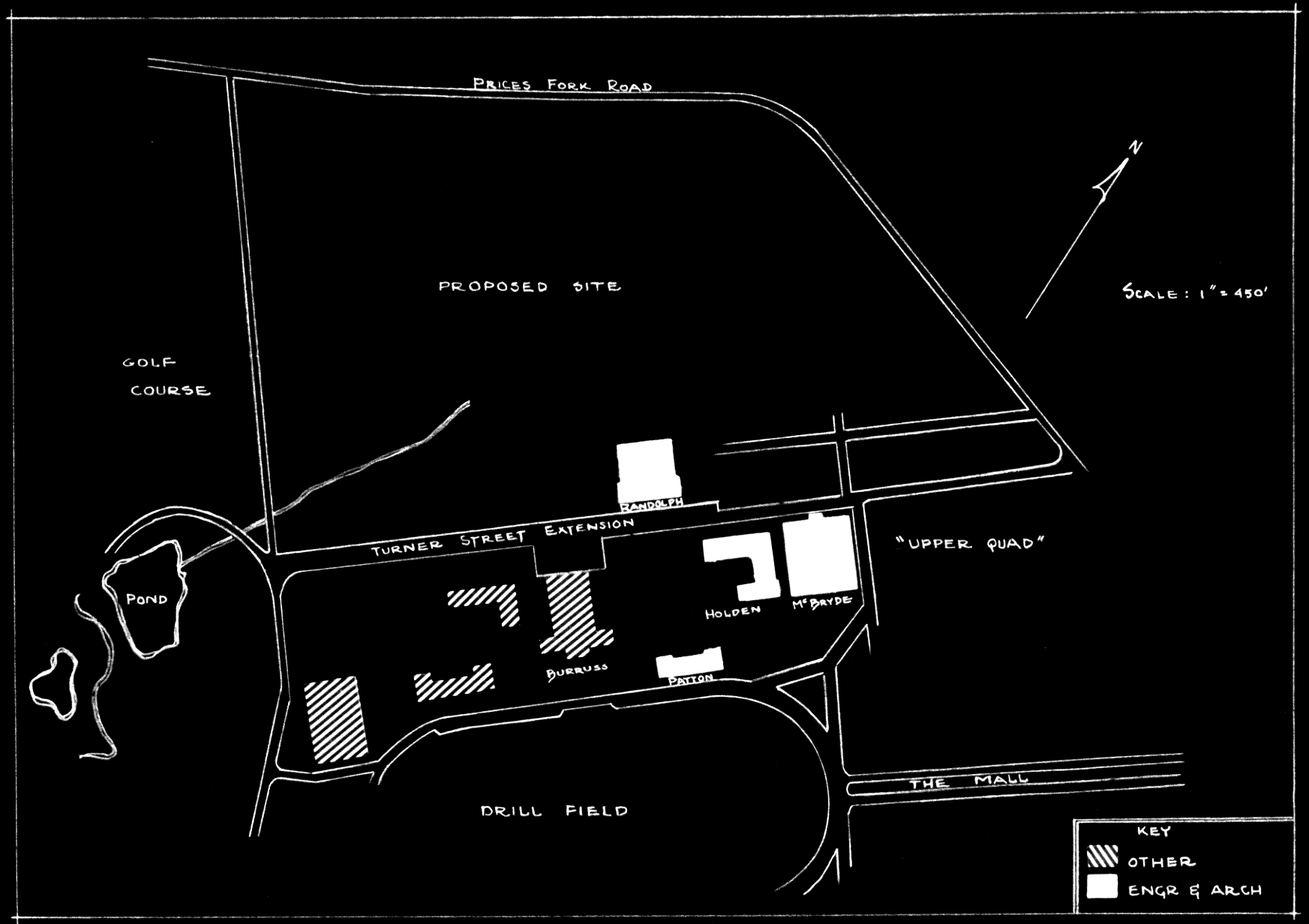


Plate 2. Plan Showing Relationship of Site to Existing Buildings on Campus

Negroes was established with the remaining one-third of the scrip.

The property of the Preston and Olin Institute (one building) and $20,000 which was raised by Montgomery County was transferred to the State. In September of 1872, the College opened with 132 students and one major college building.

Unsettled conditions due to many changes in the Board and Faculty contributed to what Hudnell (1902) called "retrogression rather than advancement."

Expansion of the College

The year 1891 ushered in a new era for this College. There had been a sweeping reorganization by the Board of Visitors which led to many changes. The name of the College was changed to Virginia Polytechnic Institute in 1896 by the authority of the legislature.

The College rapidly grew and developed from the enrollment of only 177 students in the fall of 1892 to 452 students by 1902. The original building was now complemented by some 46 others,

not including many small buildings. More property had been acquired: Painters' Spring consisting of one acre; 4 houses and lots totaling 70 acres; and Smithfield which added another 700 acres. There were over 9,500 feet of roadway and 7,500 feet of walks. In this year, 1892, only 20 years after its opening, the College had the largest attendance of any school or college in the State excepting the University of Virginia (Hudnell, 1902).

In June of 1913, the old shops burned. The Board of Visitors decided to employ a firm of architects to advise them as to the location of the new shops which were to be built. This firm, Carneal and Johnston of Richmond, was also to determine on the "character of architecture that shall be used for all large buildings in the future" (Eggleston, 1918). Up to this time, the method of building was, according to Eggleston "piecemeal and makeshift" and was far from satisfactory or economical. It was determined that the character of architecture best suited for V. P. I. would be native blue limestone since it could be quarried on the grounds of the Institute and was fireproof.

The institution continued to grow and by 1946 there were over 2,000 students. Today, after 85 years, V. P. I. has a student population of over 4,500. The school consists of 1,500 acres, 300 acres of which are included in the campus proper. The remaining 1,200 is devoted to the Airport, the College Farm, the Experimental Plots and the Orchards. In addition to this, the school has under long-term lease another 1,400 acres of farm land adjoining the college property. V. P. I. also owns 1,300 acres of nearby mountain land and the mineral rights on approximately 1,300 other acres.

The physical plant consists of over 77 major buildings and about 78 minor structures. Forty residences exist for professors.

In 1946 Alfred Hopkins and Associates were consulted and in May a report was made by that firm encompassing recommendations for the future development of V. P. I. As part of this report, the firm submitted a site plan, "Plan for Future Development" (dated May 3, 1946).

Present Development Plans

It is according to the plans submitted by Alfred Hopkins and Associates that the V. P. I. campus is presently being expanded. This plan is based upon an axial design; that is, the dominating element is the Oval which was originally established on two axes, the short axis running northwest by southeast and the long axis running at right angles to it. "The Administration and the architects of the buildings now bordering the Oval have recognized the importance of this element in their successful arrangement of Burruss Hall, Memorial Hall and Miles Stadium on this short axis. The secondary buildings take their places around the perimeter of the Parade Ground" (Hopkins, 1946).

With respect to the plans for future expansion of the campus, Alfred Hopkins and Associates have "preserved and emphasized the Oval as the center of the design and have arranged the numerous buildings in groups according to their related functions. Each group has been subordinated to the whole, and contributes to the unity of the scheme by radiating from the Oval so as to focus on Burruss Hall."

Plate 3 shows the portion of the Hopkins Plan for Future Development of the north side of the V. P. I. campus. The plan includes a proposed new School of Engineering and Architecture, dormitories, and residences for married students, based on the ultimate assumed student population of 6,000.

REVIEW OF LITERATURE

The trend today is toward larger and larger schools. Most of America's colleges and universities are already overcrowded and the pressure is mounting. A huge segment of our population, born during wartime 16 years ago, is close to the college age and will soon increase the pressure to an all-time high. Our school facilities must be expanded to meet this increasing demand for higher education.

The need for larger schools maximizes the importance of site utilization and planning. Educators and school planners recognize the necessity of analyzing a site for maximum use and of developing a master plan for expansion.

Hill and Taylor (1939), in discussing the problems of college design, state that "the problems are best approached through the cooperation of four agencies - the school authorities, the consultant on educational matters, the architect, and the landscape architect." They bring out the point that the cooperation should be maintained from the very beginning with the preparation of the general plan of the site. "No program of the future, involving

buildings and surrounding lands, should be considered without the adoption of a coordinated program of planning which will not only provide an economical design on the basis of which immediate work may proceed, but also provide amply for future growth of the institution; thus producing a unity of practical design and real permanency of construction."

Royston (1952) also brings out the importance of cooperation from the beginning of planning between the architect and the landscape architect. "The trend today in some of the leading offices is toward early consultation with the landscape architect, thus allowing early unification of ideas and agreement on basic objectives. This arrangement takes full advantage of the experience of both the architect and the landscape architect in formulating the relationship of the building to the site."

"This site work is within the scope of professional practice of the landscape architect who prepares complete plans and specifications for the site work. Where a landscape architect is not employed, these problems (pedestrian circulation, service access, etc.) are solved in part by the

architect. However, this places a great burden on the architect in a field for which he has had little training."

Royston stresses the fact that after the plans and specifications have been prepared by the landscape architect, the development of the landscape should be under his supervision; and after he has accepted the work done by the landscape contractor, the maintenance should be carried out by the school maintenance departments.

B. W. Pond (1956), in referring to the practice of Landscape Architecture, has this to say: "Collaboration between the landscape architect and the architect occurs on problems of the private estate, and where architectural structures play an important part in the outdoor compositions. During World War I collaboration developed further to include the civil engineer on the design of communities, army cantonments, government war housing, industrial plants and similar problems. This collaboration has continued to expand ever since, until most federal agencies now require a landscape architect for the site-planning and other phases of the development of

the land, acting as one member of the design team along with the architect and the engineer."

Unfortunately, in most cases, such cooperation between the school architect and the landscape architect did not exist. A school consists of more than buildings; it involves the entire site. The designer must not consider the buildings as a separate entity, to be designed in a void or to be located individually. He must consider their relationships one to another, and he must relate them to the different outdoor areas. To do this, he must start with an overall plan for the present and future development of the whole school. This cannot be done by the architect alone; nor can it be done by the school board alone. It must be done from a basic consideration of land-use in conjunction with the landscape architect.

Currier (1955) is a proponent of the free park-like campus arrangement, the plan of which is determined by the topography of the site. He says, "To a great extent the disposition of the site is dictated by the topography and other natural features." In reference to a plan for a school site which is similar to that of the area for

V. P. I.'s North Campus, he goes on to say that "this scheme begins to recognize the site's native character. It requires less clearing and grading. Because of the natural changes in grade, the classroom units assume individuality when located freely across the slope."

Hubbard (1928) also recognized the importance of the design relationship to the topography of the site. He would allow the subdivision of land areas to be determined by the natural topography, and the character of the design to be determined by the subdivisions. On land which is not entirely level, the informal design is more adroitly adapted to the site and lends itself more readily to extension.

Allowing the topography to determine the design of a master plan for a large institution such as V. P. I. not only admits the best land use, but it allows expansion of the school to be in keeping with the latest trends in architecture and building materials and methods. Since World War II architecture in this country has become decidedly changed. It is still changing, and it will continue to change. In tracing the history of architecture, Upjohn (1956) writes that Thomas Jefferson was the first architect

to adopt not merely the use of past style but specific building forms of that style. He forced them to house new purposes, rather than creating new styles to house new purposes. This was the beginning of eclecticism, or the freedom of either the architect or client or both to choose among the styles of the past that which seems most appropriate to him. Bannister (1956) sums this up by writing, "Thus, into the 20th century, most architects and schools conceived of architecture primarily as a method of covering buildings with a veneer of historic ornament." He goes on to say that the work of many architects, among them C. F. A. Voysey in Great Britain, Victor Horta in the Netherlands, Otto Wagner in Austria, Peter Behrens in Germany, and Louis Henri Sullivan and Frank Lloyd Wright in the United States "liberated architecture from this historicism and paved the way for an expression more consonant with contemporary needs, materials and desires."

Because of new problems in architecture, new materials and new building methods, a new style of architecture was born. The functional theory of architecture was developed, fathered by Louis

Sullivan in the last 19th century. "According to this theory", writes Upjohn, "any problem in architecture contained the germ of its own solution; the duty of the architect was so fully to understand the problem that the solution of both its utilitarian and its expressive aspects become apparent, neither of which could be met by historic styles." He further states, "In Europe, too, the more advanced architects dropped their inherited load of eclecticism. This change did not occur suddenly." Along in the 1920's, this new style known as the International Style reached its full development, exemplified by the activities of the Bauhaus group in Germany, by Mies van der Rohe in Czechoslovakia, and Frank Lloyd Wright here in America. Upjohn (1956) describes the reaction of many. "The obvious contrast of these buildings with any traditional style at first aroused hostility, particularly in America. However, it became evident that the principles of the International Style were those of architecture, whereas the principles of eclecticism were not. All the great styles of the past were based on plans suited to their functions, on sound building with the chosen

materials, and on expression of both function and material in design; in other words, on commodity, firmness and delight. Inevitably, therefore, as its strangeness has worn off, it has become evident that the International Style is a logical outcome of the 20th century life, and indeed the only sensible approach to architecture in 1950."

With respect to architecture of a college, Hill and Taylor (1939) advocate keeping new building programs in line with the modern trend. "...old buildings of poor design need not have a strong influence. The future development employing a unified architecture can be carried away from the old buildings into newer and fresher surroundings without detracting from the tradition inherent in the older buildings."

Sir Hugh Casson and N. Conder (1954) would "firmly reject...the strict control of facades and architectural treatment. Such a device is constricting both to the clients and to the architects of the future; a mask is after all as unwelcome to a designer as a gag would be to a university lecturer."

Shear (1957) feels that our colleges and universities have wasted many opportunities to serve the community. "They could and should be living laboratories for experiment in planning and design. Their acreage is large and the authority over its use almost uniquely single. Because the campus is becoming increasingly a community in microcosm - with most of its building types and most of its planning problems - every lesson that can be learned there has direct value for the community." The students now enrolled in our colleges will be tomorrow's citizens and tomorrow's leaders in community planning. The campus is where they will form their appreciations and tastes. Shear feels that the student is not afforded early, positive experiences and impressions which could inform and refine his awareness of the meaning in planning and design. "Campus architecture is a melancholy prospect. In the face of enrollments which will double in a decade the continued building of phonial Colonial, tragic Gothic, and that misbegotten, modern product of incompetent compromise: neo-Cretin, insures the imminent flowering of fullgrown malignancies in hundreds of our communities."

The formal plan, or axial design has many proponents today, among them Alfred Hopkins and Associates who prepared a master plan for the extension of Virginia Polytechnic Institute. In an article in the Architectural Forum (June, 1953) Eero Saarinen, architect, is quoted as saying, "Certain master plans for colleges have been made along great axial schemes. They do not work out very well when you add the dimension of time. The building on one side of an axis is built now; 20 years later a symmetrically placed building is built when the building program may have changed completely. Usually at that time the plan falls apart.....In other words, a master plan should be a continuous process, not an ironclad design."

It is natural that we look to our colleges and universities for design leadership; however, well-designed buildings and grounds are rare and the few that do exist fall far short of the leadership which is so urgently needed by the community. The challenge exists, and it begins with the team of architects, engineers, and landscape architects who design the physical facilities of our schools.

METHODS OF INVESTIGATION

This thesis, being a problem in site planning and space utilization, will be presented in three major sections: Design, Landscape and Planting, and Architecture. Methods of investigation will be discussed in detail under the appropriate section.

The problem for this thesis developed from a discussion with Mr. A. S. Beecher concerning various aspects of landscape design which were pertinent to the interests of the writer. Since the writer intends to do future work in the field of site planning, it was decided that a master plan for a large area would be an appropriate problem. Mr. Beecher suggested extension plans for the campus of Virginia Polytechnic Institute. After a conference with Mr. H. P. C. Vandenburg, Planning Engineer for the school, in which the immediate needs of the school were discussed, the writer chose a site and determined the requirements of that site for the thesis problem.

Topographic surveys of sections of the site were obtained from Mr. Vandenburg's office. Since the surveys involved several scales, they were consolidated into one survey covering the entire area involved (see Plate 4).

From the topographic map, a plan for an extension of V. P. I. was made. The topography determined the subdivision of the land areas, the location of the buildings, the patterns of the roads, and the disposition of other areas.

Space requirements in terms of academic buildings, dormitories, and parking were determined through an analysis of the use of such facilities, and information from the Project Reports by the local Building Committee. No attempt was made to make detailed assignments of space or floorplans of buildings as this is beyond the scope of the thesis and is properly the responsibility of the architects designing the individual buildings.

The description of the site made previously was based on observation of the property, and the historical information presented was obtained by a review of literature contained in the V. P. I. library.

DESIGN OF THE NORTH CAMPUS

Introduction

The purpose of this thesis is to present a master plan for the northwest part of the V. P. I. campus, and to embody in this plan a new concept in site planning which would more adequately satisfy the needs of the school. It is not proposed to create one huge centre of a "wheel" with various sections of campus radiating out from it; nor is it proposed to create one immense quadrangle which would be edged with new buildings year by year. Any such plan is static and unyielding. In so formal a plan, there is no location on the campus or in the plan where it becomes natural for the plan to change, for the architecture to develop in accordance with modern concepts, or for the use of the land to be adapted to later needs.

The design for the site plan in this thesis (see Plate 5) is a series of units, grouped according to their function, to be developed as the need arises. Each unit may further be developed within itself and is, therefore, flexible. It is not intended that this plan be final, and what Saarinen would call "an

ironclad design", but one which can readjust to changes in the school building program.

The basic premise of the plan is a consideration of the existing topography. The buildings have been located on the plan so as to complement the topography, and the landscaping is developed according to the natural terrain, except within the inner courts of the various units or buildings.

Just as many of our cities are patterned along the grid-system, so are many of our campuses patterned along straight lines adorned with archaic buildings. Today's campus should, rather, inbue the student and the community with the spirit of individual thought, imagination, creativeness, and esthetic appreciation.

Area Designation or Land Subdivision

In order to designate areas of the site according to their logical functions, the writer first determined the future trend of development of the school. An analysis of the program was made. The relationships of the various school activities - academic, administrative, residential, and recreational - were studied and this led to a land use plan which would be consistent with the needs of the school over many years.

The proposed design of the School of Engineering was developed as an outgrowth of the existing facilities. It is flanked on the east side by a residential area for students, this being related to various outdoor areas. The residential area for young instructors and graduate students was isolated from the general activities of the campus and separated from it by a vegetative screen of trees and shrubs. The new Education Center also was thus isolated since its activities would be carried on independent of the academic schedule.

Through a study of the relationships of various campus activities, the writer determined the direction

of traffic and pedestrian circulation. The pattern of traffic was carefully adapted to and distributed along the existing contours.

Student Population Breakdown

To determine the space requirements for expanding the school, the writer made an analysis of student population breakdowns for the last normal pre-war year 1942-1943, and for the last two years (1955 and 1956). Table 1 shows that slightly over 50 per cent of the student population has been regularly enrolled in Engineering and Architecture. The ultimate enrollment assumed by the writer is 15,000 students. The distribution of students among the various curricula groups is assumed to be relatively the same as it has been in the past years. Analyses of past enrollments made by the local Building Committee show that changes in the percentage of enrollment in each curricula group have been sporadic and brief.

For this thesis, therefore, the desired ultimate student population breakdown is as shown in Table 2. The specific requirements for various space allocations will be discussed under the appropriate topic heading.

TABLE 1

Breakdown of Student Populations

School	1942		1955		1956	
	No. of Students	% Enrolled	No. of Students	% Enrolled	No. of Students	% Enrolled
Agriculture	568	17.18	730	18.40	691	16.03
Engineering and Architecture	1816	54.90	2228	55.90	2537	58.80
Business Administration	556	16.80	651	16.34	662	15.32
Applied Sciences	317	9.59	353	8.83	410	9.50
Part Time and Special	51	1.53	22	0.53	15	0.35
Totals	3308	100.00	3984	100.00	4315	100.00

* These figures do not include enrollments for the summer quarter or short courses.

TABLE 2

Assumed Ultimate Student Population *

School	No. of Students	% Enrolled
Agriculture	2,583	17.22
Engineering and Architecture	8,480	56.53
Business Administration	2,422	16.15
Applied Sciences	1,395	9.30
Part time and Special	120	0.80
Totals	15,000	100.00

* These figures do not include enrollments for the summer quarter or short courses.

School of Engineering and Architecture

The primary purpose of developing the North Campus would be to provide facilities for a greatly enlarged School of Engineering and Architecture. In addition, student dormitories would be provided to accommodate the increased enrollment.

It is proposed that the School consist of the buildings shown in the new site and of the following existing buildings: Patton Hall, McBride Hall, Holden Hall, Randolph Hall (which are shown in Plate 2).

The new Engineering Building was designed to house the administrative center for the School, a library, an assembly hall, two large lecture rooms, the Dean's suite, and a lounge. Thus, the activities which are common to the School as a whole were located at the center of circulation.

The existing Mineral Industries Building (Holden Hall) has been extended to the west to house additional laboratories, offices, classrooms, and storage space. As proposed in the plan by Alfred Hopkins and Associates, a second story addition to this building has been included.

Randolph Hall has been extended to the north at several levels. The topography permits a basement level which should house the wind tunnel and other noisy activities. On the upper levels may be located the Architectural Engineering and Graphics Departments. The former has relatively little fixed equipment which would have to be moved to this new location. The Graphics Department would be moved from Building 362 which is a temporary wooden structure. The final extension behind Randolph Hall was intended to house the Chemical Engineering laboratories.

It is proposed that Patton Hall be assigned to the Electrical Engineering Department since it would be impracticable to move its power laboratory, now located in the basement. In addition, the Old Military Building could be turned over entirely to the Military Department, and the old Mechanical Engineering Laboratory could be vacated and left to the plumbing and printing shops.

To the west of the New Engineering Buildings are the proposed new buildings for the Departments of Architecture and Building Construction. They are linked together by a corridor of skylighted studios

and a lounge which opens on to a terrace. These departments were located more-or-less separately to provide for the possibility of there being a separate School of Architecture in the future.

To the left of the New Engineering Building along Turner Street is a small building to serve as a gallery, a building devoted to the exhibition of works of art. This may include exhibitions by the architectural students, models by the engineers, drawings and paintings, sculpture, and outside exhibitions as well as the well-known Round Robins.

For the proposed School of Engineering and Architecture, approximately 600,000 square feet of floor space have been provided, this to include some of the presently available facilities, the gallery, space for the experiment station work, and the main lounge.

Further expansion of the School of Engineering and Architecture would be possible to the north and west. The plan of the School allows for such future growth without impinging on the design as shown in the plans herein. Wings could be added to the Architecture building; contemporary architecture

is amenable to the addition of new floors without destroying the balanced appearance of a building; and finally, a whole new group of buildings could be located to the north or west and be in complete continuity with the scheme of things.

Dormitories

It is assumed that as the Virginia Polytechnic Institute expands, all parts of the campus would extend facilities proportionately. It is here proposed that eventually all the students enrolled in the Schools of Agriculture and Applied Science and Business Administration be quartered in dormitories in areas southeast of the Parade Ground. If this is done, the dormitories in the "Upper Quad" (northeast of the Parade Ground) will be available for use by students enrolled in the School of Engineering and Architecture.

The Local Building Committee had indicated that it is the intention of this institution to house approximately three-fifths (3/5ths) of the total student body. Based upon an ultimate enrollment of

15,000 students, approximately 8,480 of which would be in Engineering and Architecture, the writer has provided dormitory accommodations for 5,000 male students with a slightly higher ratio of living space per student than is used in the existing dormitories. This figure does not include female students who would be housed in the women's dormitories, southwest of the Parade Ground.

Table 3 shows the breakdown of space per student in each of the existing and proposed dormitories. These figures include all parts of the buildings (lounges, halls, luggage rooms, etc.) in addition to the sleeping quarters. It will be noted that the space allowed each student in the existing buildings varies from a low of 154.81 square feet to a high of 250.37 square feet per student. In the latter case, each student does not actually have more usable room than in the former case; the latter figure is high because of very wide hallways.

The writer proposes to allow each student approximately 200 square feet. It is recommended that only residence halls built in the most modern, contemporary style should be contemplated; and in such

TABLE 3

Capacity of Dormitories, Existing and Proposed, for School of Engineering and Architecture Students

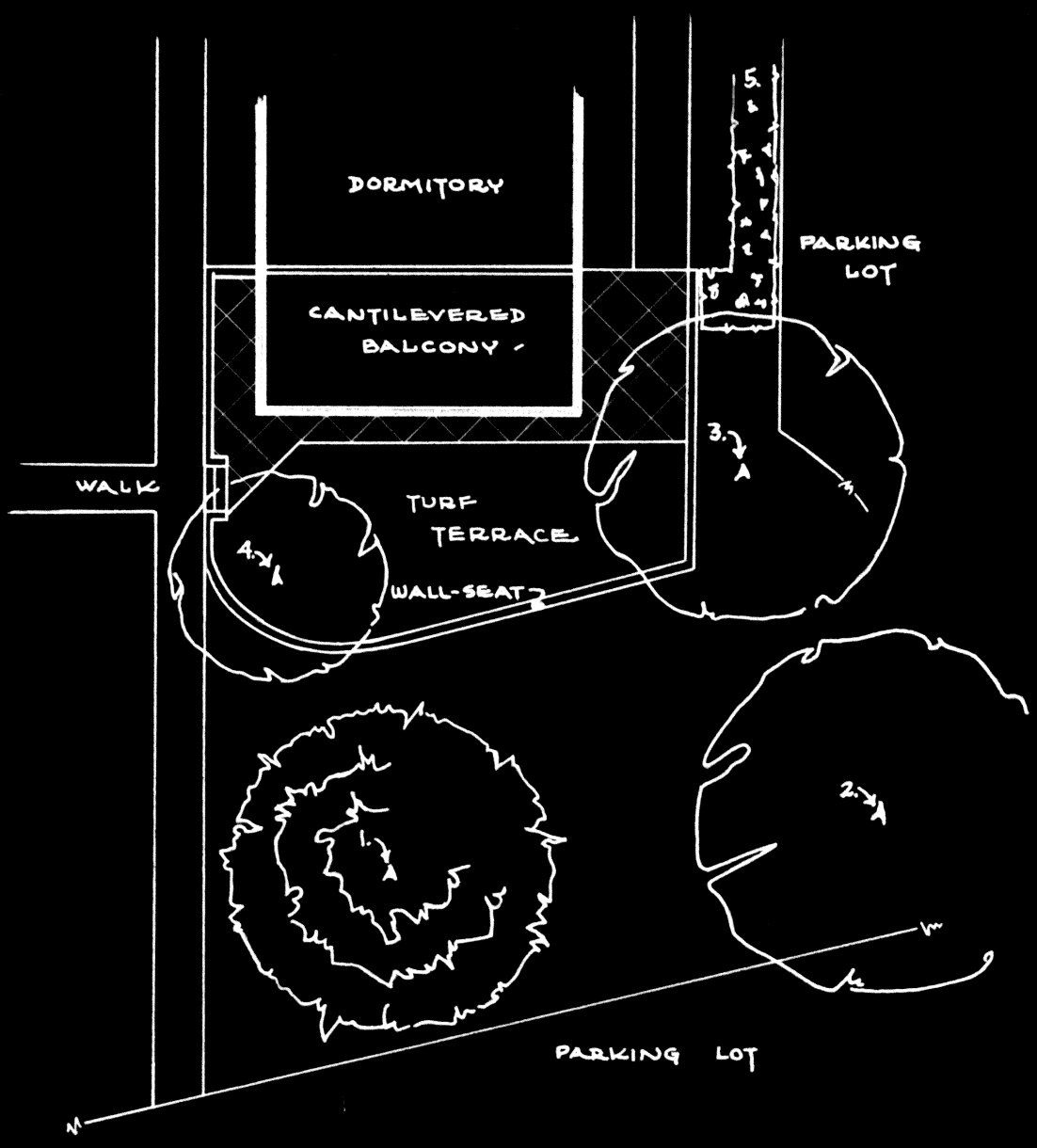
Name of Building	Total Sq. Ft.	Total Capacity	Sq. Ft. per Student
Lane	33,049	137	250.37
Rasche	21,969	127	211.24
Brodie	24,515	131	207.75
Shanks	21,121	130	185.27
Major Williams (5)	21,969	132	192.71
Major Williams (6)	33,136	217	172.58
Femoyer	33,538	228	155.87
Thomas	37,775	244	154.81
Monteith	35,860	228	157.28
New Buildings	126,088	650	191.03
Totals	389,020	2,224	174.92
North Campus Proposed Dormitories	555,200	2,776	200.00
Totals	944,220	5,000	188.84

structures, which would eliminate wasted space such as is found in most old buildings, the architect can make available to the student a much greater proportion of space in terms of lounges, balconies, and perhaps playrooms.

The writer envisions the new dormitories of steel frame construction with light weight curtain walls. Extensive areas would be of glass, and on each end of the buildings cantilevered balconies would extend from the students' lounge on each floor. Plates 7 and 8 show plan views of typical landscaping of a dormitory.

Residential Area

The residential community area has been located on moderately sloping terrain and commands a good view of the golf course and of the distant mountains. Apartment buildings in the plan have been placed along the existing contours. As the area was designed primarily for pedestrian use, no roads or drives enter the central area. At the rear or side of each apartment building there are driveways leading to ramps which descend to parking space in the lower levels of the buildings. In addition, there has been

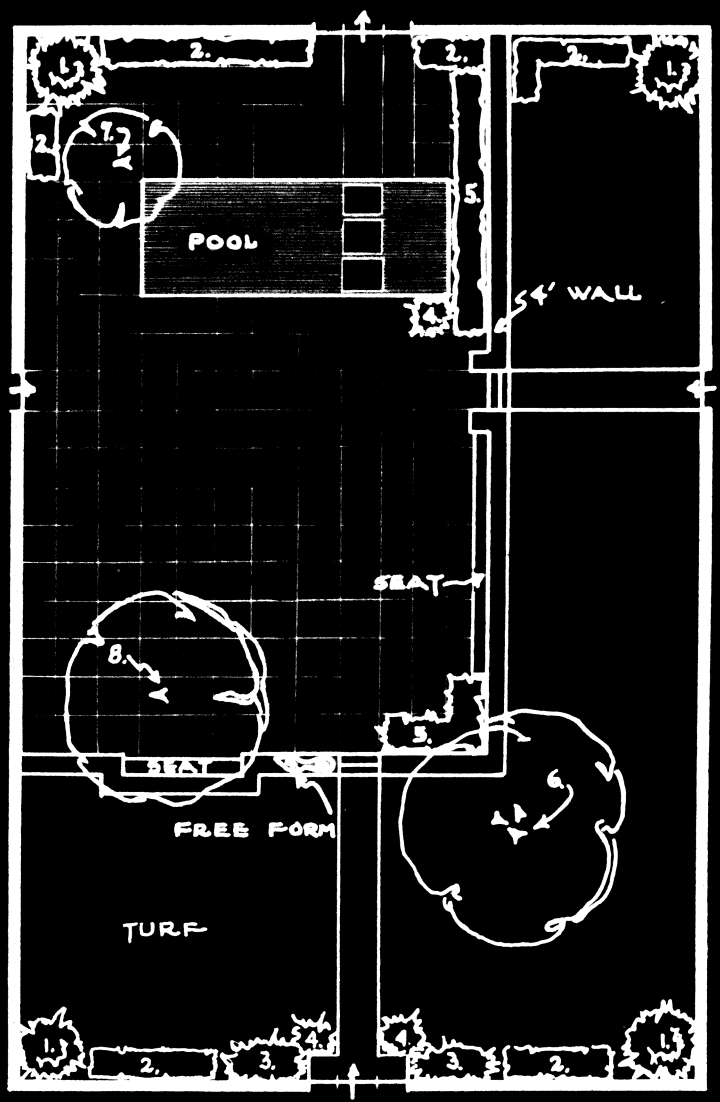


DETAIL: DORMITORY TERRACE -

1.	PINUS SYLVESTRIS	SCOTCH PINE
2.	ACER PLATANOIDES	NORWAY MAPLE
3.	ACER RUBRUM	RED MAPLE
4.	ACER CAMPESTRE	HEDGE MAPLE
5.	TSUGA CANADENSIS	CANADIAN HEMLOCK

SCALE: 1" = 20'

Plate 7. Landscape Design of Dormitory Terrace



DETAIL: DORMITORY INNER COURT -

1. PINUS MUGO MUGHUS	MUGO PINE
2. OSMANTHUS ILICIFOLIUM	HOLLY OSMANTHUS
3. TAXUS CUSPIDATA	JAPANESE YEW
4. TAXUS CUSPIDATA DENSA	" (VARIETY)
5. ILEX CRENATA	JAPANESE HOLLY
6. BETULA POPULIFOLIA	GRAY BIRCH
7. PRUNUS NIPPONICA	NIPPONESE CHERRY
8. ACER CAMPESTRE	HEDGE MAPLE

SCALE: 1" = 20'

Plate 8. Landscape Design of Dormitory Inner Court

provided sufficient paved area adjacent to each building for trucks or moving vans to park for loading operations. A minimum of outdoor parking space is available near the buildings.

Behind or to the side of each building is an area for laundry, trash bins and the like. These areas are accessible from the loading drives and are partially screened by shrub masses.

The central area is park-like and is intended as a place for the children to play and be in full view of the parents. A large sand-box, a swing, and a slide are provided as well as sitting places. In addition, there is a paved area for roller-skating and bicycling. Plate 9 indicates typical residential landscaping.

Also provided for the residential community is a swimming pool and additional outdoor living areas for older children and adults. The pool, being located on a sharp slope, has a wood deck extending out over the terrain, and the entrance to the filter plant is just beneath. Plate 10 shows a detail plan of the pool and landscaping adjacent to it.

This community is intended for use by young instructors and graduate students; that is, primarily

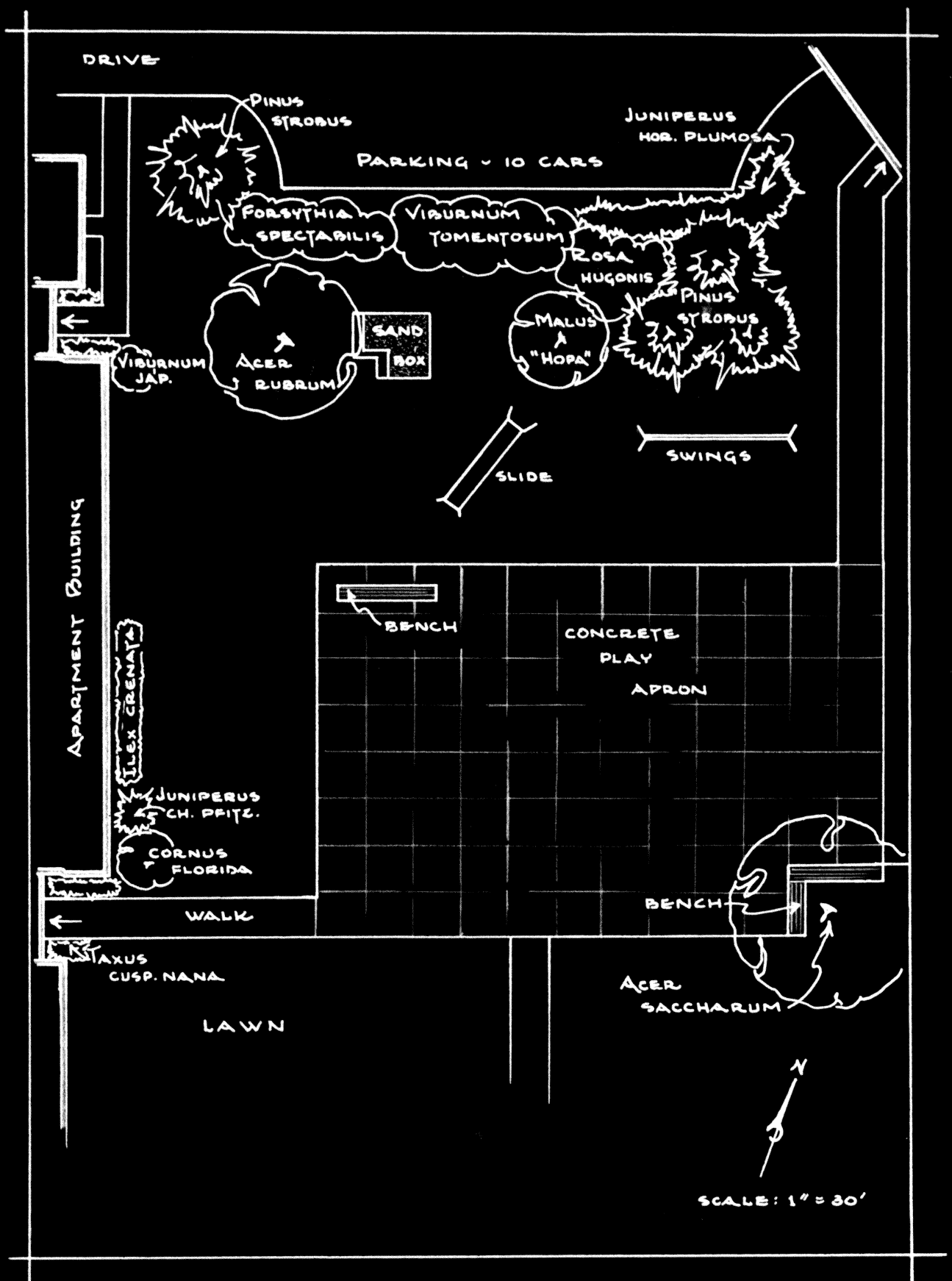


Plate 9. Residential Landscape, Central Area

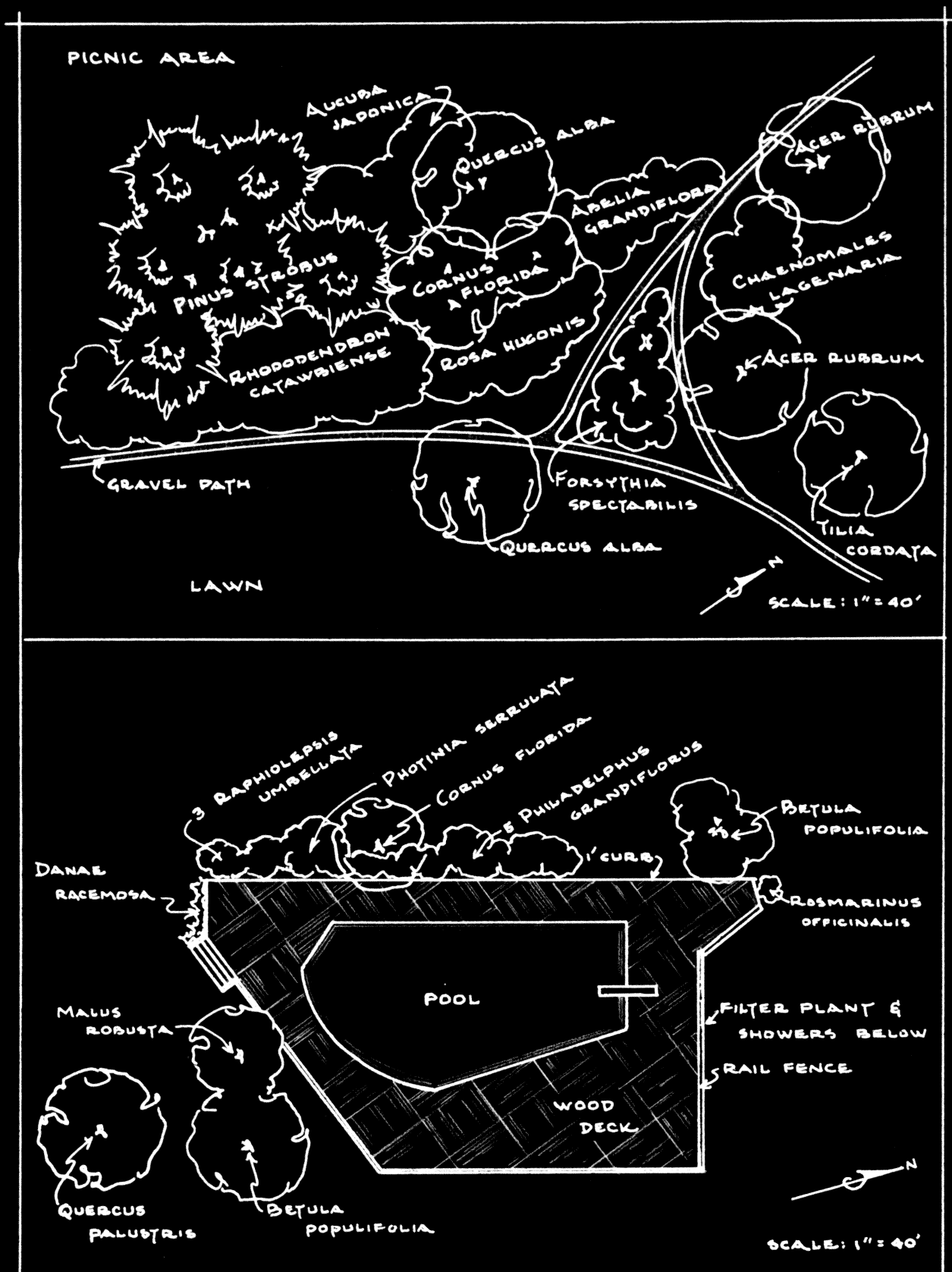


Plate 10. Border Planting Around Recreation Area, and Pool Detail

by those who would be at the school for a relatively short time. Plans for developments to accommodate married students in and around the town of Blacksburg are either in process or are contemplated for the very near future. While the number of veterans is on the decrease, the number of married students other than veterans is rising rapidly, and it would be impracticable for the College to attempt to house them separately. If the community for resident graduates and young instructors should not be filled, however, the College could rent the available units to married students.

Education Center

The purpose of the Education Center is to provide a place for the College to carry on its program of Short Courses independently from normal college activities and at any time of the year. Usually the Short Courses are held in the summer and attending persons are housed in the then vacated dormitories. The writer feels that with the tremendous increase in enrollments in our nation's colleges and universities, more stress will be placed in future years on the

summer program for students as a means to help alleviate the situation. If this occurs at V. P. I., it will become increasingly difficult for the College to house the persons attending Short Courses, and there may be difficulties finding available auditorium space.

For this reason, and also so that Short Courses may be held during the fall, winter and spring quarters, the writer has separated the activities of the Education Center from the rest of the functions of V. P. I.

The Center consists of a Hotel capable of accommodating 250 persons, a 1000-seat Auditorium, and an Administrative Building. These three buildings are so arranged in the plan that they may each carry out their respective functions without interfering one with the other. Entering traffic may be directed either to the Administrative Building or to the Hotel where persons may register, receive room assignments and information.

Parking has been provided for 40 cars to the rear of the Hotel, and for 30 cars in front of the Administrative Building. In addition, there is a 125-car lot behind the Auditorium. This would provide for public parking should the Auditorium be used for other than academic functions.

The Administrative Building is intended to house some offices and to provide meeting places for relatively small groups. Reserved parking is provided for visiting lecturers.

The Hotel has a dining hall, the west wall of which would be glass and open onto a deck overlooking the school and the mountains. Access by vehicle would be possible at the front entrance to facilitate unloading; the remainder of the grounds around the Hotel have been designed for outdoor sitting or walking. A path from the Hotel or Administrative Building leads one around the interior of the site, to the ponds, and then back to the Hotel.

During the summer, a few of the Short Courses have enrollments which exceed the number that the Hotel could accommodate. Rather than provide at the Education Center extensive facilities which would lie idle most of the year, it would be more practical for the College to house the occasional overflow in one of the proposed dormitories of the School of Engineering and Architecture. It is not anticipated that even with full summer session in progress, all dormitories would be filled.

Circulation and Parking

Every attempt has been made to avoid interior drives. The buildings have been arranged as much as possible so as to be accessible from the outer roads which are on the perimeter of the campus. The purpose of this plan is to reduce the noise on campus as well as the confusion which occurs when vehicular and pedestrian traffic cross.

As recommended by Hill and Taylor (1939), a combination of large central parking areas and some smaller ones have been provided in connection with the various buildings. This method of providing for parking seems to be the least objectionable and the most efficient. There has been no effort made to eliminate parking within the campus grounds as all efforts in the past have been to no avail.

Since the war, records show that approximately 75 per cent of the student body has had automobiles at V. P. I. Assuming a resident male population of about 5,000 in the School of Engineering and Architecture, the writer has located one large parking lot adjacent to the dormitories capable of accommodating 1,000 cars; this would be the

anticipated parking for those dormitories consistent with the recommendations made further on in the thesis.

In addition, an estimated 385 cars are able to park in minor areas reserved for faculty and staff adjacent to the academic buildings. The extension of Turner Street has been widened as far as Stanger Street so as to allow for parking along the length of that street from the pond area east.

LANDSCAPE DESIGN AND PLANTING

Introduction

Every attempt to maintain a park-like effect on the site has been made; the buildings which are placed on the lower areas of the rolling terrain have been restricted to two and three stories so as not to block the view of the golf course, the pond area, and the distant mountains from the buildings on the higher levels. Especial attention was given to the areas between the buildings and between different outdoor areas; every effort was made to cause these areas to flow one into the other, so that each seems a part of the next. The indoor space has been integrated with outdoor space as well, through the use of courts and terraces which would extend almost from within the buildings themselves. As Berger (1957) says, "The use of outdoor space on the campus assumes an importance that few of us seem to realize. The relation of building to building is significant, as are the planning of space between buildings, the shape this space will take, the degree of effectiveness with which it will display the

buildings themselves, the way in which it will serve to handle the people using the campus intensively in their goings and comings as well as their arrival and departure from the campus itself. Outdoor space has to accommodate all these functions as efficiently, directly, and unobtrusively as possible, yet achieve a dignity and entity and pleasantly proportioned appearance of its own."

The planting design has been kept simple. Its purpose is to frame vistas as well as to define open areas and enhance the appearance of the entire site. Buildings have been given a good frontage of lawn, a background of trees, and foundation plantings, all of which will enhance their architectural beauty.

Much of the landscaping is in terms of concrete and stone. Pools, walls, seats and terraces have relative permanence and require very little maintenance. They allow for greater use of outdoor areas; they provide a pleasant place for students to stop and study or visit; they permit a person to step aside for a moment from the hustle of campus life.

Construction

The construction with which this thesis concerns itself pertains only to outdoor areas, roads, walks, pools, sitting areas, and the like.

The buildings on the North Campus have been arranged along existing contours, as has been discussed previously. The purpose of this is primarily to reduce the amount of necessary grading, a very costly procedure. The same is true of walks and roads on the site. Plate 6 shows the revised contours with respect to the proposed School of Engineering and Architecture, Dormitories, Residential Area, and Education Center. On this plate the original contours are shown in broken lines, and the final contours in solid lines. The contour interval is two (2) feet. The contours have been revised to allow for proper surface drainage away from the buildings.

Roads

The pattern of the road system was governed by the location of approach roads and roads which surround the school. The system of roads within

the site was laid out so as to restrict traffic to persons either living or working in the area and to avoid "through" traffic. The roads, which are 20 feet wide, are intended only as access ways to the various parking and service areas.

The planting strips between the roads and walks are of varying widths, the minimum being 10 feet. If the space of a tree belt is narrower than 10 feet, special kinds of trees would have to be used, either columnar type or very small (less than 30 feet) trees. Trees planted in strips that are less than 4 feet wide have little chance of survival.

Concrete curbing was provided on either side of the roads to carry off excess rain water. Roads are of macadam as it is felt that macadam would fit into the park-like atmosphere better than would concrete.

Walks

Walks along roads are 5 feet wide; walks which lead directly into buildings are a minimum of 8 to 10 feet wide and are constructed of concrete so that in the event it should be necessary, they could be driven upon by small trucks for service to the buildings.

This may be necessary for the dormitories for loading and unloading of heavy luggage.

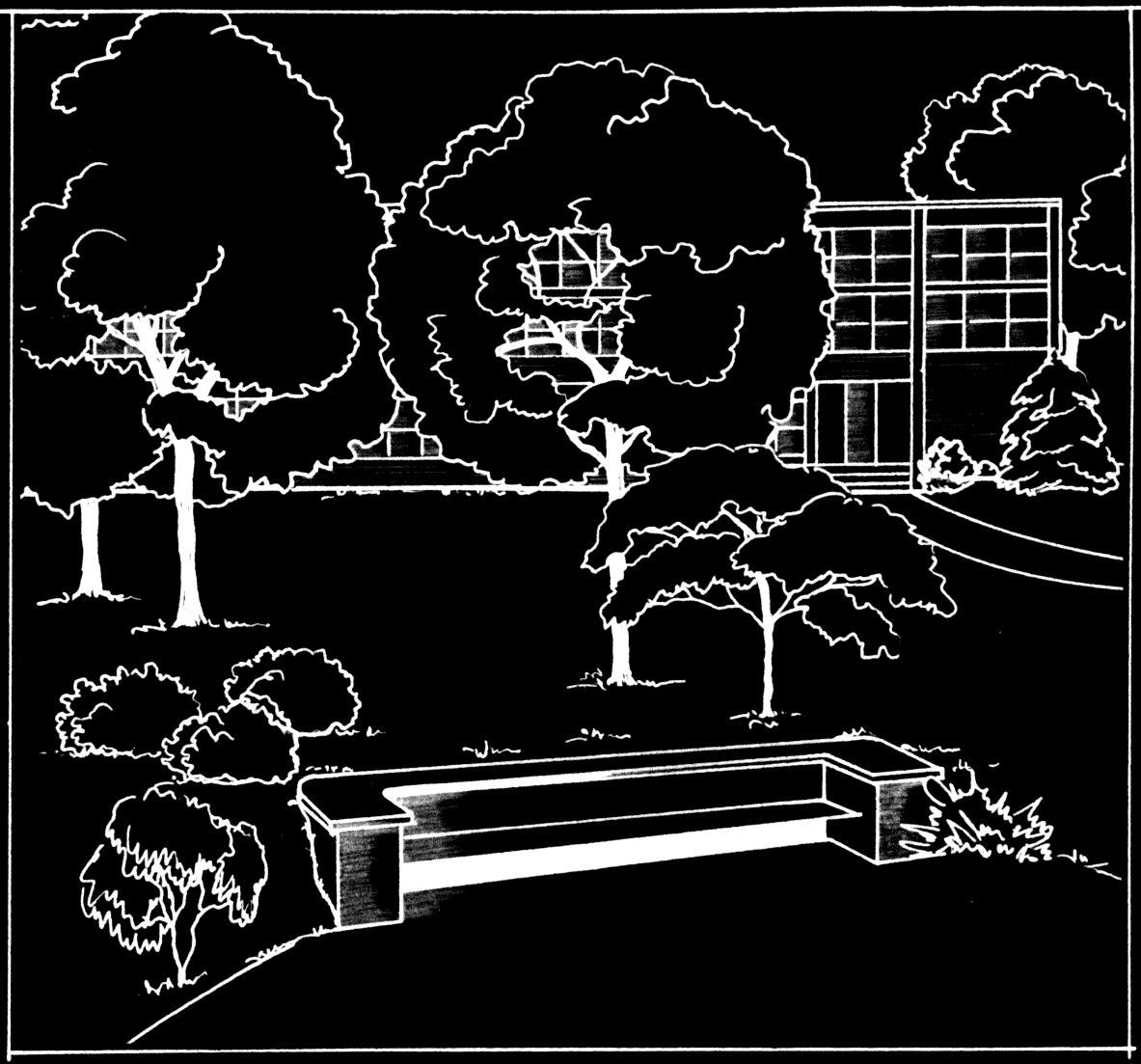
Walks elsewhere on the campus are of varying widths according to their anticipated use. In order that they may blend with the surroundings, they would be constructed primarily of concrete block or brick set in sand. At appropriate places along walkways, sculptured works have been located as landscape features.

Sitting Areas

Plate 11 shows a typical sitting place which nestles into the rolling terrain. The small retaining wall does not protrude above ground level, nor does it become a "feature" in the landscape. Rather, the little area blends into the terrain in a casual way. Planting around the area is unobtrusive and merely a continuation of the general landscape.

Terraces and Courts

The terraces and courts are constructed in most cases of concrete block to insure ease of maintenance. In a few instances, however, gravel or flagstone surfaces would be appropriate and are indicated on the drawings.



SAMPLE PLANT MATERIAL

BORDERING THE SITTING AREA-	
RHODODENDRON ALBRECHTI	ALBRECHT AZALEA
TAXUS CUSPIDATA NANA	DWARF JAPANESE YEW
JUNIPERUS HORIZONTALIS	CREEPING JUNIPER
ALBIZZIA JULIBRISSIN	MIMOSA TREE
TYPICAL CAMPUS TREES -	
ACER RUBRUM	RED MAPLE
TILIA CORDATA	LITTLE-LEAF LINDEN
QUERCUS COCCINIA	SCARLET OAK
ACER PLATANOIDES	NORWAY MAPLE
FOUNDATION PLANTS -	
TAXUS CUSPIDATA	SPREADING JAPANESE YEW
LIGUSTRUM LUCIDUM	GLOSSY-LEAVED PRIVET
THUJA ORIENTALIS	ORIENTAL ARBOR-VITAE

Plate 11. Plan of Typical Sitting Area

The Pond

The point at which the stream emerges from its underground line is where the pond begins. Approximately 320 feet from this point the dam has been located. In an attempt to disguise the artificiality of the dam, the writer has designed the dam with a structural core wall over which a veneer of "naturalism" has been applied. The veneer, composed of native rock, has been made irregular in both plan and vertical section so that it does not follow the regular line of the core wall. It is important that this veneer extend low enough so that during a period of low water the core wall is not exposed. The slope on the dam is 2:1 (2 feet horizontally for each foot of height).

Around the pond is a walk, and a small deck for sitting has been located on the southeast side. The pond is intended to be something of a naturalistic reflecting pool and the center of attractiveness on the site.

Street Trees

Careful consideration has been given to the selection of trees to be used along streets and roads. In this thesis, it is assumed that all electrical wiring will be underground as it is on the existing campus today. The primary considerations for trees are size, growth habit, and suitability.

Having selected the trees to be used, one must consider their placement. Large trees are not located too close to houses nor are trees too close to the walks, sewers, or gas or water lines. Finally, they are not placed close to corners or intersections as to do so would hamper vision.

Size

Trees have been chosen so as to be in scale with the surroundings. That is, in order to create a feeling of what Stevenson (1957) calls "proper harmony and balance in the design of a street cross section or as it will appear in perspective as one traverses it...," trees must be in proportion to the width of the street; the wider the street, the larger the tree.

For purposes of this thesis, it is assumed that large trees are those which, under average conditions

on the V. P. I. campus, would attain a height of 60 or 70 feet; medium trees would reach heights of 40 to 50 feet, and small trees, from 20 to 30 feet.

Large trees have been used in relation to the major roads which surround the site; medium trees have been used along the interior drives; and small trees have been used along paths and walks to complement medium-sized tree plantings.

Growth Habit

Trees which grow too quickly and are not long-lived, are subject to breakage easily, have root systems which are overly vigorous, or which are "messy" due to fruit-drop are avoided.

Suitability

Trees have been selected which are adaptable to this climate, and which will require little maintenance and are not attacked by insect pests or diseases. Most evergrees are not suitable for street planting because their wood is brittle, they tend to spread too much, and their shade is too dense.

In the list of plant materials to follow are some trees which are recommended for street planting. In

the landscaping of the North Campus, trees have been grouped rather than lined up like tin soldiers in order to give the campus a more park-like effect and to break the monotony of regimented spacing. Several groups which are not too close to the roads consist of evergrees to provide winter landscape interest. At least a dozen varieties of trees have been used in order to minimize the chance of some disease or insect infestation denuding the campus, or even one roadside.

Selection of Plant Material

Trees and shrubs are planted for a purpose; they should, therefore, be selected with the purpose in mind, and not merely planted indiscriminately about the grounds. As Cameron (1953) has put it, plant material must be "justified."

Some of the major considerations which determine, first, whether or not to plant, and second, what to plant, are:

1) erosion control
2) barriers
3) area definition, traffic control
4) screening

5) temperature control

6) beautification.

In addition, according to Cameron (1953), one may use plant material as an air purifier and to provide educational opportunities. The former would apply primarily in industrial areas; the latter might well be considered on the campus. The more diverse the plant material, the more opportunity there will be for students of Botany, Horticulture, and Forestry to observe plant growth. All material of interest should be well marked with metal plates, and charted on a master planting plan.

In the selecting of plant material, at least three of the above functions should be served. The grouping of plant materials below is based primarily upon function. Some of the plants selected are native to this part of the state, and the rest have shown their adaptability to thrive here; especially were they chosen for their suitability for use with contemporary design in both landscape and architecture.

Plant Material

A. EROSION CONTROL - In addition to turf, the following plants are suggested as ground covers for banks as well as level areas:

Berberis thunbergi	Japanese Barberry
Celastrus species	Bittersweet (vine)
Chaenomeles japonica Alpina	Dwarf Japense Quince
Cotoneaster dammeri	Bearberry Cotoneaster
Cotoneaster horizontalis	Rock Spray
Eyonymus fortunei	Wintercreeper (vine)
Euonymus fortunei vegeta	Evergreen Bittersweet (vine)
Euonymus fortunei carrierei	Evergreen Bittersweet (vine)
Forsythia "Arnold Dwarf"	Forsythia or Golden Bells
Forsythia suspensa sieboldi	Siebold Forsythia
Gaultheria veitchiana	Veitch Wintergreen
Hedera helix	English Ivy (vine)
Jasminum nudiflorum	Winter Jasmine
Jasminum officinale	Common White Jasmine
Juniperus chinesis sargenti	Sargent's Juniper
Juniperus horizontalis	Creeping Juniper

Lonicera pileata	Privet Honeysuckle
Mahonia repens	Creeping Mahonia
Pachistima canbyi	Canby Pachistima
Pachysandra terminalis	Japanese Spurge
Spiraea billiardii	Billiard Spirea
Vinca minor	Periwinkle or Myrtle

B. BARRIERS - The following plants are suggested as barriers and as an aid in directing student traffic:

Acanthopanax species	Acanthopanax
Berberis species	Barberry
Chaenomeles species	Quince
Eleagnus pungens	Thorny Eleagnus
Pyracantha coccinea Lalandii	Firethorn

C. AREA DEFINITION AND TRAFFIC CONTROL - In addition to the plants listed above, the following plants may be used to define areas, as hedges and border plants, and to direct pedestrian traffic:

1. Low Plants - under 5':

Abelia grandiflora	Abelia
Berberis buxifolia nana	Dwarf Magellan Barberry
Berberis thunbergi atropurpurea	Red Japanese Barberry

Buxus microphylla	Little Leaf Box
Buxus sempervirens suffruticosa	Dwarf Common Box
Euonymus alata compacta	Dwarf Winged Spindle Tree
Hypericum species	St. Johnswort
Ilex crenata rotundifolia	Round Leaf Japanese Holly
Ilex crenata helleri	Heller's Japanese Holly
Lonicera nitida	Box Honeysuckle
Taxus baccata repandens	Spreading English Yew
Taxus cuspidata densa	Japanese Yew
Taxus media hicksi	Hick's Yew
Viburnum opulus nanum	Dwarf European Cranberry-Bush

2. Medium Plants - 5'-15':

Buxus sempervirens	Common Box
Cotoneaster lucida	Hedge Cotoneaster
Ilex cornuta	Chinese Holly
Ilex cornuta burfordi	Burford Holly
Ilex opaca	American Holly
Ligustrum amurense	Amur Privet
Ligustrum lucidum	Glossy Privet
Ligustrum ovalifolium	California Privet
Taxus cuspidata	Japanese Yew
Taxus media	(hybrid) Yew

D. SCREENING - These plants are useful to screen unsightly areas, to insure privacy, and to define areas:

Buxus sempervirens	Common Box
Cornus mas	Cornelian Cherry
Eleagnus angustifolia	Russian Olive
Euonymus yedoensis	Yeddo Euonymus
Kolkwitzia amabilis	Beauty Bush
Ligustrum species	Privets
Lonicera bella	Belle Honeysuckle
Lonicera maacki podocarpa	Amur Honeysuckle
Philadelphus species	Mock-Orange
Photinia serrulata	Chinese Photinia
Prunus Laurocerasus schipkaensis	Shipka Cherry-Laurel
Spiraea veitchi	Veitch Spirea
Syringa species	Lilac
Thuja occidentalis	American Arbor-vitae
Thuja orientalis	Oriental Arbor-vitae
Tsuga canadensis	Canadian Hemlock
Tsuga caroliniana	Carolina Hemlock
Viburnum species	Viburnum

E. TEMPERATURE CONTROL - The best plants for the purpose of breaking the wind and deflecting the heat waves are the evergreens (pines and hemlocks). Height is important in retarding the wind over a large area, but shrubs, too, are necessary in the windbreak for density and wind resistance below the crowns of the trees. Most of the shrubs listed above are suitable to plant as facing to the following trees:

Picea abies	Norway Spruce
Pinus nigra	Austrian Pine
Pinus strobus	White Pine
Tsuga species	Hemlocks
Ulmus rubra	Slippery Elm

In addition, the following shrubs may be used to face the trees:

Kalmia species	Mountain Laurel
Osmanthus species	Osmanthus
Pieris species	Andromeda
Rhododendron species	Rhododendron

F. BEAUTIFICATION -

1. Foundation Plants - for residences and dormitories:

Abelia grandiflora	Abelia

Berberis juliana	Juliana Barberry
Berberis thunbergi	Thunberg's Barberry
Buxus sempervirens	Common Box
Hypericum species	St. Johnswort
Ilex aquifolium	English Holly
Ilex cornuta	Chinese Holly
Ilex cornuta burfordi	Burford's Holly
Ilex crenata	Japanese Holly
Ilex crenata convexa	Spreading Japanese Holly
Ilex crenata helleri	Heller's Japanese Holly
Ilex crenata microphylla	Littleleaf Japanese Holly
Ilex crenata rotundifolia	Roundleaf Japanese Holly
Ilex glabra	Inkberry
Leucothoe catesbaei	Dropping Leucothoe
Mahonia aquifolium	Oregon Grape-Holly
Nandina domestica	Nandina
Osmanthus fortunei	Fortune's Osmanthus
Pieris floribunda	Mountain Andromeda
Pieris japonica	Japanese Pieris
Pinus mugo mughus	Mugo Pine
Prunus Laurocerasus shipkaensis	Shipka Cherry-Laurel

Pyracantha coccinea	Scarlet Firethorn
Rhododendron species	Rhododendron, Azalea
Thuja orientalis	Oriental Arbor-vitae
Thuja occidentalis	American Arbor-vitae
Taxus baccata repandens	Spreading English Yew
Taxus cuspidata varieties	Japanese Yew
Taxus media hicksi	Hick's Yew
Viburnum rhytidophylum	Leatherleaf Viburnum
Chamaecyparis	False Cypress
Juniperus species	Junipers

2. Mass Plantings -

Aucuba japonica	Japanese Aucuba
Forsythia species	Forsythia
Juniperus chinensis pfitzeriana	Pfitzer Juniper
Philadelphus species	Mock-Orange
Photinia serrulata	Chinese Photinia
Pieris floribunda	Mountain Andromeda
Pieris japonica	Japanese Pieris
Prunus laurocerasus varieties	Cherry-Laurel
Rhododendron varieties	Rhododendron and Azalea
Rosa hugonis	Father Hugo Rose

Spiraea thunbergi	Thunberg Spirea
Spiraea vanhoutei	Vanhoutte Spirea

3. Specimen Plants -

Acer palmatum	Japanese Maple
Aucuba japonica	Japanese Aucuba
Chionanthus virginicus	Fringe Tree
Cornus alba sirica	Siberian Dogwood
Cotinus coggygria purpureus	Smoke Tree
Fothergilla species	Fothergilla
Magnolia stellata	Star Magnolia
Spiraea vanhoutei	Vanhoutte Spirea
Viburnum sieboldi	Siebold Viburnum
Viburnum tomentosum mariesi	Maries Doublefile Viburnum

G. TREES (* recommended for street planting)

1. Large trees for general use on campus (60-70'):

*Acer rubrum	Red Maple
*Acer saccharum	Sugar Maple
*Ginkgo biloba (male)	Gingko
Prunus Sargenti	Sargent Cherry
Quercus borealis	Red Oak
Quercus coccinea	Scarlet Oak
*Ulmus americana	American Elm

2. Medium Trees (40-50'):

*Acer platanoides	Norway Maple
*Gleditsia triacanthos "Moraine"	Moraine Locust
Nyssa sylvatica	Blackgum
*Oxydendron arboreum	Sorrell Tree
Quercus palustris	Pin Oak
Sophora japonica	Chinese Scholar Tree
*Tilia cordata	Little-leaf Linden
*Zelkova serrata	Japanese Keaki

3. Small trees (under 40'):

Acer campestre	25'	Hedge Maple
Carpinus caroliniana	35'	Ironwood Tree
Cercis canadensis	36'	Eastern Redbud
Cornus florida	35'	Flowering Dogwood
Cornus florida rubra	35'	Pink Flowering Dogwood
Crataegus Crus-galli	25'	Cockspur Hawthorn
Eleagnus angustifolia	20'	Russian Olive
Koelreuteria paniculata		Golden Rain Tree
Malus eleyi		Eley Crab
Malus floribunda		Japanese Flowering Crabapple
Malus Hopa		Hopa Crab
Malus ioensis fimbriata	30'	Fringe-petal Crab

Malus robusta 30'	Siberian Crab
Ostrya virginiana	Hop Hornbeam
Prunus pissardi rosea 10'	Purple-Leaved Plum
Prunus serrulata Fugenzo 35'	Fugenzo Japanese Flowering Cherry
Prunus serrulata Kwanzan 10-15'	Kwanzan Cherry
Viburnum sieboldi 25'	Siebold Viburnum

This list of plant material is not exhaustive of the possibilities, and represents only especially selected plants.

Maintenance

The problem of maintenance is properly that of the Department of Buildings and Grounds. Planting, fertilizing, spraying, pruning, reseeding and mowing must be attended to periodically. As has been stated herein, the list of plant material includes those plants which are hardy and, after they have become well established, they will need little attention. An additional mitigating factor is the informal grouping of plant materials; thus the major maintenance involved would pertain to the pruning of hedges which are to be kept rather low and the mowing of lawn areas. Access for heavy equipment has been provided to each lawn area and smaller areas not easily accessible have been put into a ground cover or are paved.

ARCHITECTURAL CONSIDERATIONS

As has been expressed earlier, the writer has designed the plan for this site intending that it be developed in the most modern and contemporary style. New expressions in architecture may be utilized, carrying the whole development "away from the old buildings into newer and fresher surroundings without detracting from the tradition inherent in the older buildings." (Hill and Taylor, 1939). The major intent has been to create a free park-like campus arrangement which would achieve a sense of spaciousness and proportion.

The use of modern construction methods involving, for example, the new lift-slab technique, and utilizing steel frameworks with light-weight curtain walls allows the designer to get away from the ponderousness of stout bearing walls and heavy stonework. With the extensive use of glass the feeling of openness can be achieved. To add to the feeling of spaciousness, the writer has designed individual courts or terraces and gardens for each building insofar as is practicable. Thus, the inside space is visually integrated with outside space,

creating a feeling of one space area flowing into another and being a part of it.

Modular planning should be incorporated in order to get the maximum flexibility of design and use in the various buildings. With a basic unit established, other modules could be added as the need arises. The use of modular planning and standard building material components would reduce the overall cost considerably in addition to making the facilities more usable. Within the buildings such things as demountable partitions would make it possible for a laboratory to be doubled in size in a matter of a day - or classrooms could be subdivided to accommodate smaller or larger groups of students. Mechanical and electrical services, however, would have to be established in continuous systems.

The architecture of the buildings should not be a compromise with tradition. It should be an expression of function, contemporary materials and design. Accordingly, as stated by Upjohn (1956), "any problem in architecture contains the germ of its own solution; the duty of the architect is so fully to understand the problem that the solution of

both its utilitarian and its expressive aspects become apparent, neither of which can be met by historic styles."

CONCLUSIONS AND RECOMMENDATIONS

The design presented in this thesis provides a possible solution to the problem of expanding the facilities of Virginia Polytechnic Institute to the northwest. The concept of the "master plan" herein presented is unconventional: the plan is conceived of as fluid, "incomplete," it might be said. Rather than being a final type of plan to which school engineers must adhere closely even though the building program extends over many, many years, this plan allows for alteration in both expansion and architecture. The various elements of the design are not tightly related to any axis or hub; each of the elements may be treated individually.

With this new concept of a master plan, it would be possible for school engineers to proceed with expanding the College in stages, ever mindful of new trends in architecture and new building methods and materials.

Recommendations

The major element involved in this problem is one of land use. That is, the objective is to utilize the site adequately. To do this, there must be an over-all plan to guide the growth of an institution in an orderly manner. The following general recommendations are made:

1) there should be early coordination and cooperation between the landscape architect and the building architect;
2) the various stages of site development should be carried out in order of relative importance: grading and drainage should be accomplished first and in one step in order to avoid costly regrading; planting of foundations of the buildings and in the immediate vicinity of buildings should be accomplished as soon as possible after construction has ceased; lawns and street trees should be put in at this time also; later, as funds are available, paths and walks should be planted, then the areas between buildings, and finally the campus grounds should be beautified with specimen plant material;

3) the factors and problems peculiar to the site must be considered, such as the per cent of slope, the access ways, the location of adjacent buildings and school activities, the amount and direction of winds, rain, and snow, and possible future development of the site;
4) the "master plan" of the development should be used as a guide but not as a limitation to the expansion of the campus.

In addition to the above, it is specifically recommended that:

1) state-owned vehicles be parked and maintained in a central motor-pool to be located on the college farm;
2) the heating plant be expanded to provide service for the proposed additional buildings;
3) parking for dormitory students in the "Upper Quad" be provided in the area west of those dormitories;
4) parking for "town" and commuting students be provided at the fringe of the present campus above the stadium;

5) only resident students of the junior, senior, and graduate levels be allowed to maintain automobiles on campus.

SUMMARY

The object of this thesis is to present a site plan for the northwest part of the Virginia Polytechnic Institute of Blacksburg, Virginia, in anticipation of the growth of the student population to 15,000. Expansion of the College facilities to this site includes a new location for the School of Engineering and Architecture, additional dormitories, a residential area for graduate students and young instructors, and an Educational Center.

A review of literature which dealt with site planning and landscape design of larger schools was made.

Topographic maps of sections of the site were obtained and projected into one map of the site. From this large map subsequent drawings and a small-scale site plan were made.

The introduction to the thesis provides a description of the site as well as a discussion of the historical background of the College. In addition, there is presented a brief review of the previous plans proposed for the expansion of the College.

The body of the thesis consists of three major sections: "Design of the North Campus," "Landscape Design and Planting," and "Architectural Considerations." Drawings relevant to each topic are included and explained in the text. The design is strictly contemporary, and it embodies a free park-like campus arrangement.

It is concluded that the site plan is a deviation from conventional planning in that it may be altered and expanded upon without affecting the substance of the design.

BIBLIOGRAPHY

1. Architectural Forum, "At the University of Michigan, an Answer to Expansion: don't extend the old campus; add another one." Vol. 98, June 1953, pp. 118-122.

2. Bailey, L. H., Manual of Cultivated Plants, rev. ed., New York: The Macmillan Company, 1957.

3. Bannister, T. C., "Architecture, Education for," The Encyclopedia Americana, Vol. II, New York: Americana Corporation, 1956, pp. 182-185.

4. Berger, A. S., "Trinity University Campus", Landscape Architecture, July 1957, pp. 471-475.

5. Bush-Brown, A., "College Architecture: An Expression of Educational Philosophy," Architectural Record, August 1957, pp. 154-157.

6. Cameron, J. L., "Shrubbery for School Sites," American School and University, Vol. 25, 1953, pp. 313-318.

7. Casson, Sir Hugh, and Conder, N., "Cambridge University Development, Sedwich Avenue Site," Architectural Record, Vol. 115, April 1954, pp. 149-155.

8. Collins, P. E., "Why Plant Shrubs in Windbreaks," South Dakota Agricultural Experiment Farm and Home Research, Winter 1952.

9. Currier, C. A., "The Planning Requirements of Larger School Sites," American School and University, Vol. 27, 1955, pp. 315-318.

10. Davis, F. F., "Better Lawns for Schools and Colleges," American School and University, Vol. 15, 1943, pp. 130-138.

11. Eckbo, G., "Site Planning," Architectural Forum, Vol. 76, 1942, pp. 263-267.

12. Eggleston, J. D., "The Legislature and V. P. I.," (unpublished), 1918.

13. Farrier, P. H., "Future Enrollment at V. P. I.," (unpublished report), 1952.

14. Hill, C. S., and Taylor, A. D., "Principles Governing the Landscape Development of Grounds for Educational Institutions," American School and University, Vol. 11, 1939, pp. 203-215.

15. Hopkins, A., and Associates, "Recommendations for Future Development, Virginia Polytechnic Institute," (unpublished report), May 2, 1946.

16. Hubbard, H. U., "The Influence of Topography on the Layout of Land Subdivision," Landscape Architecture, Vol. 18, No. 3, 1928.

17. Hudnell, R. H., "The Virginia Agricultural and Mechanical College and Polytechnic Institute, Its Growth Since the Reorganization - its present condition and prospects," Southern Planter, Vol. 63, Jan. 1902, pp. 27-29.

18. Johnson, R. L., "Precise Response to Urban Conditions," Architectural Record, August 1957, p. 164.

19. Lautner, H. W., "The Landscape Architect Serving a University," Landscape Architecture, Vol. 44, No. 2, 1954, pp. 83-88.

20. Parker, H., and McGuire, J. W., Simplified Site Engineering for Architects and Builders, New York: John Wiley and Sons, Inc., 1954.

21. Pond, B. W., "Landscape Architecture," Encyclopedia Americana, Vol. XVI, New York: Americana Corporation, 1956, pp. 705-711a.

22. Project Reports by the Local Building Committee of V. P. I., (unpublished), 1945.

23. Ramsey, C. G., and Sleeper, H. R., Architectural Graphic Standards, 3rd ed., New York: John Wiley and Sons, Inc., 1941.

24. "Reducing Damage to Trees from Construction Work," Farmers Bulletin No. 1967, U. S. Department of Agriculture, Washington, D. C.: 1945.

25. "Report of the Virginia Senate and House Joint Sub-Committee on the Investigation of the Virginia Agricultural and Mechanical College," (unpublished report), 1900.

26. Royston, R., "Landscaping the School Site," American School and University, Vol. 24, 1952, pp. 259-262.

27. Shear, J. K., "Design is Desired Under the Elms," Architectural Record, August 1957, p. 136.

28. Stevenson, M., "Street Trees - Design Principles of Tree Use to Fit Space and Environment," Landscape Architecture, July 1957, pp. 476-479.

29. Upjohn, E. M., "Architecture," Encyclopedia Americana, Vol. II, New York: Americana Corporation, 1956, pp. 169-182.

30. "Virginia Polytechnic Institute," Encyclopedia Americana, Vol. XXVIII, New York: Americana Corporation, 1956, p. 129.

31. Weir, L. R., Parks, U. S. Department of Labor Bulletin, 1928.

32. Yearbook of Agriculture, Trees, U. S. Department of Agriculture, 1949.

The two page vita has been removed from the scanned document. Page 1 of 2

The two page vita has been removed from the scanned document. Page 2 of 2

APPENDIX

Plate 3. Hopkins Plan for North Campus

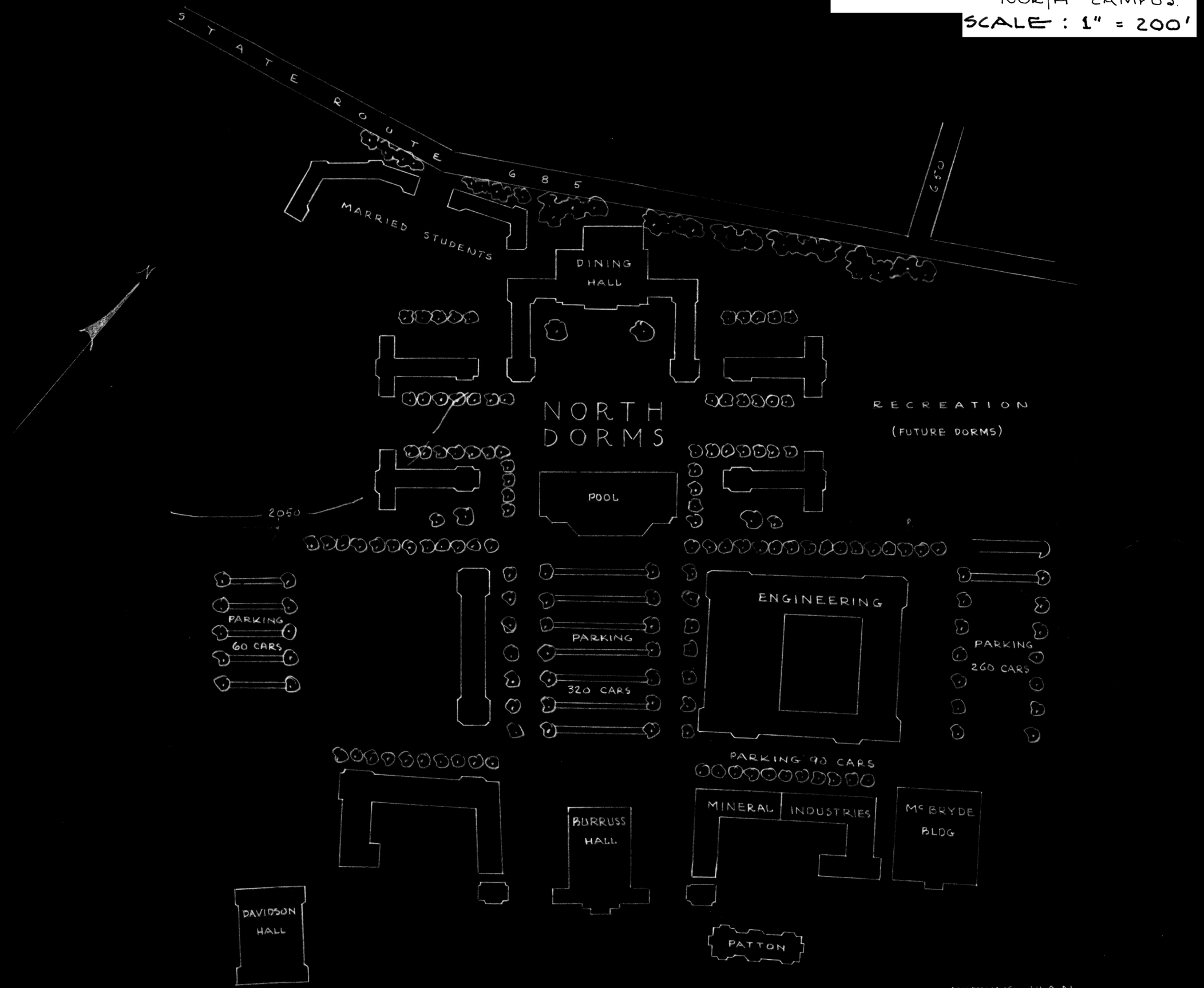
Plate 4. Topographic Survey

Plate 5. Landscape Plan and Site Development

Plate 6. Plan Showing Revised Contours

(See pocket inside back cover)

PLATE 3 - HOPKINS PLAN FOR NORTH CAMPUS.
SCALE : 1" = 200'



HOPKINS PLAN
for EXTENSION OF V.P.I. CAMPUS

SUBMITTED MAY 1946
SCALE: 1"=200'-0"

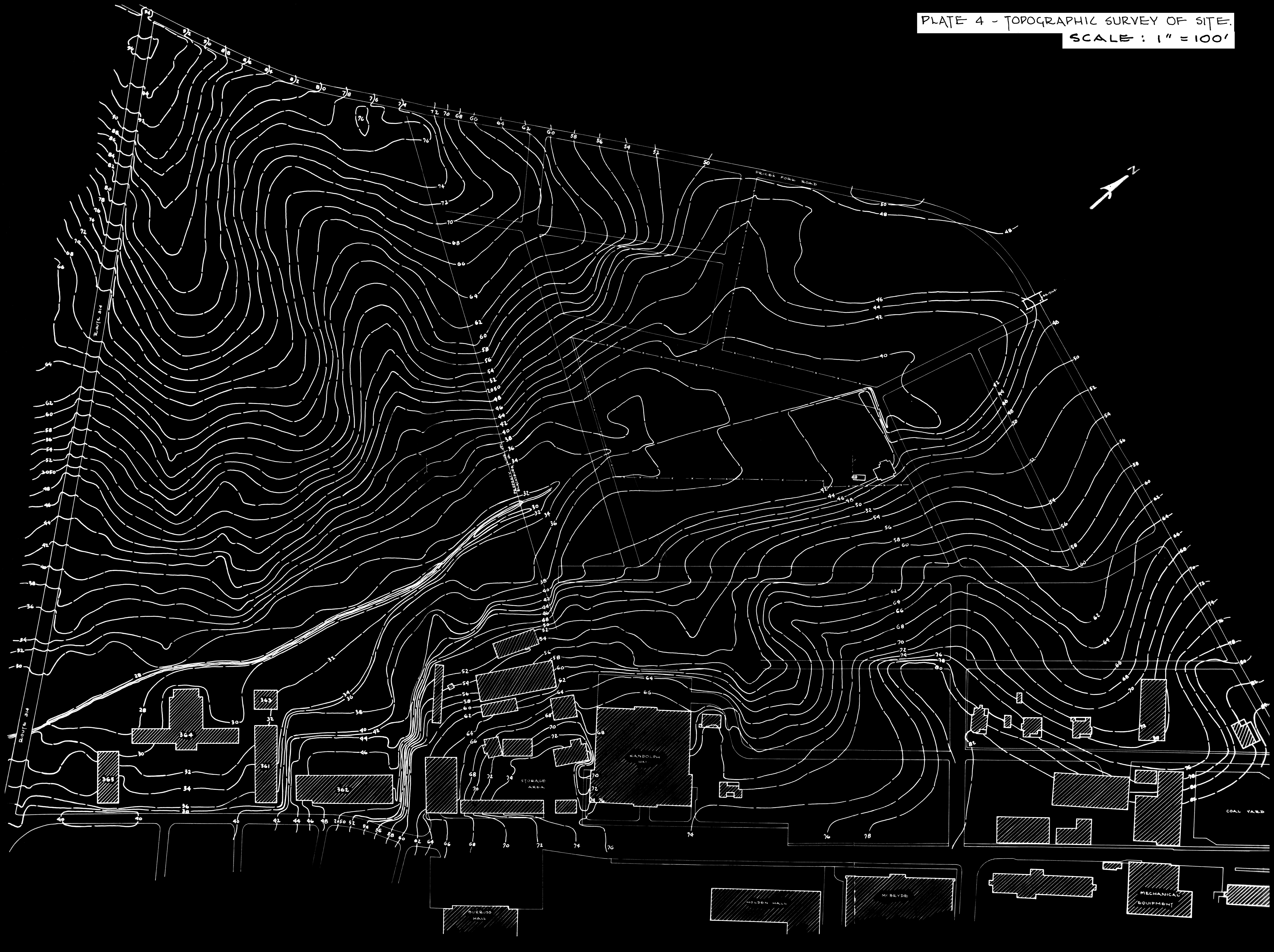


PLATE 4 - TOPOGRAPHIC SURVEY OF SITE.
SCALE: 1" = 100'

PLATE 5 - LANDSCAPE PLAN AND SITE DEVELOPMENT.

SCALE : 1" = 100'

PLATE 6 - PLAN SHOWING REVISED CONTOURS.

SCALE : 1" = 100'

PLAN SHOWING ORIGINAL & REVISED CONTOURS

NORTH CAMPUS, V.P.I. BLACKSBURG, VA.

SCALE: 1"=50'-0" MARCH 1958