

Vancouver, B. C.

Nov. 10th. 1913.

To the Board of Governors
of the University of British Columbia,

Gentlemen:-

As the Commission appointed to examine and report upon the general design for the University, prepared by Messrs. Sharp & Thompson, Architects, we have the honour to present herewith the result of our findings, which, we are pleased to say, have the full approval of each individual member of our body.

Very respectfully yours,

(Sgd.) Warren P. Laird.

(Sgd.) Thomas H. Mawson.

(Sgd.) Richard J. Durley.

(Sgd.) G. L. Thornton Sharp.

(Sgd.) Charles J. Thompson.

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REPORT OF THE GENERAL DESIGN
FOR THE UNIVERSITY OF BRITISH COLUMBIA.

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Preamble.

Pursuant to the instructions of the Board of Governors the Commission has given careful study to the general design for the University of British Columbia as prepared and revised by Messrs. Sharp & Thompson, Architects, having visited and examined the site and taken into account the various governing conditions as brought to their attention.

Scope of Report.

An enquiry of this nature must of necessity concern itself broadly with general and preliminary questions upon whose right determination at this stage will depend the success of the entire scheme for all time to come.

The further development and actual execution of the design of course lies entirely within the province of the architects and their expert colleagues in engineering and landscape practice; but prior to the detailed consideration of the individual parts or units those large general factors must be decided which underlie and govern the scheme and affect the economy, efficiency and beauty of each of its individual parts throughout every stage of its development. The central purpose of our study of your problem has therefore been to determine upon right fundamentals.

Content of Report.

The report is cast in three parts, presenting a statement of the problem to be solved, the solution proposed by the Commission and an account of the practical and other possibilities

of the design in the course of its development. The drawings referred to consist of the architects' competitive design as revised and of two diagrams showing (I) the Re-allocation of building areas herein proposed and (II) the location proposed for buildings now to be constructed.

THE PROBLEM.

The
University.

The University of British Columbia is here conceived as an institution of the first order whose scope shall be co-extensive with the educational needs of the Province, This involves provision for a State University comparable in the range and magnitude of its activities to the seats of learning of any country in the world. To create a comprehensive plan for the ultimate accomodation of such an organism, it is necessary at the outset to assume all factors now known to be necessary to a complete university and also to provide for the future inclusion of other factors which will inevitably develop with the advance of knowledge and changes in social conditions.

Functions.

These factors are susceptible of classification under the following general headings :

I. Administration or Control.

II. Instruction. The Diffusion of Knowledge.

(a) General Arts and Science.

(b) Applied (Technical and Professional).

(c) Service (Libraries, museums etc.)

III. Research and Investigation.

The Advancement of Learning.

IV. Community Life.

Social, Recreational, Religious;

For Students, Officers, Employees.

V. Service.

(a) Heat, Light, Power, Sanitation, etc.

(b) Movement of Passengers and visitors, and

(c) Receipt, Transportation and storage of supplies.

(d) Care of Buildings and grounds.

Develop-
ment.

The creating of a comprehensive design for progressive development makes it necessary to provide for the needs of an institution, potentially great, whose relatively small beginnings must be arranged with due regard to present economy and efficiency and in such a manner as to permit them to fall into place in the steadily developing general scheme. This twofold aim has governed the formation of the design covered by this report.

Requirements
of
Institution.

A detailed statement of the University requirements is unnecessary here, as it was formulated for the competition in which the original design was produced, and as since modified, is embodied in the plan now before us. Certain further modifications laid before us simultaneously with this plan are comprehended in the advices of this report. We therefore proceed to a consideration of :-

THE SITE.

Character of
site.

This lies upon a headland at an elevation of approximately three hundred feet above the sea, from which it is separated

by a steep bluff, crowned in places with a heavy forest growth, consisting largely of the coniferous trees, characteristic of this region.

The waters of the Gulf of Georgia form more than half of the boundary of the site, while its remaining sides adjoin a tract of some three thousand acres of government land bounded on its farther side, several miles distant, by a suburb of Vancouver.

Following the recommendation of Dr. C. C. James, Dominion Commissioner of Agricultural Instruction, the University will ask the Provincial Government to grant two hundred acres of this land at the South Easterly side for the use of the University Farm. On the seaward side the crest of the bluff is followed by the Marine Drive, at present the thoroughfare connecting the site with the City on the one side, and with New Westminster, through Eburne, on the other. By this drive and by prospective street car lines, the Institution will lie within a seven-mile radius from the City centre.

Two
Divisions.

The site may be regarded as composed of two regions ; one forming the location of the University buildings ; the other constituting the farm. The building area occupies that portion of the site nearest the Gulf, the adjoining farm lands extending towards the southeast. This gives to the building site a northern, and to the farm, a southern exposure. The farming area, in its character and relation to the University and its school of agriculture has been made the subject of a

special report by Dr. C. C. James.

Aspect
Prospect.

The surface of the site may be described as that of a gently undulating tableland, somewhat higher than the Marine Drive, thus securing to the buildings the important advantage of an elevation above their immediate surroundings. The site is sheltered from the most inclement winds by the belt of forest lying along a portion of the waterside, while on the remaining and climatically more favoured exposure, there is afforded a magnificent panoramic view of Gulf, Bay and forest, enclosed by an amphitheatre of distant mountains, crowned by glaciers and snow peaks. Reciprocally, a full view of the University will be afforded to all vessels bound to or from the City of Vancouver. Just as the City gains in individual character because approached by water, so the Campus of the University will have an unique quality as seen by water, and it is fortunate that the first impression gained by those who come to Vancouver by sea will be that of a seat of learning and culture.

Topography
and soil.

The building area is characterized by a crowning ridge paralleled by gentle depressions which rise slightly toward the outer margin. The ridge lies nearly north and south, dropping gently and directly toward the view.

All these considerations combine to adapt the site very happily to the needs of a large grouping scheme of buildings, ensuring as they do economy of grading, natural surface drainage, ease of access and intercommunication, and fine possibilities of architectural effect in vista and internal and external aspect.

The land immediately surrounding the actual building area, although not of the high quality necessary for agriculture, is, nevertheless, eminently adapted to garden purposes. The large amount of vegetable humus lying on a dry subsoil in a district where the rainfall is considerable, and the humidity fairly constant, ensures the growth of trees and shrubs and the creation of perfect grass lawns, all so essential to the setting of university groups. The agricultural lands adjacent to the site have been enriched by the deposit of centuries of alluvial or virgin soil from the higher ground.

Communi- cations.

In respect to communications, the situation of the site is most favourable because its entire periphery is accessible to lines of travel, either by land or water. Not only is it bordered for a considerable portion of its margin by the Marine Drive, but on the remaining, landward side, it is reached by projected streets, three of which at least must ultimately carry car lines. These streets impinge upon that side of the property lying nearest to the centre of the building group. Moreover, since the longitudinal axis of the site lies at nearly right angles to these lines of approach, the distance to be travelled to or from any point of the site is reduced to a minimum. It will be observed also that the farm lands extend towards the lines of communication.

A desirable feature in respect to the movement of passengers and materials consists in the fact that there is no intersection of service and pleasure communications at grade level. The former, which will be chiefly by water can be carried up the

bluff side under the Marine Drive, and the latter on the land side, radiating as they do from the site , will parallel the proposed Grey's Point Boulevard.

Berthing facilities suitable for vessels of small draft can readily be provided at several points of the Western boundary of the property convenient both to the building group and to the whole territory, including the farm.

Turning now from the building requirements and nature of site, we would ask attention to the solution of the problem thus created, as it is presented in the general design modified as shown in Diagram No. I, and described as follows :

THE SOLUTION OF THE ARCHITECTURAL PROBLEM.

Fundamental principles.

An underlying principle in the formation of an architectural design, be it that of a single structure or a group, is that of frank recognition of the site : in other words, the natural and unchangeable conditions of the ground as to its topography, soil formation, aspect, prospect, and environment must be fully recognized and conformed to in any determination of the character and disposition of the buildings to be placed upon it .

Another fundamental requirement is that the design must have unity; must constitute in all its parts a single conception by bringing into a coherent relation both buildings, grounds and communications, which thus are made to constitute a single organism.

Moreover, this organism, complete and self-contained, must relate itself to its surroundings, forming an integral part of the whole landscape; so that, although newly created for a specific purpose, it will be wedded with pre-existing and environing conditions.

These statements bring us to the most important single consideration of the whole project ; the central principle on which the University plan should be composed.

Original Design.

In explaining this point, it is proper for the three advisory members of the Commission to state parenthetically regarding the design on which they have been instructed to report

that it was conceived on the right principle, and as laid before the advisory members showed improvement on the original scheme. The amended form advised by this report as the result of study by the advisory members in consultation with the architects is not a reversal but is the natural evolution of that plan, modified and extended to adapt it to recently changed conditions.

Revised
Design.

The organic structure of the plan is based on two axes crossing at right angles on the higher levels of the site. Upon these axes lie broad open spaces or malls bordered by building groups, this portion of the scheme constituting its nucleus. This is fringed on the West by a broad area to be devoted to Horticulture and on the East by a similar tract whose proximity to the adjoining residential area and car lines warrants its assignment to buildings and other constructive features of the plan. Adjoining at the South lies the farm, while the limited area at the Northerly end provides the chief portal of entrance, and space to complete the building groups. At the crossing of the chief axes lies the seat of administration or control within which may be comprised such features as library, convocation hall or museum.

Vistas.

From this point along the Greater Mall is ensured the panoramic view of mountains and water which is the chief distinction of the site. The Lesser Mall opens to the West, giving a vista through the trees towards the Strait of Georgia, while towards the East it affords communication with Tenth Avenue, prospectively the chief line of approach to the University by street car.

General Groupings.

Grouped about the administration centre, and within practicable working distance, are the several areas to which should be assigned the more closely related educational departments ; each given a juxtaposition with its neighbors according to their interrelations.

Departures from original.

The remaining building groups, athletic and military reservations, etc. are also allocated as required by their respective relations. The several assignments as well as the location of certain features all as indicated in the accompanying diagram I, present some departures from the original design both as to axes and position of buildings made necessary for the following reasons :-

Major Axis.

Direction of Main Axis : The final topographical survey of the property shews its main ridge to have a direction bearing markedly further West of North than shewn in the preliminary survey, necessitating a change of direction in the major axis of some fifteen degrees westward. This involves no sacrifice of vista but on the contrary permits the axis to centre upon one of the chief of the snow capped peaks of the panoramic view.

Secondary Axis.

Direction of Secondary Axis. By this change the line of Tenth Avenue would lose its intersection at right angles with the Major Axis. This is restored by breaking the axis at a point between the central and easterly groups, thus carrying the intersection to a point somewhat higher and further south along the main axis, an undoubted advantage to the setting of the central group of buildings.

Open
Spaces.

The principal open spaces could we believe be reduced with advantage to both use and appearance , to the dimensions now shewn on the diagram, approximately as follows :- Major and Minor Malls from four hundred to two hundred fifty feet and the "Eastern Boulevard" from three hundred to one hundred seventy five feet.

Position of
Building
Areas.

The introduction into the problem of a farm to adjoin the present holdings on their South East Boundary necessitated the removal of the Agricultural group to that point most convenient to both University and farm. This position was originally occupied by the dormitory group.

Engineering.

The desirability of convenient relations between Administration, Pure Science, Arts, Agriculture and Engineering suggested the removal of the last named to the region immediately South or West of the Administration.

Dormitories.

To the positions thus vacated on the farther boundary of the site the dormitories have been assigned. Here, while the quadrangles may open toward the South the buildings will have an unobstructed frontage toward the best view to the North, while their architectural form will well lend itself to the creation of good effect in the great Mall whose buildings progressively increase in height until they culminate in the administration tower.

Compact
Grouping.

Thus the re-distribution of those departments most dependent upon one another permits their grouping in the most compact way possible having due regard to necessary openness of space and freedom of circulation.

**Medical
Department.**

Adjoining the central group on the Southeast stands the Medical Group, convenient to the science departments of the University, its approaches for ambulance service open to Tenth Avenue, and its hospital frontage open to the South and the quiet of the farm.

**Womens'
Dormitories.**

The Womens' Dormitories and Union are slightly shifted to the North but retain the original advantage of propinquity to a future residence neighborhood.

Pedagogy.

The Department of Pedagogy will find place in a region convenient at once to its students and to day pupils from the town attending its model school.

**Athletic
and Military
Divisions.**

Both Athletic and Military divisions have gained in the shift of position by reason of their greater nearness to direct city communication. The change was to some extent dictated by the need of open land near the agricultural buildings, and is in part required to keep the gymnasium and athletic fields near the dormitories.

Power Plant.

The Power Plant with its yards, University repair shops etc. finds position near the armory, a site on the whole the most advantageous from the points of view of economy of service, dispersal of smoke and architectural appearance.

**Theological
Schools.**

For the Theological Schools a tract is provided of adequate area, in a position of comparative retirement and near a future residential region.

Other modifications have been made in the original design in the matter of minor groups and thoroughfares, as indicated in the diagrams.

Reduction in
building
areas.

The modifications thus effected and the reductions in area of open spaces within the building tract have resulted in a material economy to the latter and a corresponding increase in space available for farming purposes, thus enabling the University to restrict to two hundred acres the additional land needed to complete its farm equipment.

Revised
Distributions.

Allocation of Departments in the revised Plan. This in a general way is indicated in the foregoing description of changes in location of building areas or tracts, but is here summarized in order to show the distribution of parts assigned to each tract. Letters refer to the tracts as they are marked in the accompanying diagram No. I.

Schedule.

Tract.	Department.
A.	Administration, comprising also Library or Museum and Convocation Hall.
B.1.	Department of Agriculture.
B.2.	Farm Lands.
B. 3.	Horticultural Fields.
C.	Pure Sciences(Biology, Bacteriology, etc.)
D.	Mining Engineering, Forestry and Geology.
E.	Pure Sciences (Physics and Chemistry.)
F.	Mechanical, Electrical and Civil Engineering.
G.	Arts.
H.	Cognate Departments (unassigned.)
I.	Mens Dormitories.
J.	Mens Dormitories.

Schedule.

Tract.	Department.
K.	Medical Department and Hospital.
L.	Womens Dormitories and Union.
M.	Pedagogy.
N.	Stadium and Field Sports.
O.	Unassigned.
P.	Armory and Drill Field.
Q.	Power House, Shops and yards.
R.	Gymnasium, Mens Union etc.
S.	Theological Schools.
T.	Faculty residences.
U.	Future dormitories.

Future
Expansion.

Two factors of uncertainty as to future building requirements must be reckoned with : one, that of growth within existent or prospective departments: the other, that of the future creation of new lines of work not foreseen at present. The first of these is cared for by the possibilities of arrangement within the assigned grouping areas; with regard to the second, we understand that it is feasible to reclaim, at moderate expense, a possibly considerable tract of land extending to the North and West from the present foreshore of the University property. Such land, while not available for buildings, would obviously set free a proportion of the land now assigned for recreation purposes.

Either the land thus released or that at the West

now assigned to horticulture and cognate subjects would then become available for the future departments above referred to, which would thus be assured of a close relation to established parts of the University organization.

MATERIALS AND STYLE.

Materials.

Ideal conditions would indicate the use of local and characteristic materials which, as wrought into buildings, would be possessed of an indigenous character.

Stones.

The chief of such materials will be that employed in the construction and facing of the external walls of the buildings, and the native materials now most available are various stones of a bluish-grey tone, the nearly white Haddington Island stone, and granite. The use of the first two for the entire wall surface of all buildings is open to the following objections; both are costly and the blue stones are of a color undesirable for exclusive use in considerable quantities, and unsuited for combination with other materials. Even were the cost of the Haddington Island stone not prohibitive, its whiteness renders it less desirable, for the mass effect of a great group of buildings in this situation, than a material of lower color tone.

Stone Preferred.

The granite, in combination with other materials of suitable color may be considered as more available on the score of cost. We feel that in any event stone should be regarded as the main material for the outer walls of the University Buildings, and should, in fact, be employed exclusively for the walls, provided that suitable stone can be purchased at a reasonable figure.

It would be fortunate if there might be found a quarry of stone suitable in color, texture, cost, and of quantity sufficient

to provide for the full needs of the future.

Brick and
stone as
alternatives.

Only in the event of failure to obtain this stone should the University in our judgement adopt brick as the prevailing material for outer walls with which there should be combined Haddington Island or similar stone or light terra cotta. The brick should be carefully chosen for color and texture and need not be of the more costly kind. Under these conditions the outer wall materials would probably cost from 25% to 40% (according to the proportion of brick used) less than the sum expended on wall construction if the Haddington Island stone were used exclusively.

Upon many structures brick could be used with but little stone; upon others a greater amount of the latter would be desirable, while in structures of chief consequence or commanding position a large or total use of stone may prove necessary to right architectural effect. In any event the choice and distribution of materials as to color and texture should be the subject of close and comprehensive study by the Architects and be carried out under the fixed and consistent programme to which reference is made below.

Style.

The architectural style of the buildings should in our judgement be that originally proposed in the competitive design, which may be designated as " Modern Tudor." As a phase of English Gothic architecture, and better than any period of the Renaissance, does it express and perpetuate the traditions of British scholastic life.

Its essential quality can be properly realized in the materials advised. It lends itself admirably to the needs, in this design, for great simplicity and dignity of general treatment with a variety of expression of purpose in individual parts, ranging from the nearly domestic character of dormitories to the monumental feeling suitable to the seat of administration.

Controlling
scheme.

The unity of effect toward which each step of development should be directed will be possible only by adherence to a controlling scheme of architectural style, materials and color. This is as necessary as conformity to the essential lines of the plan. Within these broad bounds there may and must be allowed freedom in treatment of individual units but this freedom should never be such as to disturb the general harmony of the whole design.

THE IMMEDIATE BUILDING PROGRAMME.

Appropriation.

For its initial uses the University has an appropriation of which, in our opinion, \$1,500,000. may properly be assigned to buildings, exclusive of educational equipment and furnishings. Due provision must also be made for these latter items and for necessary landscape work.

Types of Building.

The departments to be developed with the sum stated, while comprising a wide range of subjects of instruction and including both administration and residence, can be accommodated in three types of structure which may be named respectively "academic", containing lecture rooms, offices, etc. ; "scientific", providing laboratories, classrooms etc.; and "residential" with dormitory and refectory accommodation.

Volume and Capacities.

A conservative estimate of capacities to be had for the sum named should be based on a cube foot cost of forty-five cents (.45¢) for the structure exclusive of furniture and educational equipment, but inclusive of mechanical equipment. The resultant total volume of three and a third million cubic feet should provide a dormitory capacity of 250 students in buildings of one million cubic feet and in the remaining buildings a total of at least ninety thousand square feet of clear floor area in class rooms, laboratories, offices etc.

The number and location of these buildings and the grading, road making and planting necessary to them constitute

the initial building project. These points we consider in their order :

Number of Buildings.

Instructional requirements may preferably be met in three structures. Dormitories should be two in number, one for men and a second to be used by women until their own group is available.

Location of Buildings.

Two considerations should influence the placing of these buildings : convenience and appearance. The latter is especially worthy of attention at this time, for it is desirable from the very beginning to give an effect of co-ordination between parts. Where there are very few buildings with which to work, their form and relation become the more important. If this is carefully considered, the requirements of convenience will be met and a due regard for economy will result.

We advise that three buildings of the instructional type be constructed at the points shown in Diagram II at points 1, 2 and 3 and that the dormitories be placed at points 4 and 5.

Advantages.

This will place instruction and administration at their permanent centre and within convenient relation to each other. When the agricultural department begins to build it will from the outset hold its final relation to the University system. Each subsequent step in the further building programme will extend the plan without disturbing essential relations. The dormitories are at their normal and proper distance from the centre of scholastic activities and are suitably separated.

This arrangement of buildings will establish at once the salient points in the chief feature of the general plan, - its great Mall - whose lines will be well established by the addition of a simple planting scheme of trees and shrubs and the construction of roads and paths. This will give to the region first occupied an appearance of unity and completeness, of great importance in the new community life of the institution.

SOLUTION OF TOPOGRAPHICAL

OR LANDSCAPE PROBLEM.

Increase area
of land
available.

The allocation of the University buildings along the Central ridge leaves a considerable area of land for the various needs of service, as in the roads for recreation, as in the stadium and playing fields, and for ornamental purposes as in the lawns and shrubberies which give the immediate setting to the University buildings.

Importance of
Allocation.

The proportion, disposition and location of these divisions is a matter of supreme importance, just as important in fact as the grouping of the University buildings. The Campus as a whole has not only to provide for the immediate educational and recreational needs of the students and graduates, but what is more important, it has to link the University with the City.

For
Recreation.

Thus the students would stand in healthy rivalry with the athletic clubs of the City, and great crowds of sympathizers would, as in all other Universities, attend the football and other matches.

For social
functions.

In like manner, in a democratic institution like the University of British Columbia, there is bound to be much social intercourse between the University and the City of Vancouver. For whilst reserve and exclusiveness may characterize the older Universities, the reverse holds good in the modern seat of learning. This fact has an important bearing on the campus and its plan of subdivision, and needs

to be grasped in all its bearings.

On the practical side the Campus must approximate in its lay-out to the public park and recreation ground, with this

For auto-
mobile roads.

difference, however, that as the University attracts a much denser and more diversified crowd, including many automobilists, there

is special need for macadamized roads, while on the other hand students and men of intellectual pursuit need spaces suited to the retired temperament and vocation. Interwoven with the

For Promen-
ade.

public and semi-public spaces there must therefore be other

"spaces apart," retreats where only the privileged may enter.

For retired
parts.

Ancient seats of learning have fostered this idea of private grounds within the campus; the modern University emphasizes the place of "greeting" or promenade, yet cannot afford to neglect the other.

For Botanical
and Horti-
cultural
Gardens.

Of equal importance is the recognition of the possibilities of the campus as a series of open air schools, fully utilizing the botanical gardens, where practical and systematic botany receive its inspiration and impetus, and the gardens devoted to studies in practical and theoretical horticulture, Bee culture, Fruit culture, Arboriculture, practical forestry and scientific research in many departments of nature study.

For
Agriculture.

The Campus of the University of British Columbia is also ^{include} to an agricultural establishment complete in every department, not only for study and research, but also for practical demonstration in workshop, orchard and field.

As the natural counterpart to the more serious studies which the University imposes, there must be a definite encouragement of physical exercise. This necessitates the setting apart of large areas, and their lay-out for special forms of recreation.

Correlation.

All these various needs must be correlated in such a manner as to give the highest degree of efficiency at the lowest cost for maintenance, with the least discordance with natural surroundings and with the greatest aid to the aggregate composition of separate units into one connected whole. This end must not be gained at the cost of losing aspect for the horticultural department, soil and aspect for the farm, or car line facilities for the recreation grounds.

Maintenance charges.

Internal and External views.

All these controlling factors have to do with the internal arrangement of the campus. The external effect is however equally important, for the impression produced upon the visitor as he approaches the University is the one impression which will last longer than any other. This consideration has suggested an improvement to the approaches to which more detailed reference will later be made.

Site in relation to surroundings.

A survey of the site in its relation to the surrounding landscape, of the contours in relation to aspect, of the position of boat landings and piers for barges, and of the roads and avenues connecting the city with the site, together with the position of the street car lines and termini, suggests that the Stadium, Armory and drill ground, the hockey and tennis, and other recreation grounds should, as already stated, be placed on the East side of the site, thus gaining immediate access to the street

Importance
of soil and
aspect.

car lines; that the horticultural department should be to the West where the ground lies warm to the sun and is well sheltered by the outer fringe of forest, and that the orchard and experimental fruit farm should lie between the horticultural and agricultural sections, and lastly it is suggested that the farm lands should extend to the south where the soil is of good loamy quality, and the location favourable to the handling of stock and heavy farm produce without intercepting the ornamental drives, walks and automobile roads or, by immediate contrast, spoiling the formal furnished lay-out of lawns. All these conditions are amply met in the arrangement now proposed, the relative positions of the parts of which are indicated on the diagrammatic plan already referred to.

Importance
of Transit
Facilities.

In the correlation of the several parts of the campus there is this further and most important consideration that, in so far as local conditions permit, the traffic, which at times will be of considerable volume, whether pedestrian or automobile, slow or fast, light or heavy, should be graded. Hence certain approaches to the University should provide for automobiles, the service roads for heavy slow farm traffic, and the walks and promenades for pedestrians; and all should be designed to secure convenience, directness and ease of gradient. To gain this directness all unnecessary curvature of roads and walks should be avoided.

Influence of
Revised
Orientation.

All these factors had already been studied by your architects, whose premiated designs show a good disposition of the several sections. By the introduction of the ground which it

is now proposed to add for agricultural purposes, together with the revision of the lay-out and orientation of the University buildings, it has been possible to make more economical use of the land. In the opinion of your advisers this will very materially enhance the aesthetic and orderly qualities of the composition as a whole. If all the factors are grasped it ought to be possible by the ordered arrangement of buildings and surroundings to express in the campus a perfect aggregation of parts, which unconsciously, but nevertheless assuredly, will influence the life of your University. From this catalogue of needs and opportunities, it will be seen that the planning of a University Campus involves the consideration of all the principles and conditions which obtain in the onerous task of designing a City.

Extent of
land
available.

The total area of the campus, with the additional two hundred acres of farm land, the Marine Drive and sheltered slopes, cliffs and waterfront is approximately as follows :-

The Campus (including an additional 10 acres for drill ground)	260 acres.
Addition for Experimental Farm (to be asked for)	200 "
Additional land over and above area in- cluded in exchange in reservation for Theological Colleges,	11½ "
In Marine Drive,	10 "
Small triangular plot to be asked for on North side of Marine Drive partly in ravine and partly private prop- erty,	½ "
In bluff, forest fringe and shore line,	47 "
	<hr/> 529 acres. <hr/>

We advise that this area might roughly be subdivided and dedicated to the various departments in the following manner and proportion. Modifications might of course from time to time be found desirable, but the apportionment is sufficiently good to illustrate and elucidate certain conclusions upon which you may safely proceed.

		Acres.
Subdivision of land.	1. Central ridge occupied by University Buildings and quadrangles and Mall ;	70
	2. Areas on the Eastern side of the campus devoted to Armory drill Grand Stadium, Hockey grounds and Womens' playing field.	30
	3. Areas of the North Eastern corner of the Campus allocated to Theological Colleges,	24
	4. Area reserved for Hospital and Medical School,	12½
	5. Areas on the South side lying between the University Building and the outer fringe of forest devoted to Horticultural and experimental grounds,	30
	6. Land for Orchard and Fruit Nursery, connect- ing Horticultural and Agricultural depart- ments, Poultry Farm,	19
	7. Areas in Boulevards Service Roads and walks,	23½
	8. Lawns and ornamental shrubberies and plantat- ions.	38

9.	Triangular plot of land at the North end of the Campus reserved for professors' residences,	5
10.	In forest fringe between Campus and Marine Drive,	10
11.	Area in existing Marine Drive bluffs and fringe of Natural Forest,	
12.	Community centre to South of Agricultural Department Building, including 200 acres for farm,	47
13.	Poultry farm lying between Community centre and the land reserved for Hospital,	20
14.	Remaining area for Agricultural purposes,	200

Items 5, 6 and 13 properly belong to the Agricultural Department which by these additions is increased to 269 acres.

Providing
for other
Recreational
Facilities.

From this it will be seen that while two special areas are devoted to the drill ground, stadium, and other recreational uses, there will be many other level spaces in the ornamental grounds and in close proximity to the University Buildings which could be used for Croquet, Tennis, bowls and other games, providing suitable recreation for garden parties and receptions.

Relative cost
of Landscape
work.

The proportionate cost of landscape work as included in the lay-out of grounds is generally little understood, and as it is important that some relative liability under this heading should be recognized from the first, we add for your guidance the following approximate calculations which do not include the cost of terracing, balustrades, steps and other purely architectural adjuncts

Roughly it may be stated that in the case of grounds of the extent and kind now proposed, including the necessary provision for roads, lawns, recreation grounds and plantations, the cost will be found to be about one-fifth of the whole expenditure; in other words, out of every \$100,000. expended upon buildings, grounds and equipment, \$20,000. is needed to lay out and equip the grounds. This proportion of the whole cost is made up in the following manner:-

	Per Cent.
Clearing land and drainage for Horticultural purposes,	35%
Formation of roads and walks,	}
Grading and formation of lawns,	}
Clearing and preparation of ground for ornamental plantations and shrubberies,	} 44%
Planting and maintenance of same for one year,	21%
	100%

Immediate cost out of proportion with final cost.

It is perhaps unfortunate, but nevertheless true, that in such a case as the present, where much of the building programme is necessarily deferred, the immediate cost of landscape work cannot be in ratio to the cost of building construction, for in some of its developments the landscape work must be complete from the first. For instance the service roads must be made to connect the public roads with the buildings first erected, even though the intervening buildings, which are to be omitted for the present, constitute more than one-half of the completed composition. Recreation grounds must also

be completely levelled and made useable, while it is generally found advisable to form and plant at an early stage the principal shrubberies, plantations and shelter belts. If, therefore, expenditure must be curtailed, the necessary landscape plans should be prepared at once in their completed form and subjected to the process of elimination or postponement of every feature which can be relegated to the future, and the omission of every detail on which an immediate saving can be effected.

Work to be postponed.

Reduction on work carried out.

An examination of the proportionate cost of the several kinds of work required in the development of the ground, will show that if the work which is actually to be carried out is to be done with economy, two items must be closely checked, firstly, the cost of road making, and secondly, the cost of grading. Whilst appreciating the broad spacious effect produced by wide roads, we may state that in our opinion the amount of Macadam laid down is usually much wider than is really necessary and that sidewalks are frequently laid out in an extravagant manner. Thus for the main roadway or boulevard and farm roads, we think that nineteen feet of macadamized roadway (or two units of traffic) is quite sufficient, and that a width of three units, or six feet six inches along the main lines of transit and two units, or four feet four inches, for the minor lines is usually sufficient for sidewalks. If the total width is as usually proportioned, the balance can be laid down in grass and trees. This method would reduce the cost of road-making by fully 15 to 20 per cent.

Reduced width of Roads & sidewalks.

Cost of
work at
Point Grey.

We would further observe that ample stone can be found on the ground at Point Grey for all purposes of road construction, for the erection of such rough retaining and dividing walls as may be required in the horticultural section, and for foundations for garden structures.

Reduced
Cost of
Grading.

By the re-spacing of the buildings and altered orientation of the two main axes, the possibilities for economical grading have been much improved, and we suggest that this work should only be undertaken after the preparation and careful consideration of re-grading plans, in relation to the floor levels of the buildings and surrounding land. If this care is duly observed in connection with the initial building programme, it ought to be possible to construct the immediately necessary service walks and roads in connection with same, also to lay out and level the recreation grounds, construct all necessary boulevards, sidewalks and walks connecting the several buildings, grade the ground, trench and form and plant beds for shrubberies and forest trees, for about one-half the proportionate percentage which we have given as usual for work of this character. In other words

Estimates
only
approximate.

the approximate amount now needed for the Campus proper would be \$180,000.00. It is only right to state that these estimates are based on rough calculations of areas and local prices. A more detailed and accurate estimate could only be arrived at after the preparation of detailed plans and sections and specifications.

The following considerations and conclusions respecting the divisions of the Campus and the treatment accorded to its

various parts may be helpful.

Main En-
trance
Approaches.

First, as to the approaches to the University from contiguous roads. There are three main approaches, each of which would have a distinct character, and give an enhanced value to the Campus by providing specially favourable view points. In addition there are several minor entrances for service and direct access to the Campus. The three main approaches as now proposed are digressions from previous plans.

The first is the approach from the Marine Drive; where it is proposed to make a diversion of the said drive so as to bring it parallel with the contours and the buildings. Incidentally a feature would be made of the ravine, which should be crossed by a stone bridge of solid but simple design, replacing the existing wooden structure. The fallen timber should be removed from the ravine and the water gathered into pools and cascades, thus adding an incident of great natural charm. The approach to the northerly buildings would be by a long curve laid out to an even gradient suited to the contours, thus ensuring a fine sweeping approach and perfect circulatory facilities for vehicular traffic. On the centre axis it is proposed to build stone steps of ample proportions connecting the Great Mall with the Marine Drive. This area is most important as it lends itself to an exceedingly interesting landscape development combining lawn and shrubbery with the University buildings.

Ravine to
be preserved.

The second entrance connects the two main approaches from the City on the East side with the main axis of the Campus, and by its open effect suggests the possibility of shade trees and central park-ways. II. 11.

Parkway.

The third connects the main farm road with the University Campus. Here on the Southern side of the agricultural building, it is proposed that a model community centre should be created for the economic and hygienic housing of the employees. Such a centre would in itself be an object lesson to students in agriculture.

Materials
for roads
on site.

We believe that it would be wise to begin at once to collect the stones lying on the ground for the purposes of road-making, engaging a stone crusher for the topping material, where a sufficient quantity of stones have been collected. In constructing the roads it would be wise to hand-pitch the ballast, as in the method of road construction adopted with such great and economical success in Scotland.

Home
Nursery,

As a preliminary to the laying out and planting of the grounds, we advise the formation of a home nursery (preferably a part to be devoted later to horticulture) and to collect on the site large quantities of Gaultheria, Barberis, Cedars and Pines, with any other serviceable native trees. These in quantity would be extremely useful for planting up rough banks or slopes or for undergrowths.

In addition to native trees and shrubs, it would be wise to purchase now, and plant in the nursery for future use such other shrubs as are likely to be needed.

The Horticultural Grounds and Orchard should be laid out at an early date, thus ensuring that the fruit and other trees and bushes will be in a serviceable stage of growth when the agricultural and horticultural schools are ready to start operations.

Forest
reserves.

In respect to the forest reserves along the Westerly margin of the site and constituting an invaluable fringe of forest both for shade and ornament, we desire to say that the further removal of any part to create vistas, or to provide other features, should only be proceeded with after considerable study, and with due regard to the age and quality of the trees and undergrowth.

Restrictions
on surround-
ing property.

We would suggest that in order to secure and preserve a desirable environment for the University, the adjoining land should only be sold subject to such restrictions as will prevent the erection or construction of any building or the formation of any area whose purpose, arrangement or use is not in keeping with the general scheme.

ENGINEERING AND SERVICE ASPECTS.

General
Conditions.

When considering the design for an important group of buildings of the kind now reported upon, it must be remembered that the cost of maintenance, the health and convenience in working, and the efficiency of every department are largely dependent on the manner in which the services for Heat, Light, Power, Sanitation and Transport are provided for. The first cost of the necessary equipment for such services forms a very considerable proportion (15% to 20%) of the total expense of construction, and the operating costs are necessarily of such magnitude, that careful study, scientific design, and the exercise of an experienced judgement are all required on the part of the engineers who will be responsible for the design of the service features of your completed institution.

Leading
Points.

Without going into such detail as to trench on the province of your Architects and their future technical advisers, we feel that it will be proper for us to indicate briefly the leading points which should be borne in mind in selecting and designing your service plant. The skill and judgement of your engineer must be shown in assigning proper weight to, and holding evenly the balance between, certain factors, upon which his success or failure will depend. These are :-

Service.

(a) Satisfactory service - as demonstrated by the comfort, safety and health of the persons using the buildings, and by the continuous availability of the service whenever called for.

Economy
in use.

(b) Low cost for maintenance, labour and superintendence, and low consumption of power, fuel and supplies. This is almost of equal importance from the administrative standpoint, involving low operating cost for the services rendered.

Relation
to Design.

(c) Proper subordination of design of service plants to the architects' constructive and aesthetic requirements. It is often difficult to fulfil this condition, without some sacrifice either of economy in operation or even of satisfactory service, and it is in connection with this point that the ingenuity of the design is most frequently required. Architectural requirements, when improperly met, often lead to a compromise or even to an arrangement which may affect prejudicially the conditions as to

Economy in
Construction.

(d) Low first cost of plant, or economy in construction and installation.

Operation.

(e) Ease and convenience in operation, so as to lessen the demands upon the operating staff.

Discussion.

Finally we note the desirability of

With this introduction, we proceed to discuss your chief service requirements, in the light of the information which we have been able to obtain, with special reference to the supply of Heat, Light and Power and the needs as regards Water Supply, Fire Protection, Sanitation and the Transportation of Passengers and Freight.

(A)

Heating &
Power Plant.
Present and
ultimate needs.

In view of the climatic conditions, the conformation of the site and the arrangement of the buildings, we are of opinion that the heating and power plant should ultimately be

placed toward the Eastern side of the completed building group, and as near as possible to the Engineering buildings, the Hospital group and other points of maximum demand for steam, heat and current. This arrangement avoids any long or uneconomical runs of piping, and the power plant will be on the lee side of the site, in a convenient position for service.

Present provisions.

The distance between the various buildings to be first constructed and the site assigned for the Permanent Power House are such, that if this site were used during the first few years of the University's operation, the transmission losses would be a source of unnecessary expense. We therefore recommend that a service boiler plant should for present use be provided, in connection with one of the first buildings to be constructed, of sufficient capacity for heating these buildings, and capable also of extension so as to deal with further buildings up to (say) four million cubic feet. As far as possible this original power equipment would be designed so as to form part of, and occupy space destined for, the apparatus of the Department of Mechanical Engineering ; so as to be in fact the nucleus of the experimental boiler plant of the fuel testing laboratory or laboratory of steam engineering. Whenever the development of the University shall have reached a suitable point , the construction of the permanent or ultimate Power Plant would be proceeded with, the original plant reverting to laboratory use.

Heat Dis-
tribution
System.

We recommend that the University Buildings should be laid out for ultimate connection to a system of heat distribution by means of hot water, heated by steam in the Power House, and circulated throughout the system by means of steam turbine driven, or motor driven pumps. In the comparatively mild climate of the British Columbia Coast Region, where frozen radiators are not common, this system is specially applicable, in view of its undoubted economy when worked below its full capacity in mild weather, and on account of the facility with which the temperature of all the buildings connected can be regulated from the central station by varying the water temperature in the flow mains.

Steam for cooking, sterilizing and laboratory purposes will naturally be needed in certain buildings and would be transmitted from the central Boiler Plant.

Tunnels &
Conduits.

The heating pipe lines to and from the first buildings and connecting these with the boiler plant now to be installed, must evidently be laid out so as to form eventually an integral portion of the larger system. As far as possible, the pipe lines of the completed system would be carried through the basements of buildings so as to lessen the costly construction of pipe-tunnels and conduits. The first dormitories to be built must of necessity be located at such a distance from the original heating plant that until such connecting buildings exist, it will probably be found economical to heat the dormitories by their own individual hot water plants, arranged, however, for connection to the general scheme at a later date.

(C)
Boiler
Equipment &
Fuel.

The boilers to be presently installed being intended for use in connection with engineering instruction as well as for service purposes, should not be in too large units - they must be suitable for generating high pressure steam (say 150 lbs. per sq. inch) so that they can be used for laboratory work, and the furnaces must be designed for the smokeless combustion of local coals. One boiler at least might with advantage be fitted for oil fuel for instructional use.

Fuel.

It is in our opinion not advisable to depend entirely on either coal or oil. With the prices at present quoted in Vancouver and in a comparatively small boiler plant where the use of oil fuel can only lead to a slight saving in labour, there appears to be but little economic advantage in the use of oil for steam generation as compared with coal. We think therefore that at this stage provision need only be made for the use of oil fuel in boilers for demonstration purposes.

(D)
Electric and
Power
Supply.

The question arises as to whether electric current for service and laboratory purposes should be purchased or generated by the University's own plant. The decision as to this point depends on three factors (a) the cost of the current as furnished by the power company, (b) the cost at which it can be generated by a small isolated plant, allowing for the possible utilization of exhaust steam for heating, and (c) the advantage of using to a certain extent the engines, generators and instruments of the service plant for instructional purposes in the Departments of Mechanical and Electrical Engineering, pending the

installation of their complete laboratories and equipment.

Cost of
Current.

Until the first buildings are actually designed, it is impossible to make a close estimate of the cost of generating current in an isolated plant serving them. From experience with installations of similar size to that contemplated, but working under more severe climatic conditions, we believe that say $3\frac{1}{2}\text{¢}$ to 4¢ per K. W. hour would be near the mark, and it would be advisable to give careful consideration to any offer to supply current at a figure below $3\frac{1}{2}\text{¢}$ per K. W. hour (measured on the consumer's side of the transformers).

Power
Station.

We recommend that the designs for the first group of buildings to be erected, provide for a power station large enough to contain not only the necessary boiler and heater equipment as suggested above, but also space sufficient for the engines and generators which would be needed if the University generates its own current.

Engines.

In view of the comparatively moderate price of fuel oil on the coast, the mild climate and consequent small heating load, and the high fuel economy of internal combustion engines of the Diesel type, we would advise that an investigation should be made as to the desirability and possibility of using fuel oil in engines of this type for at least a portion of the electric load.

Purchase of
Current.

Negotiations should be opened with the electric supply companies on the basis of the following alternatives; (a) purchasing all current, (b) purchasing current during summer only and (c) purchasing current for night or partial use and standby purposes. The most economical alternative can only

be decided upon definitely after the first group of buildings has been designed, and when full information as to their probable demand and load factor can be obtained.

(E)
Electric
Distribution
System.

The arrangements for the distribution of electric current for light and power, if current is purchased, will probably involve the provision by the supply company of a transformer station outside the University grounds, stepping down from 11,000 to 2,200 volts. This station would be supplied by overhead lines, and from it the 2,200 volt lines would be led underground to the various transformer substations at points of demand, whence 3 phase current for power and single phase or three phase current for lighting would be distributed. For experimental or other work needing direct current, motor generators, with or without storage batteries, would be needed.

Voltage.

The area covered by the University scheme in its ultimate development is so great that a low voltage direct current supply would probably be uneconomical to instal. A power plant of this type if put in at present could supply the first few buildings, but changes in equipment would of course, be required at a later date when the area of supply is extended.

Cables
Underground.

It is perhaps unnecessary to add that all electric cables within the grounds, including telephone, time service and other secondary lines, should be underground.

(F)
Water supply
and Fire
Protection.

We understand that as soon as instructions are received from the Board, the Municipality of Point Grey is prepared to put in a six-inch water main along Tenth Avenue, which

will thus be available during the construction of the first University buildings. When these are complete, additional pipes will have to be laid so as to give duplicate and continuous service.

Pressures
Reserve Tank.

The water pressure available on the site will be only about 40 lbs. per sq. inch, but this will carry the supply to practically all parts of the buildings except towers over about 70 feet high. Such a pressure is however, quite insufficient for fire protection purposes, and we recommend the installation of a complete and separate system of fire mains throughout the grounds and buildings, with fire pumps in duplicate in the Power House. Provision should also be made for a large reserve tank in connection with the fire pump suction.

We are informed that a fair supply of water could probably be obtained by pumping from deep wells on the site, should this be found advisable.

Immediate
Installations.

If it is intended to commence actual construction work in the spring of 1914, steps ought to be taken at once preparing for the installation of the proposed water mains.

(G)
Sanitation.

The Greater Vancouver Sewage Scheme will probably include eventually an intercepting sewer following the North shore of the Point Grey peninsula and flowing East to the main system. The levels and arrangement of all sewers on the University property should be such that connection (with gravity flow) can ultimately be made to this intercepting sewer if required.

In the meantime the sewage (treated by settlement or otherwise so as to remove the solids) should be discharged to the sea at a point below low water mark on the west shore, this point being chosen with reference to tidal flow in such a position as to cause the least possible local contamination.

The design will of course include a separate storm water system.

Experiment
Station.

It may be added, that if a sewage treatment plant is installed to serve the University buildings, attention might well be given to the possibility of so arranging it as to be available for experimental and research work. The problem of successfully treating sewage is one which presents many aspects , due to the fact that such treatment must be suited in every case to the quality and composition of the material dealt with, and in the varied industrial development of a country like British Columbia, where special kinds of mining and manufacturing wastes will be discharged into potable waters in ever increasing volume, an experiment station of this kind would be likely to prove of great value to the Province. By its aid the effect of special local conditions could most readily be investigated, and the results would be highly beneficial to the health of the community.

(H)
Passenger &
Freight
Transportation.

In view of the distance from the City to Point Grey, it is necessary to consider carefully the problems of transportation, which involve :

- (a) Movement of workmen and materials during construction.
- (b) Movement of passengers, materials, supplies and fuel needed for the operation of the institution.

For these purposes we have available (1) the existing and future lines of the B. C. Electric Railway Company, (2) steam wagon or motor truck haulage and (3) water transport by scows and tugs or motor launches.

(I)
By Street
Railway.

The first method necessitates the construction to begin with of at least two miles of car line connecting with existing lines of the B.C. Electric Railway Company at Tenth Avenue and Sasamat Streets. This line would include a considerable length of such steep grade that only one loaded freight car could be handled at a time, and the alternative route via Fourth Avenue requires the bridging of a ravine. The expense of dealing with large quantities of material in this manner will probably be considerable, first because of the length and character of the new line to be built, and secondly, because existing curves render it impossible to take standard freight cars on to the site.. Freight arriving by rail must therefore be transshipped to cars of the B. C. Electric Railway Company in any case. To haul freight originating in Vancouver near lines of the Company would probably cost in the neighborhood of \$1.00 per ton, exclusive of cost of loading, unloading or switching. As regards Passenger Traffic, the University will be mainly dependent on the lines of the B. C. Electric Railway Company, and the Company should be approached at once, in order that ample provision may be made for workmen during the construction period which we understand will commence next spring.

As soon as the first buildings are in service, and in the future, the passenger requirements will become more onerous.

At certain times large crowds may have to be handled, and we are of opinion that three lines for street cars should eventually be brought to the Eastern boundary of the site. The first line to be constructed would naturally be that on Tenth Avenue, and this should be followed as need arises by the Fourth Avenue line and at a later date by a third line along one of the Southern streets near South Boulevard. A spur for construction work could be carried on to the site from the first line to be built.

(2)
By motor
vehicle.

Steam wagon or motor truck haulage would naturally be utilized in connection with road making and construction work, and we also recommend its use in handling coal and supplies in conjunction with water transport. Contracts for steam wagon haulage can now be let at from 25 to 35¢ per ton mile, depending on the length of journey and time spent in loading and unloading, and we believe that the University itself will ultimately be able to do this work, owning its own steam wagons, at a still lower figure.

(3)
By water.

The problem of water transport for freight to and from the buildings has been studied. We have at Point Grey a steep bluff running down to a water area where the water deepens gradually to about ten feet at a distance of 200 or 300 feet from low water mark. The rise of tide is from 11 to 13 feet, and there appears to be no difficulty in constructing a jetty or wharf alongside of which scows or barges carrying 200 tons or more could be safely berthed.

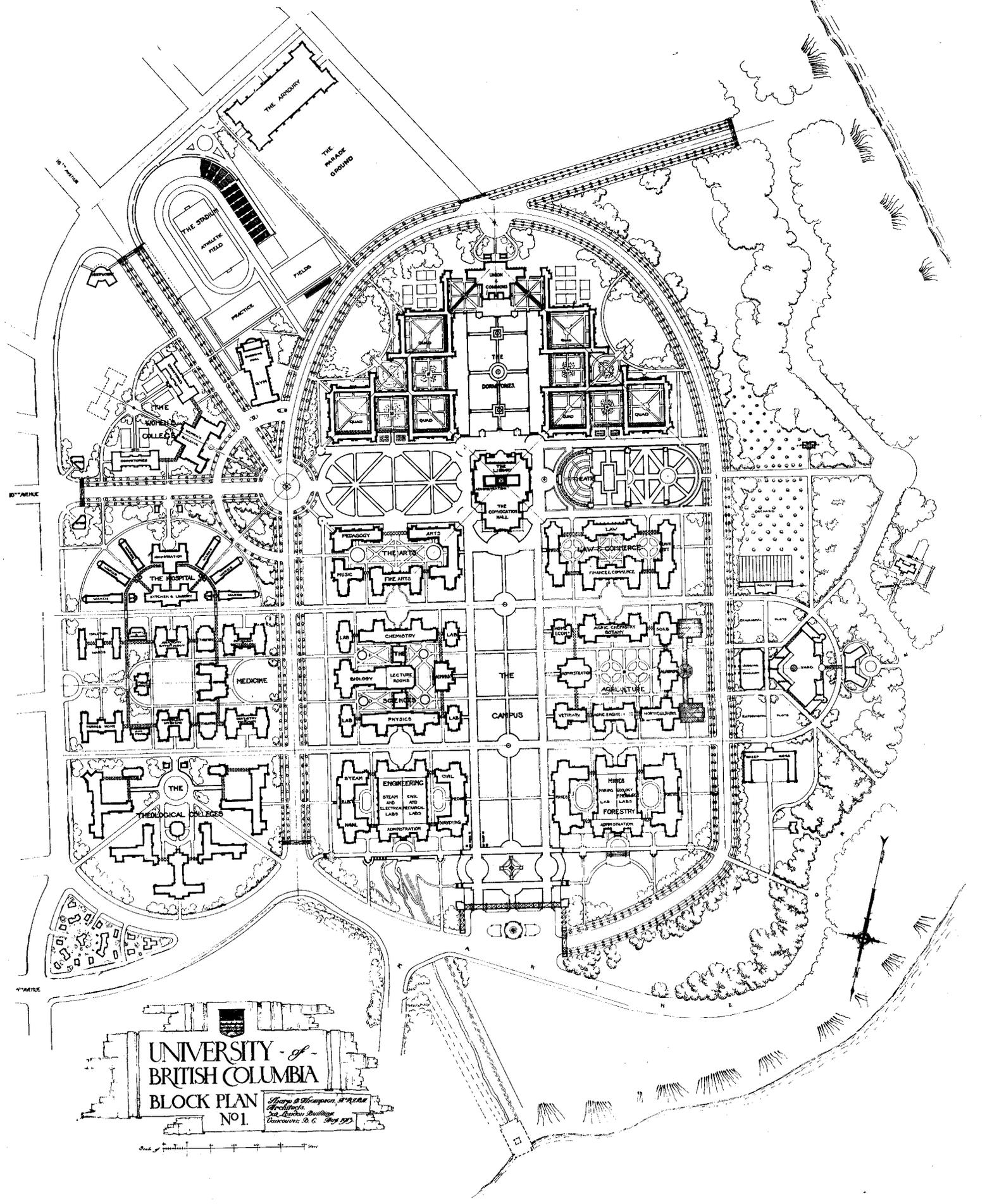
From this jetty we suggest that an inclined railway should be built, the cars of which would dump into a bin arranged to spout coal, broken stone, or similar material, direct into a wagon on the level of the Marine Drive. A somewhat similar method has already been adopted for dealing with the material used in the construction of the Marine Drive, and its working proved to be economical, the operating cost being given us as about 10¢ per ton from scow to wagon. We propose the construction of this elevator at or near a gully about one thousand feet south of the extreme west point of the University property, and it would be used not only during construction but also for handling the coal and other supplies needed when the University is in operation. The distance from the top of the elevator to the ultimate position of the heating plant will be about 3,500 feet, and to the initial boiler plant about 2,000 feet.

In order to deal with such material as cannot conveniently be loaded in an elevator car or bucket, and to provide for bringing live stock, farm supplies, and possibly passengers, by water, we think that a road should be constructed leading up from a second wharf to the Marine Drive at an easy gradient suited for both heavy and light traffic. Such a road can be most cheaply built on a comparatively straight portion of the bluff lying to the Southward of the University Boundary where the confirmation is practically a side hill. The construction of this road (lying outside the University property) would naturally be undertaken by the

Provincial Government, and the wharf to which it would lead would, we presume, be within the sphere of the Dominion Government, especially as such a road and public wharf would be available not only for the use of the University but also for the residents along the South side of the Point Grey Peninsula.

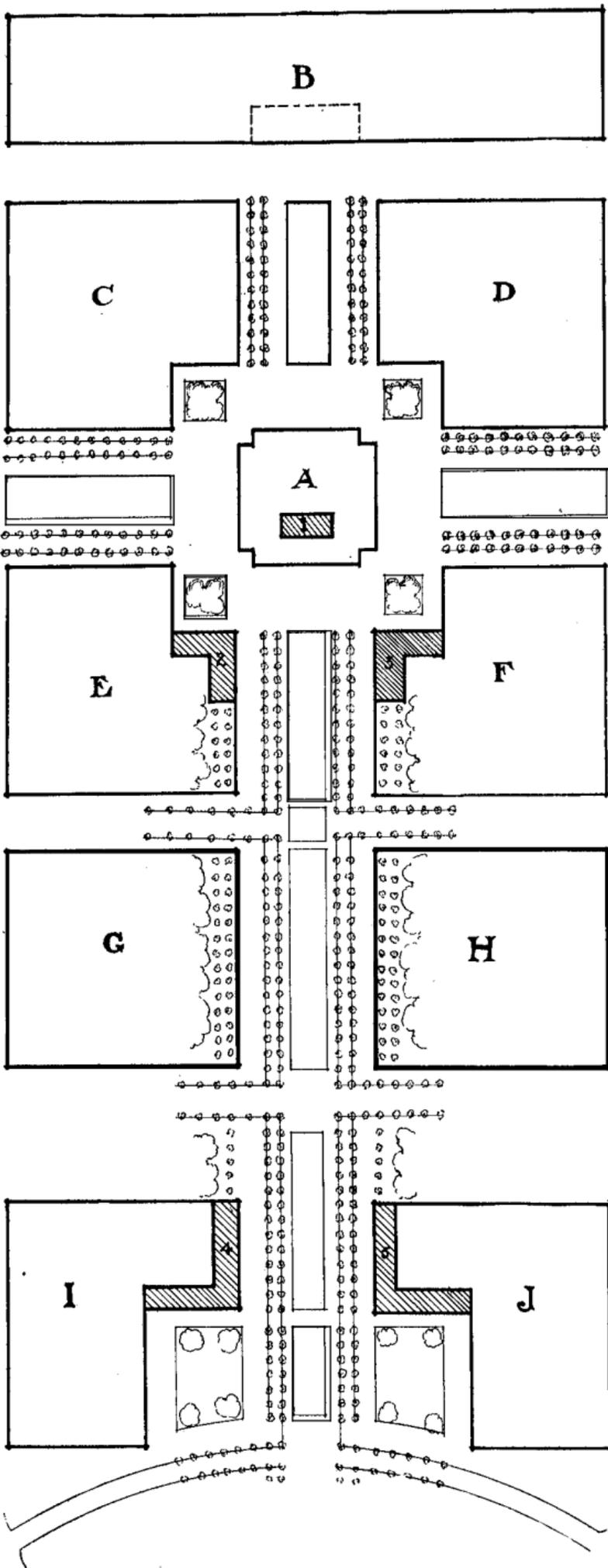
(Sgd.) Warren P. Laird.
(Sgd.) Thomas H. Mawson.
(Sgd.) R. J. Durley.
(Sgd.) G. L. Thornton Sharp.
(Sgd.) Charles J. Thompson.

November 10th. 1913.



UNIVERSITY OF
 BRITISH COLUMBIA
 BLOCK PLAN
 No. 1

Sharp & Simpson, Architects
 215-221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 451, 453, 455, 457, 459, 461, 463, 465, 467, 469, 471, 473, 475, 477, 479, 481, 483, 485, 487, 489, 491, 493, 495, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 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UNIVERSITY OF BRITISH COLUMBIA

No 3

-SUGGESTED POSITION OF PRESENT DEVELOPMENT-

-SHOWING PLANNING FOR FUTURE DEVELOPMENT-