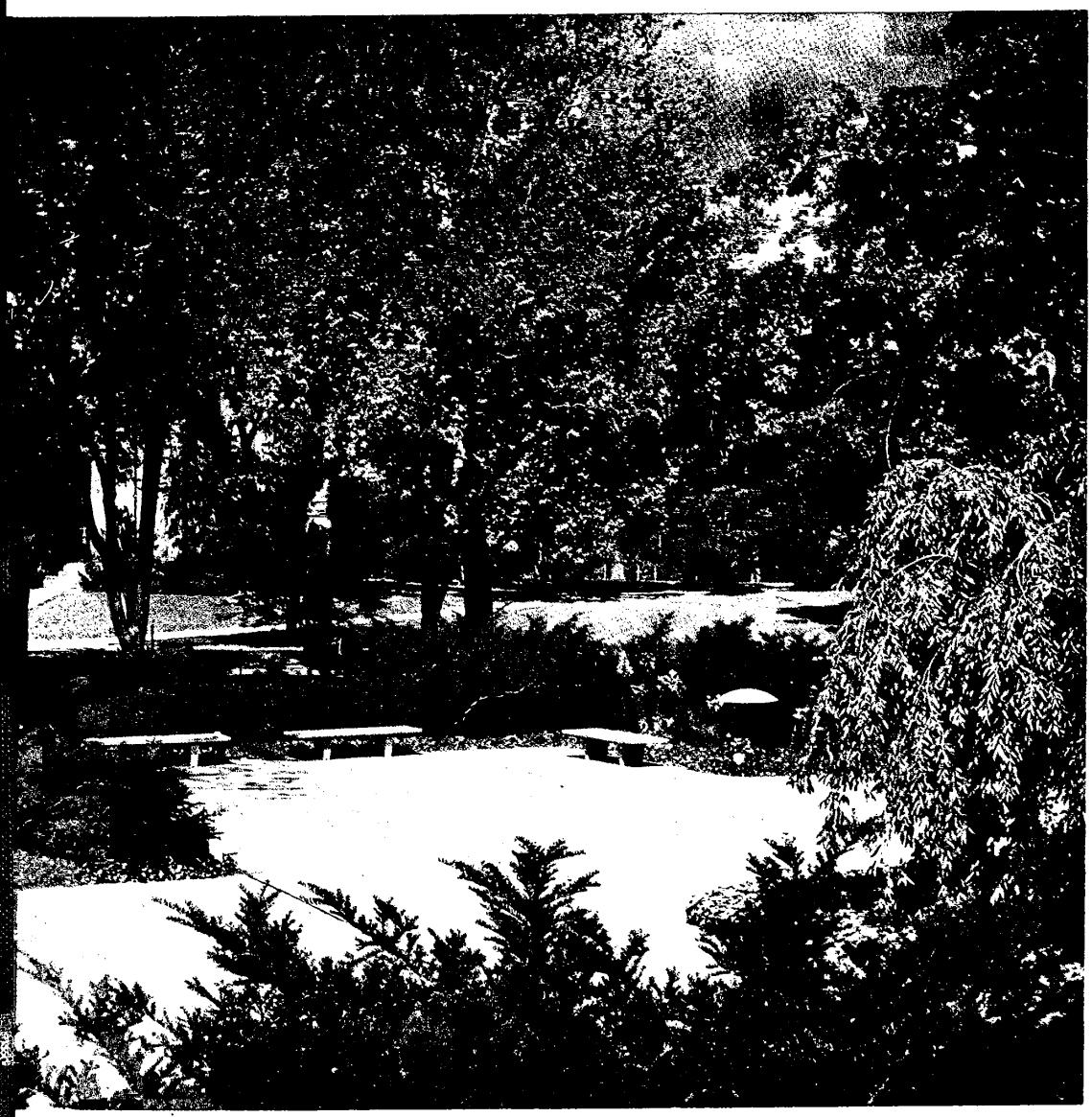
A King's Fund Report

Landscape Architecture for New Hospitals



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Landscape Architecture for New Hospitals

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The report of research undertaken by the Landscape Architect of the King's Fund into development of new hospital grounds, including advice to hospital planners and builders as to how they should make use of the natural resources of their sites

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Foreword

When a hospital is to be built, extreme care is taken by architects, doctors, engineers, nurses, and many others to ensure that the new building shall be the best that can be devised. Oddly enough, as experience has shown with a number of new hospitals, it is no one person's first interest to look after the hospital's detailed siting or the layout of its grounds. Here is yet another difficult technical subject regarding hospital planning which needs close attention from someone who really understands the problem.

The garden advisers of the King's Fund, through their work for hospital gardens, became aware of this gap in designing and building knowledge and of the serious financial consequences resulting from failure to pay attention to the subject until too late. At their suggestion Mr. Bodfan Gruffydd was commissioned to study the special needs of hospitals and prepare a report. It is published in the hope that it will help future hospitals to provide grounds that are visually stimulating, useful and economical to maintain.

May 1967

R E Peers
Secretary

Frontispiece Fiddler's Copse, Plaistow, Sussex, designed by the author. Photo: copyright *Country Life*.

Author's Acknowledgements

I would like to thank the King's Fund for this opportunity to investigate the problems and needs of hospital landscape design and for the privileges attached to work within its organisation. I am especially grateful to Mr R E Peers and to the garden advisers of the King's Fund, Mr J C Kennedy, Mr W G MacKenzie and Mr Lanning Roper for their continued inspiration and encouragement in the long toil this study has entailed and to all those dedicated members of hospital staff in Britain and in Europe who have helped to clear the lines of understanding. I am particularly appreciative of Miss Cecily Collier's invaluable help with editing and putting all the material together.

I would like to record my gratitude to Mr W G Wilson, Assistant Secretary, Ministry of Health, for his patient criticism and advice on successive drafts; to Dr T M Cuthbert, Dr James Harper, Dr Christopher Haffner, Dr D J O'Connell, Dr Francis Pilkington, Dr A M Spencer and Surgeon Captain W J F Guild for their criticism of the sections dealing with the therapeutic aspects of landscape design; to Mr James L Taylor for his painstaking help with quantities and costs; also to Miss Brenda Colvin, past president of the Institute of Landscape Architects, and Mr. Sidney Searle for their expert advice on various sections.

I would like to express my gratitude also to the librarian of the Harvard University landscape library for research and references and for the facilities made available by the librarians of the British Museum, the King's Fund Hospital Centre, the Royal Institute of British Architects, the University of London and the Wellcome Historical Medical Library.

Bodfan Gruffydd

Contents

1 Introduction

1 This report suggests the factors which should influence hospital planners and designers in dealing with the layout of grounds of new hospital buildings. Much of the guidance given can also be used as the basis for reconsidering the layout of existing hospital grounds so as to achieve greater economy and care of maintenance.

2 The standard procedure for the preparation and approval of individual building schemes* under the hospital building programme envisages that at Stage A there should be a preliminary appraisal of the sites available for the scheme, and that at Stage B there should be prepared a Development Control Plan and Budget Cost, showing how and at what cost the buildings forming the scheme might be disposed and massed on the site and the arrangements of this in terms, *inter alia,* of roads, access, car parking arrangements and external works generally.

3 Consideration of the treatment of the site from the landscape point of view should form part of the work at both stages. Section 2 of the report describes the elements to be taken into account in a landscape survey as part of the site appraisal at Stage A; Sections 3 and 4 deal with the principles upon which detailed proposals for the landscape development of the site should be based and Sections 5 and 6 describe the action to be taken during the course of construction on the site. Section 7 outlines the problems of continuing maintenance.

* to be published by the Ministry of Health in 1967

2 Landscape Survey and Site Appreciation

4 The object of the landscape survey at Stage A is to enable the designer to form his conclusions as to the general type of landscape treatment appropriate to the site in its environment. These general types are described in Section 3. A choice between them is governed by a number of factors which should be evaluated in the initial survey and site appreciation, namely:

Site Plans
Configuration
Geological Structure
Soil Characteristics
Water and Drainage
Land Cover Ecology
Topography
Views
Climate

5 Each of these factors is discussed below. The starting point for the survey, however, should be consideration of the information revealed by existing maps; and maps will also be the main vehicle for recording the results of the survey.

Site Plans

6 The coloured $2\frac{1}{2}$in to 1 mile Ordnance Survey sheets with contours of 25ft intervals are particularly valuable for assessing basic landscape features. These may be supplemented by the larger 6in to 1 mile Ordnance Survey maps, not coloured, and the Ordnance Survey air mosaics at 50in and 6in to 1 mile for town and country districts respectively.[1] Air photographs are obtainable from the Ministry of Housing and Local Government at 6in and 3in to 1 mile.[2] These may be enlarged four times to order. Oblique or stereoscopic overlays are essential. Composite enlargement to 1/500 scale is helpful for the recognition of individual trees and other features.

7 For record of features within the boundary of the site, Ordnance Survey maps to the scale of 25in to 1 mile (1/2500) or 50in to 1 mile (1/1250) are appropriate (selected areas only available). These enlarge satisfactorily for later more detailed work but do not show contours. Maps to these scales showing contours at 5ft intervals are usually available from firms specialising in air photographic mapping. The Ordnance Survey will also arrange for this in special cases.

Configuration

8 The configuration of the site should be studied from the point of view of appropriate siting of buildings and facilities, also to identify the micro-climatic characteristics of the site. Study will indicate the best lines for access and internal roads, topographic divisions of the site into environments suitable for the different functions of the hospital complex and the possibilities offered for visual and acoustic screening.

Geological Structure

9 This determines basic landscape character. Thus a site located in an area of ancient volcanic and metamorphic rocks, for example, the Highlands, usually has but a meagre covering of soil and vegetation, level sites are unusual, excavation is difficult and expensive, and there may be few trees, if any, to shelter the windy slopes. The limestone landscapes of later depositions of the carboniferous period exhibit bold outcrops of rock often weathered to produce sheltered coombs, while the more recent sedimentary chalks, for example, the Downs of south-east England, have tended to erode into rolling undulations offering a variety of comfortable micro-climates. The clays of of the London basin and Weald of Kent and Sussex between ridges of green sand develop fertile soils and rich vegetation with fine trees to provide shelter.[3]

Soil Characteristics

10 The soils overlying the skeletal rocks vary enormously though in Britain they are usually derived from them. However, soils derived from the same rocks form quite differently under different climatic conditions and it is usually necessary for a soil survey to be undertaken. Advice and help should be sought from the National Agricultural Advisory Service[4] or the Local Education Authority.

11 The upper soil layer down to 3ft or to subsoil, whichever is the lesser, should be investigated for depth, physical condition and limitations of top soil, and the nature of the subsoil. Where rock is suspected near this depth, geological investigation is called for.

12 Underlying subsoil is not generally fertile but usually can be made so by scientific management and the incorporation of organic substances.

13 Top soil is the top fertile layer in which plants grow and obtain their mineral foods. It may be a covering of a few inches or it may go down a considerable depth. In nature top soil accumulates very slowly – about 1in in 2000 years – and it should therefore be very carefully conserved. Its structure is destroyed by unsuitable handling; if over compacted or stacked too deep for lengthy periods it can lose its fertility and become subsoil.

14 Top soil falls into the following groups, roughly ascertained by hand testing, but properly established by mechanical analysis: sand, loams, clay, chalk, peat. Chemical analysis will disclose the acidity or alkalinity (pH value), any deficiencies of plant food and, hopefully, the reasons for any barren conditions. The healthiness and type of vegetation is a good indicator of the general condition and fertility of the soil.

Water and Drainage

15 Lakes, ponds and formal stretches of water are among the most valuable features to exploit in landscape design, and water is one of the cheapest elements in a landscape to maintain. Sheets of water also assist in stabilising the surrounding water table and in equalising air temperatures.

16 Average, dry and wet weather levels, the source of supply and control of level, if any, should be established. If existing lakes or ponds are to be altered or filled, a hydrological survey may be needed. The situation regarding troublesome insects should be investigated, as also should any suspicion of flooding. Similarly, the possibilities of exploiting sources of natural water supply, on or near the site, should be pursued.

17 The water table is where soil water naturally finds its level in the soil. It may vary considerably from season to season and may cause considerable complications unless its natural presence is accepted and development planned accordingly.

18 Open textured soils, sands and sandy loams and especially those overlying porous rock or gravel, usually drain more quickly than is ideal for plant growth, whereas close textured soils, clay loams and silts, are over retentive of water. To ease this difficulty, clay soils should always be finally graded to minimum falls of 1 : 60 unless heavily compacted, when the fall should

be greater to assist water to run off the surface. Sandy soils may be graded to half this fall, if not flat.

19 Drainage may be impeded by an impervious subsoil or by a hard pan created during the formation of the soil profile. Impeded drainage would be disclosed (as a mottling of iron pyrites) during physical examination of the soil in the course of soil survey. Areas subject to waterlogging would be similarly disclosed. Drainage impeded by the formation of a hard pan may be cured by physically breaking up the pan.

20 If the subsoil is non-porous, some form of drainage will be necessary.

21 The whole history of the drainage of the site should be ferreted out by enquiring locally in addition to consulting land agents and district officers of the Agricultural Land Service.[4] The site should also be visited at every season of the year.

22 While wet soils can be improved by drainage, this is not a once for all operation and requires regular if not frequent maintenance. Moreover, the nature and structure of the soil may be altered entirely. This would radically affect the trees and plants growing on it over a considerable area. Major drainage should not be instituted without careful investigation. A drainage expert familiar with the locality should always be consulted.

Land Cover Ecology

23 Careful survey of the various plants, bushes and trees covering the ground is of first importance. Plant cover indicates pH levels in the soil, for example, the presence of yew, beech or traveller's joy indicates alkalinity, while a covering of heather, rhododendrons and birch trees indicates acidity in the soil. From this survey the general ecology may be assessed while evidence of various wild animals discloses some idea of the biological balance of the site and the possibility of likely nuisance which may be expected from such wild animals as rabbits and deer. Vegetation is also important in the definition of form; the size, shape and habit of trees and massing of large bushes, has aesthetic as well as micro-climatic significance. Barren areas of ground, unable to support a reasonable cover of vegetation, are handicaps requiring detailed investigation.[4]

24 Information so surveyed should be recorded at a scale sufficiently large to show the detail required, for example, the identification of individual trees, groups of shrubs, or the main colonisers of the margins of ponds (1/500 scale is usually found convenient). Each tree should be numbered with semi-indelible paint, identified on plan, with its vital statistics detailed on the accompanying schedule: species, variety, height, spread of branches, girth of trunk at chest height, and general age and condition, whether young and vigorous, mature or going back (branches in the crown dying back so that it looks stag-headed).

25 Recommendations on trees to be retained in new development should be based on close and detailed examination which can only be obtained by someone climbing the tree and inspecting the junction of major branches with the trunk for signs of rot or water-filled cavities. If these are found, augerings should be made to discover the nature and extent of the cavity, before it is possible to assess potential danger or expectation of life or the extent to which the tree might be adapted by pruning to fit it to building development instead of felling it.[5]

26 Young and vigorous trees should be assessed with a view to moving them, out of the way of development, to a part of the site where their presence later would repay the cost and trouble involved. An eye should be kept open for likely saplings which could be lifted and planted on top of soil mounds for transplanting when the job is nearing completion, by which time they would have grown so much the bigger.

27 If tree felling seems to be indicated the value of the timber should not be overlooked.

Topography

28 Landform, man's modifications of landform, his constructions on it and vegetation combine to give, to any locality, a topographic character of its own. Thus in a rural context it will be found that groups of farm buildings, sheets of water and trees all contribute significantly to the quality of a landscape. This quality can be assessed and it can be stated with some certainty what effect a large and considerable development will have on it. In this, the scale relationship between the building and its site is important. (This aspect is dealt with in paragraphs 39–41).

1 Indigenous forest and grassland form a landscape in ecological balance. The view, brought into the environment of the hospital, is pleasantly diversified by features in the foreground. Skye. **p.11, para. 31.**

29 In the urban context where the environment is sophisticated it is necessary to evaluate man-made rather than natural features in the assessment of quality. Scale is determined by the expanse of urban spaces: squares, streets, urban parks, waterside, the size and design of the city's buildings, and other units of townscape. The smaller the scale of a townscape, the greater the importance of small details in the assessment of its quality; the limb of a tree hanging over into the street, the cladding of buildings as well as their component parts, and the textures of surfaces all weigh in this assessment.[6]

30 The way the buildings are related to their setting is equally important. Basically there are three ways of resolving this problem.

(a) Non-interference with topography: the building is designed so that it appears to rest lightly on the land in a way that does not disturb natural configuration.

(b) The building is tailored to the land so that changes in level are exploited functionally in the design of the various hospital requirements. The resulting buildings stand on the ground like the abutments of a bridge so that the topographic pattern appears to flow past without being altered in its form.

(c) The site is tailored to the building: a suitable podium or platform is created for it and the surrounding land form moulded to it in a pleasing way. This solution is appropriate only to extensive sites.

Views

31 The visual boundaries of a site may extend far beyond its physical boundaries and in this sense, the landscape of the hospital may be infinite. If the scene is good it should be exploited as part of the development. Early analysis of such possibilities should be recorded in the landscape survey by actual directional view lines. Undesirable views should also be recorded so that by careful siting and orientation of the buildings, full advantage may be taken of the opportunity to enjoy the best, while excluding the worst, views from the hospital. By nature of their very expanse, panoramic views lose their appeal more quickly than confined views which have the promise of more beyond the edge of their framing features. This difficulty may be overcome by grouping planting to frame a series of confined views, or by architectural manipulation of the building so as to disclose only part of the panorama from individual windows. Eyesores may be lost by similar means. On the other hand investigation should be made into the vulnerability of views it is desirable to secure for the benefit of those using the hospital. It is often possible to take steps to safeguard the hospital's interest in this respect. Information about proposed developments should be sought from local planning authorities.

32 Similarly, unpleasant features inimical to hospital standards must also be noted: the possibility of noise from industry, schools, sports areas, air, rail and road

c should be investigated for consideration of
iorative measures which may be taken.[7] The
esirable possibility of air pollution by industrial smoke,
nur or other fumes or traffic smells, should also
onsidered in relation to prevailing winds,
Climate below.

mate

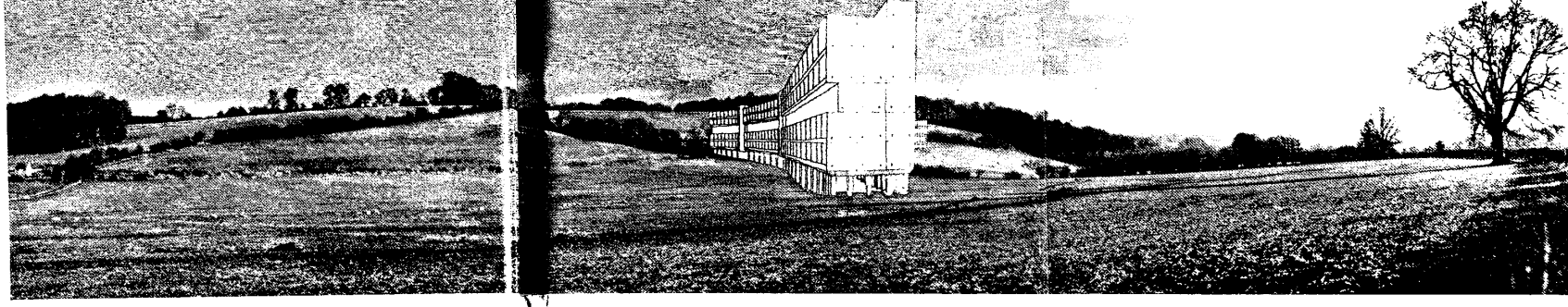
Macro-climate is the term used to indicate the
or climatic factors bearing upon a particular region or
lity. Recent research has proved that man's
th and energy depend largely upon his climatic
ronment and has identified optimum climatic
ditions.[8] The Climatological Atlas of the British Isles[9]
vides information on average general conditions
limate, mapped at small scales. From this the
ro-climatic conditions prevailing in any region may be
roximately deduced. The following observations
be helpful in the assessment.

Wind. Wind speeds are highest near the coast
and generally increase with height above sea-level
particularly when augmented by associated
heating of the land during the day. Hilltops tend to
be unusually windy, the tops of long ridges
particularly so, because all the air is forced to rise over
them. Strong winds may blow along valleys
parallel with the course of the wind, while their
configuration may alter the local course of the wind.
Even though the prevailing wind is south-west
over most of Great Britain, winds from other directions
funnelled by the configurations of the land can
have a critical effect on regional climate.

) **Temperatures** decrease with height above sea level
and could be generally depressed by the wind
factors mentioned above, bearing in mind that the
occasional north-east winds are usually colder
than those prevailing from the south-west.

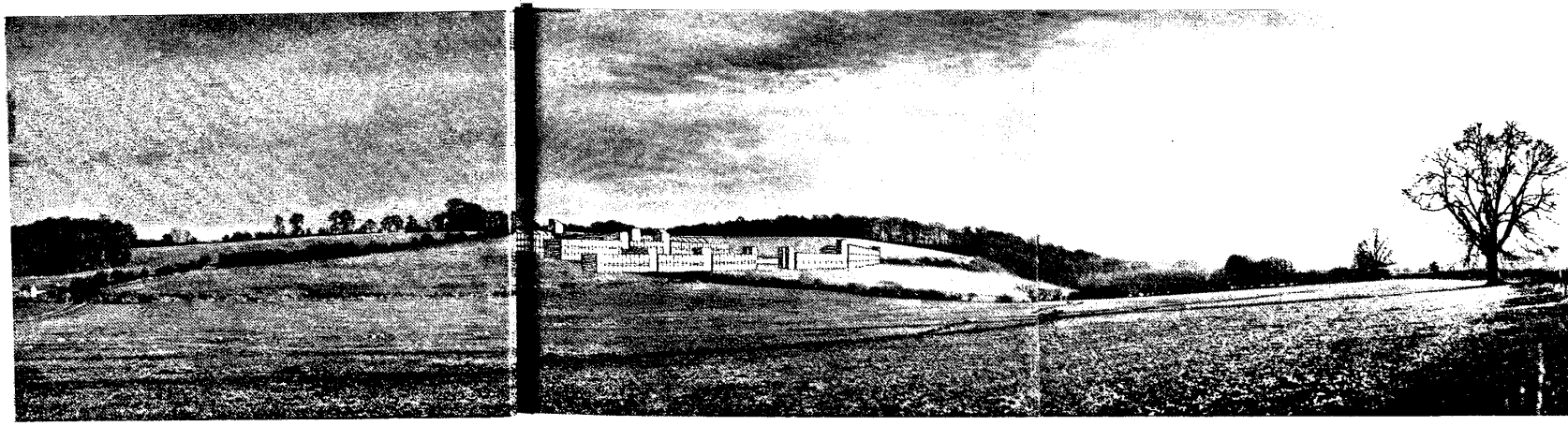
c) **Humidity.** A high evaporation rate is desirable
in Britain where prolonged periods of dull weather
raise humidity above comfortable levels. Areas
to the leeward of mountains may benefit by Föhn
effect – the evaporation which occurs as a
result of air streams warming up as they descend after
crossing mountain ranges, absorbing water vapour.

d) **Sunshine** can be affected by industrial haze developing



2 The building is raised on columns to avoid interference with landform; agriculture could continue undisturbed. Chilterns. **p.11, para. 30a.**

3 The buildings are fitted snugly round the slopes of the hill in an organic way. There is the feeling that they belong to the landscape. Chilterns. **p.11, para. 30b.**



4 The buildings are sited across a small valley and the landform must be moulded to accommodate them. Chilterns. **p.11, para. 30c.**

as the day advances, while under conditions of unstable air, cloud does not usually start to form until midmorning; easterly and south-easterly aspects in consequence capture more clear sunshine under these conditions.

34 **Micro-climate** is the term used to indicate conditions prevailing in small and localised areas of land which are affected by factors which modify, or may completely overlay, the effect of macro-climatic influences. In the absence of records it is necessary to assess local climate *ad hcc.* Variations in land form are the most important factors influencing it. Of these, those which create frost pockets are most to be avoided.

(a) **Sunshine and temperature.** Aspect and slope determine the amount of sunshine received. South-easterly slopes are generally best for sun, the warmest position being near the top, while in the latitude of the Midlands, slopes facing north with inclination in excess of 13° receive virtually no sunshine in winter. For buildings the amount of direct radiation received on surfaces of various inclinations and aspects at different times of the day is important, and information collated at Kew is a helpful guide to assessment of the general pattern of conditions in the country as a whole.

(b) **Wind.** The stronger winds blowing on top of hills and ridges create problems for big buildings, for example, increased wind loading, liability to penetration by driving rain and snow and increased fuel consumption, though these are sometimes alleviated by shelter planting. Expert advice should be sought.[10] On quiet clear nights air, cooled as a result of ground radiation to the sky, flows by gravity down sloping ground, forming katabatic wind. In a valley a general flow of cold air develops down its course; if there is some obstruction or a hollow a frost pocket is formed, which gets deeper as the conditions forming it persist. In less cold conditions, instead of frost, fog develops – a combination of humidity and low temperature – which constitutes the worst possible environment for human living. The difference in temperature between such valley bottoms and adjacent open country may be as much as 10°–15°F, under certain conditions. During daytime a contrary movement of air occurs. In the early morning on quiet clear days, eastward facing slopes are the first to be warmed in this way and a flow of air is developed up their entire length. These contrary movements of warm and cold air up and down a valley during the day and night are important factors in the orientation and design of hospital buildings, in sites where they occur. Buildings (and shelterbelts) should be orientated diagonally across the slope, in direction down valley to avoid undesirable accumulations of air.

(c) **Soil conditions** also affect micro-climate. Light sandy and loamy soils, draining quickly, cool and heat more rapidly than heavy, wet and clay soils, but temperature changes penetrate more deeply into the latter, requiring services to be buried lower down. Grass covering the soil insulates it from the air but results in greater variations in temperatures at the surface. Shallow fog often develops first over cropped grassland on clear cold nights, while long grass favours radiation fogs.

5 (right) Tuberculosis hospital set high on slope of a wooded valley. The building is designed not to interfere with the landform and gardening is confined to adjoining limited areas. Aggertalklinik Engelskirdien. **p.16, para. 38a.**

3 Basis for Hospital Landscape Design

35 The composition of a survey and site appreciation under the headings described above, provides the practical lines upon which proposals for the landscape treatment of the site can be formulated so as to constitute an integral part of the work being done by the architect and engineer at Stage B of the building procedure. The following section of the report discusses the principles which should inform such proposals, namely: ecology and natural balance; therapeutic considerations; site and building limitations; user requirements.

ECOLOGY AND NATURAL BALANCE

Climax Vegetation

36 In wild landscapes left alone to develop naturally, a climax vegetation establishes itself. In Britain this is usually grass and trees: grass along the sea coast and on high ground, trees forming forest elsewhere. The development of forest is inhibited by exposure to climatic extremes and grazing animals.

District Ecology

37 The type of trees and plants which establish themselves in any district, and consequently the fauna, depends very much on the nature of the soil, in which acid or alkaline content is a critical factor. Thus ecological associations of flora and fauna evolve characteristically in different habitats – mountain, seashore, swamp, chalk down, clay weald, etc. We may define this as the climax ecology, a state in which plants and animals are balanced in a mature weedless landscape.

38 If development can be accomplished without disturbing this climax ecology there will be little subsequent landscape maintenance to bother about. Theoretically it is possible to visualise a new hospital in rural surroundings fitted so carefully to its site as to obviate the

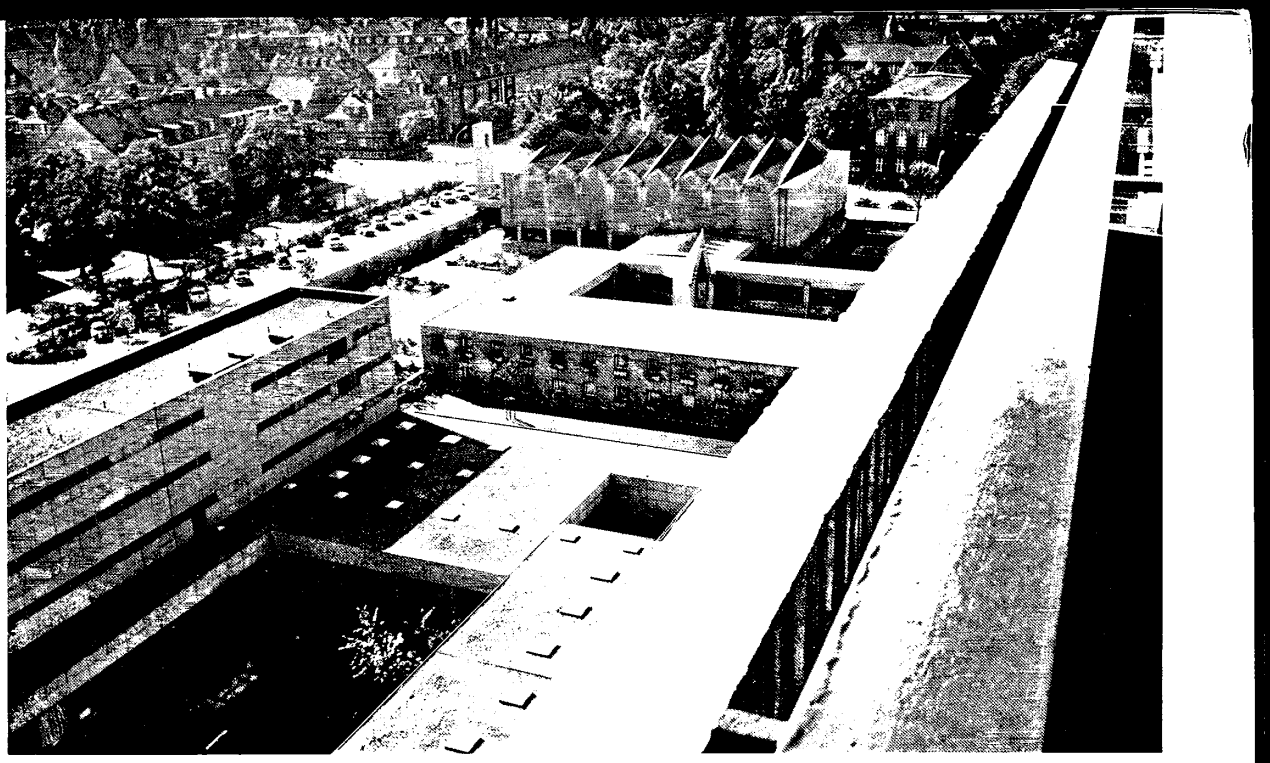
6 Grazing animals maintain mature parkland in ecological balance without further expense; the lake, being more than 4ft deep, is self-maintaining. Harewood. **p.16, para. 38c.**

problem of maintenance. Short of this, careful thought and study devoted to the development of a landscape closely attuned to the appropriate climax ecology will be repaid by considerable savings in subsequent maintenance costs.

(a) **Wild Landscapes.** The occasions for building in this condition would be few. Where they occur, for example, in open country, it may be possible to group the various buildings in a way which leaves the bulk of the landscape undisturbed and reduces landscape treatment to limited areas of planting in the immediate vicinity of the buildings. In such conditions the surrounding natural landscape would become that of the hospital and could be appropriately improved in a number of ways if necessary. Subsequent maintenance would be reduced to that of individual attention to its various features once every year or so. Thus in mainly woodland surroundings, the hospital buildings would be sited in clearings, natural or created, and the landscape treatment would consist of opening up the woodland by judicial thinning of trees, clearing of undesirable undergrowth, encouraging saplings ultimately to replace the older trees, and establishing shrubs and flowers natural to the habitat of open woodland. In such conditions regular maintenance would be limited to the areas around the buildings.

(b) **Naturalised Landscapes.** If a hospital is to be built on a landscape already developed, in greater or lesser degree, careful thought should be directed to evolving a new landscape whose elements could mature to sophisticated if not natural ecological balance. This would be achieved by assessing the factors which determine the climax ecology of the area nearest to the site in character and deliberately applying them in the design of the new landscape. If the conditions are propitious, many of the plants brought in may become naturalised and after some period of trial and error, a stabilised landscape, more or less self supporting (so far as maintenance is concerned), may be achieved. Typical associations are grass, pine and birch trees and leguminous shrubs on sandy soils; grass, ash, box, yew and beech on chalk or heaths, and oak woods sheltering rhododendrons on acidic, peaty soils. Such artificial climax ecologies would be equally attractive from the point of view of low maintenance cost.

(c) **Extensive developed landscapes.** Sophisticated naturalism of the type mentioned above may not be attainable for various reasons – the soil may be too heavy or otherwise unsuitable or local factors such as atmospheric pollution may inhibit indigenous growth. In such cases one cannot do better than turn to the traditional forms of landscape developed



7 High density development surrounds courtyards with interesting roofscape. Enclosed quiet garden near chapel and well arranged parking screened by shrubs should be noted. Cologne. p.17, para. 38e.

in Britain by combining beauty with utility – the landscapes of the English park. These are basically in ecological balance, kept in form by careful management, the large areas of grass traditionally grazed by sheep, cattle or deer from which the trees, singly or in clumps and disposed to create pleasant picturesque effects in juxtaposition to topography, are protected by tree guards or fences. Once established such landscapes have low maintenance demands, the chief cost being that of mowing the grass one, two or three times a year. Water has always been considered aesthetically indispensable to the park landscape. Moreover weeds do not grow above the surface of water which is more than 4ft deep, so that it can be the cheapest element in the landscape to maintain. The ease with which soil can be moved by modern machinery makes lake forming on suitable subsoils a comparatively simple operation, while the spoil or top soil, so won, can be useful for other features on the site.

(d) **Intensive garden landscapes** depend on continuous and specialised maintenance and therefore demand most skill and cost to administer. They are appropriate to limited spaces around and between hospital buildings.

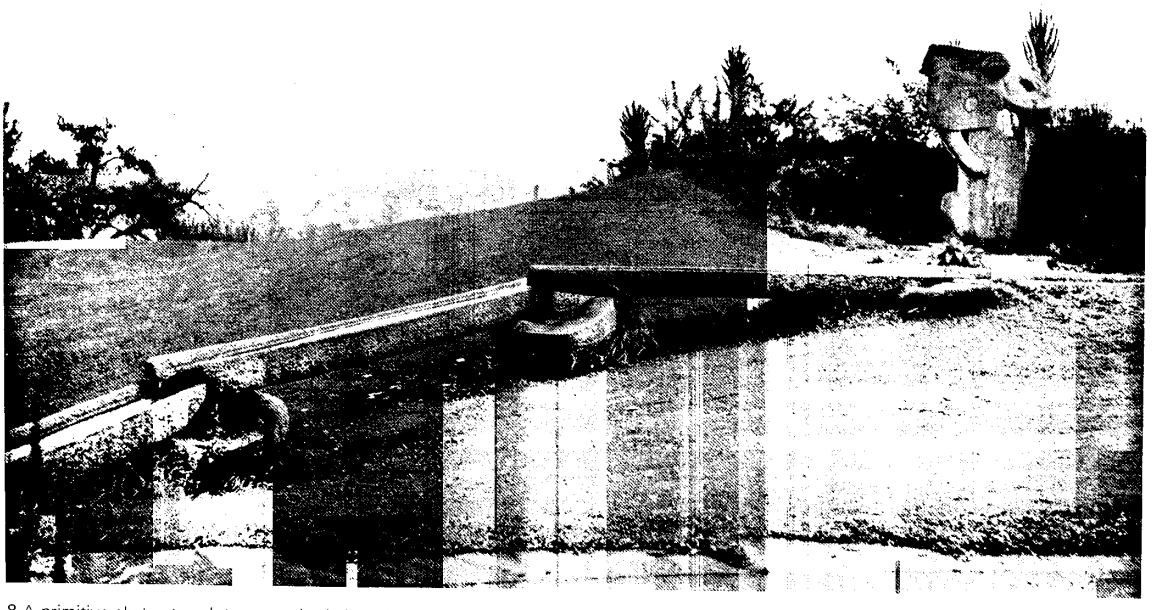
(e) **Urban landscapes.** In urban conditions micro-climatic factors – atmospheric pollution, wind, temperature and permanent shade – may exercise greater influence than soil on the district ecology, and severely limit the choice of possible planting. For example, it is only with difficulty that plants can be established in conditions of extreme heat or cold, wetness or dryness or adjacent to buildings, at the base of walls, particularly where the plants are either deprived of moisture or subject to drip. Exposed positions like the wind funnels which develop in the narrow spaces between buildings are inimical to plant growth and situations under cantilevered slabs are utterly hopeless. In such situations organic growth is often attempted under nearly impossible conditions, resulting in perpetual and costly replacement of plants. These handicaps can be reduced by careful arrangement of the buildings and the open spaces contained by them; by ensuring that wells and open courtyards are not too deep for plants growing in them to benefit from some direct sunshine; by eliminating wind funnels where it is intended to grow plants; by providing suitable screening to shelter elevated spaces, for example, roofs, which are to comprise elements in the hospital landscape; and by structural provision for sufficient depths of soil, water and drainage to meet the cultural requirements of the chosen plants. Particular care should be given to the routing of services and to the design of all structures so as to avoid damage to any existing tree or shrub, earmarked for retention,

for which the radical alteration of environmental conditions is extremely hazardous.

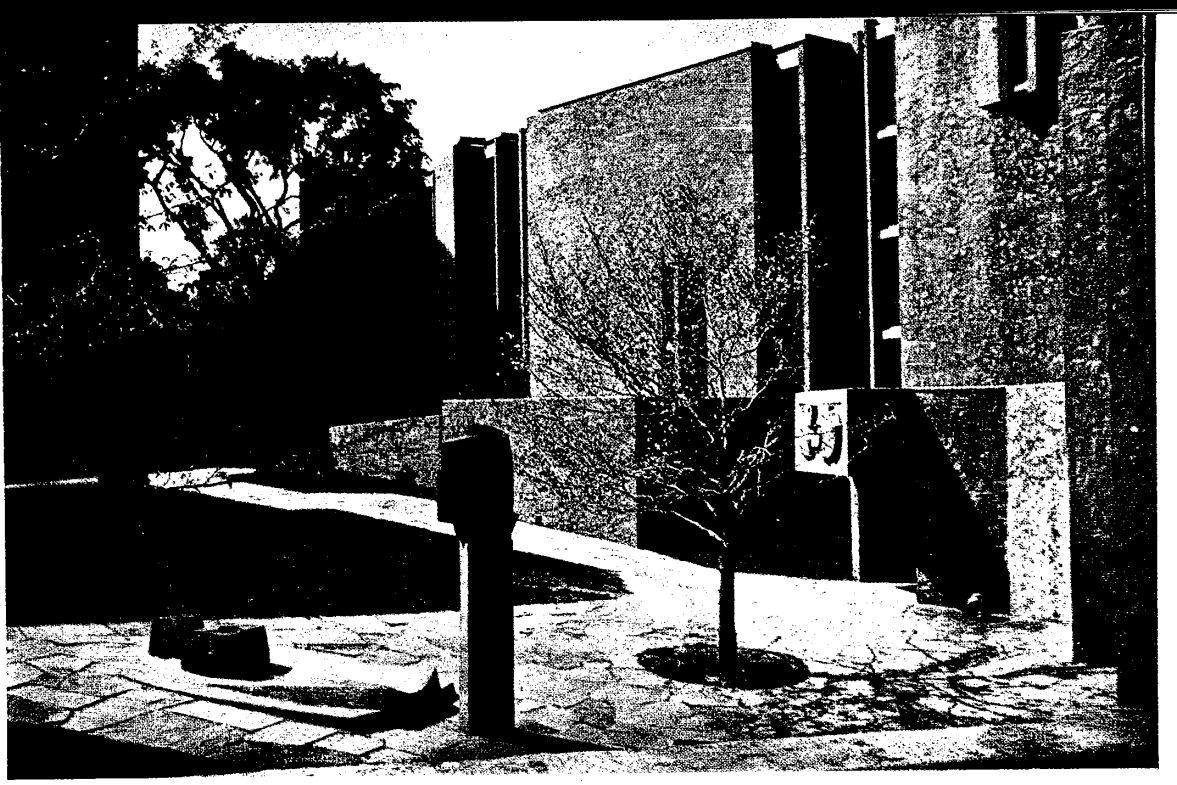
Water, sculpture and flowering plants: water can be used to great effect in urban design either statically in pools or in motion in the form of stimulating fountains and cascades. Sculpture also can substitute for much of the form and liveliness of shrubs, while gaiety can be provided by planting out a display of flowering plants in tubs and containers, kept fresh by frequent changes of plants appropriate to the season. Pavings, walls and other hard surfaces can be made attractive by introducing interesting patterns into their design.

Roof gardens: as densities rise, roof space assumes importance, especially with the development of high rise building. Apart from the obvious advantages to be gained by developing roof gardens as such, more thought could profitably be given to the architectural possibilities of good roofscape. Much could be achieved by developing the sculptural qualities of lift and ventilating machinery to make the views of rooftops stimulating in themselves; there are also possibilities in the decorative treatment of water in connection with air-conditioning to be explored.

Courtyards: courtyard gardens have a great contribution to make especially in relation to large scale building. Waiting rooms can look out on to them and if corridors run down the side of a courtyard, it is possible to create the illusion of



8 A primitive abstract sculpture stands sheltered by a mound on an escarpment overlooking the town; water trickles from its base along hand hewn granite troughs. Waide Hospital, Zurich. p.18, para. 38e, water.



9 (above) This sculpture is in monochromatic harmony with buildings of warm red sandstone. The skate headed fountain spurts water intermittently which rarely finds its target except on still days and is, therefore, fascinating to watch. Yale University. p.18, para. 38e, water.

10 (below) Roof space on the 20th floor of the nurses' home above the university campus offers privacy in the sun or shade. Troughs of plants give separate spaces to the area and make it into an attractive garden. Teaching Hospital, Zurich. p.18, para. 38e, roof gardens.

11 Large round roof lights and circular plant containers combine with a bold paving pattern on this flat roof space, which thus becomes an attractive elevated courtyard. Heathrow. **p. 18, para. 38e, courtyards.**

12 Across the road from the hospital, away from bustle and noise, old people's flats and social facilities are built on top of garages. It should be noted that raising the buildings on *pilotti* extends the sense of space. Zurich. **p.18, para. 38e, roof gardens.**

13 (above) Air-conditioning vents, skylights and balustrades combine with contra-sloping roof lines to compose trim and interesting roofscape. Volkshochschule, Wolksburg. **p.18, para. 38e, roof gardens.**

14 (below) Simple and effective use is made of grass and water in this courtyard where surrounding buildings are kept low enough on the southern side to allow sunshine to flood in. Cologne. **p.18, para. 38e, courtyards.**

15 Indoor planting brings the courtyard landscape right into a waiting area. The corridor becomes a path through this landscape to the open spaces beyond. Tübingen.
p.18, para. 38e, courtyards.

moving through the landscape while walking about the building. If a courtyard is too deep it looks like a well but if it is constructed on the roof of a lower storey, this effect is overcome and valuable shelter from the elements is afforded by the walls of the surrounding building. A practical requirement is suitable access for maintenance.

Winter gardens: the landscape should be brought inside the building so that it can be enjoyed during the wintery months of the year and during spells of bad weather. This is made easier by the variety of foliage plants now available to grow in conditions of low light intensity indoors; though grouped in containers, plants should be grown in individual pots to effect clean and easy change and replenishment. Containers should be provided with drip trays or special drainage, insulated from materials which might rot. The usable area can be considerably enlarged by extending it through opening doors on to a terrace when the weather is suitable.

THERAPEUTIC CONSIDERATIONS

The Hospital in its Setting

39 The appearance of a hospital in its setting and the way it fits the pattern of life and habits of the local community are psychologically as well as visually important to patients already under stress through illness. A sense of relationship is needed between the community and its hospital so that in times of illness, patients do not feel cut off from an environment which is familiar to them.

40 Incongruity, whether in size or character, is to be avoided for this reason. A large building sited in a complex of small buildings is oppressive in its bulk and in its contrast. But if the mass of the building is visually broken up into smaller elements, it can be married to the scale of the neighbouring buildings and thereby provide opportunities for a design of complementary, if contrasting, character. Conversely, a large building among large buildings may not be upsetting in the same way because apparent height and length are reduced by foreshortening, when viewed from near to, and features encountered at the level where people move about, can be designed to human scale.

41 Similar scale relationships exist between buildings and topography. Expansive, flat or gently undulating landscapes can accommodate large buildings of simple form because the two are in scale. But this relationship persists only so long as the simple form is preserved, uncluttered by small scale features which destroy the effect of congruity between buildings and their setting. In confined landscapes with more intricate undulations the building masses need to be visually broken

16 (above) This nurses' home overlooks a courtyard which helps refresh and relax the residents, an antidote to fatigue. Zurich. p.18, para. 38e. courtyards.

17 (below) Tropical plants, which were carefully selected for the winter garden, are grown in artificial light. The fountain is floodlit and has three form changes. Cherry Hill, Pennsylvania. p.22, para. 38e, winter gardens.

up to fit in with the smaller scale features of the site.

Design Principles of Therapeutic Significance

42 Breadth and simplicity are important. The main features of the landscape should be grouped and arranged to catch and direct the eye from one to the other.

43 Intricacy, "that disposition of objects which, by a partial and uncertain concealment, excites and nourishes curiosity"[11] is essential. It is achieved by suitable arrangement of the various compartments of the landscape, the elevation and depression of levels and by the disposition of the objects contained within them.

44 Variety is introduced by exploiting the varied and contrasting forms, habits, textures and colours of plants; but fussy effects, uneasy on the eye and therefore unsoothing, are to be avoided.

45 Movement is necessary to enliven the static elements of the design and thus provide stimulation for patients according to their perceptive needs. People moving about, suitable specimen trees, moving water, illuminated for changing colours at night, grazing animals and features, such as a dovecot or bird table, will provide this.

46 Time flow is the most basic and continuous of natural phenomena. The repetitive rhythm of dawn, daytime, evening, sunset and night has a marked therapeutic value. Confined to bed, patients can lose the rhythm of moving on, of progressing, and time can become stagnant. In rural and suburban settings this defiency can be remedied by furnishing the site with trees and plants which by their shape and disposition bring out this rhythm through the effect of changing shadows, appearance in different lights and at the various seasons of the year. In the urban context, in the absence of expansive views, moving water and sculpture, composed to form stimulating scenes in congruity with the profiles of the buildings themselves, are perhaps the nearest substitute.

47 Colour is therapeutically important and there are trees, shrubs and plants with coloured foliage to provide it in varied if muted form. Glaucous and golden evergreens are particularly valuable for the colours they give during winter months. Flowering trees and shrubs are useful for providing a counterpoint of brighter colours. By choosing from coloured evergreen and deciduous trees and shrubs and the brighter coloured flowering plants, stimulating patterns can be worked out to provide interesting colour combinations to counterpoint those of the changing seasons.

48 Fragrance. Trees, shrubs and plants with fragrant foliage and flowers with scent should always be used wherever patients and staff can enjoy them.

49 Order and efficiency induce a sense of confidence in patients and visitors. Nothing is worse than shoddily designed approaches, which are bound to be untidy, because of the impression they create, however misleadingly, that they reflect internal disorganisation.

Landscape Use

50 When patients become ambulant they may start to use the landscape in a gentle way to sit and knit or read or walk in the hospital surroundings. It is desirable to have defined spaces in the grounds scaled down to these passive uses. These are the areas of the grounds where intensive gardening might be pursued. They should be sited to be visible from upper floors but near enough to the building for ambulant patients to reach. For winter and inclement weather a glazed loggia facing south or a conservatory might be arranged with flowers and a fishpond to provide colour and animation.

51 The need to provide equally beneficial active recreation will depend on the type of hospital, the treatments being developed and the living arrangements of the staff. Decisions can only be taken after detailed investigation and analysis of the patterns of treatment and domestic living as they are developing in individual hospitals. Wherever possible it should be the aim to provide sizeable open areas for flexible use.

SITE AND BUILDING LIMITATIONS

52 The adoption of industrialised building methods introduces new problems of site development requiring resolution at design stage. Although choice in the selection of systems allows considerable flexibility, rather more space is needed for the movement of cranes and machinery, and further space may have to be cleared for the fabrication of building components on

18 Terrace with a view provides sitting areas defined by units combining seat, table and light and softened with interesting planting; a further and equally accessible extension of indoor facilities out of doors. Bombach, Zurich. **p.25, para. 54c, geriatric patients.**

the site. Inevitably these factors reduce the possibilities of preserving all the desirable features of the site suggested by the landscape survey. Further discrimination may be needed in the choice of the best features to retain for their intrinsic worth and for their contribution to the completed landscape. In preparing the landscape proposals it will be necessary to consider the way in which the constructional operations will be conducted.

USER REQUIREMENTS

The Allocation of Land

53 In the allocation of land to meet various user requirements, any larger areas needed for active recreation should first be decided upon; smaller areas appropriate to quieter activities should be fitted in later. The larger areas should as far as possible be unprejudiced by the presence of ducts or other features which might prevent enjoyment of the space as a whole, aesthetically or functionally.

Landscape Uses

54 Landscape uses for which provision is needed depend on a number of factors.

(a) **Duration of stay.** Hospitals with a large proportion of long-stay cases, especially ambulant ones, need careful landscape planning for graded outdoor activities.

(b) **Course of illness.** In multi-purpose hospitals required landscape provision depends on a number of factors including nature of illness and length of convalescence.

(c) **Type and age of patient.**

Children: consideration must be given to minimal activity levels for orthopaedic cases (remaining in a fixed position over a long period), average levels for general paediatric cases in their recovery phase, and maximum ones for psychiatric cases, most of whom may be ambulant.

Adults in their prime: for example, the relatively limited space usage made by heart and lung cases, or post-casualty patients; or the particular needs of psychiatric patients.

Geriatric patients: especially those who are losing contact with relatives, friends and their former lives generally, come to depend increasingly on what the hospital has to offer.

(d) **Requirements of patients, staff and visitors.** These uses must be accommodated in designing to satisfy the needs of various treatments and the requirements of convalescents, staff and visitors.

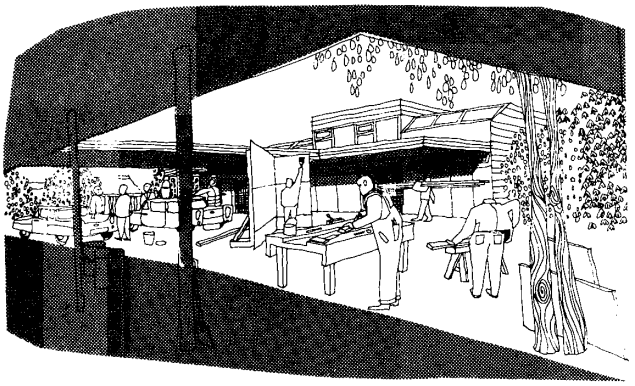
Occupational therapy: a hard surfaced area is required for heavy activities, for example, cross-cut sawing, log splitting, car washing and sand and cement mixing; part of the area should be

19 The monotony of the extensive area of hard surface, essential for play in all seasons, is relieved by patterning: steps (left foreground) and climbing sculpture in the form of a small castle. Brunmatt Schule, Basle. p.28, para. 54d, children.

covered to allow pursuit of these activities at all times of the year.

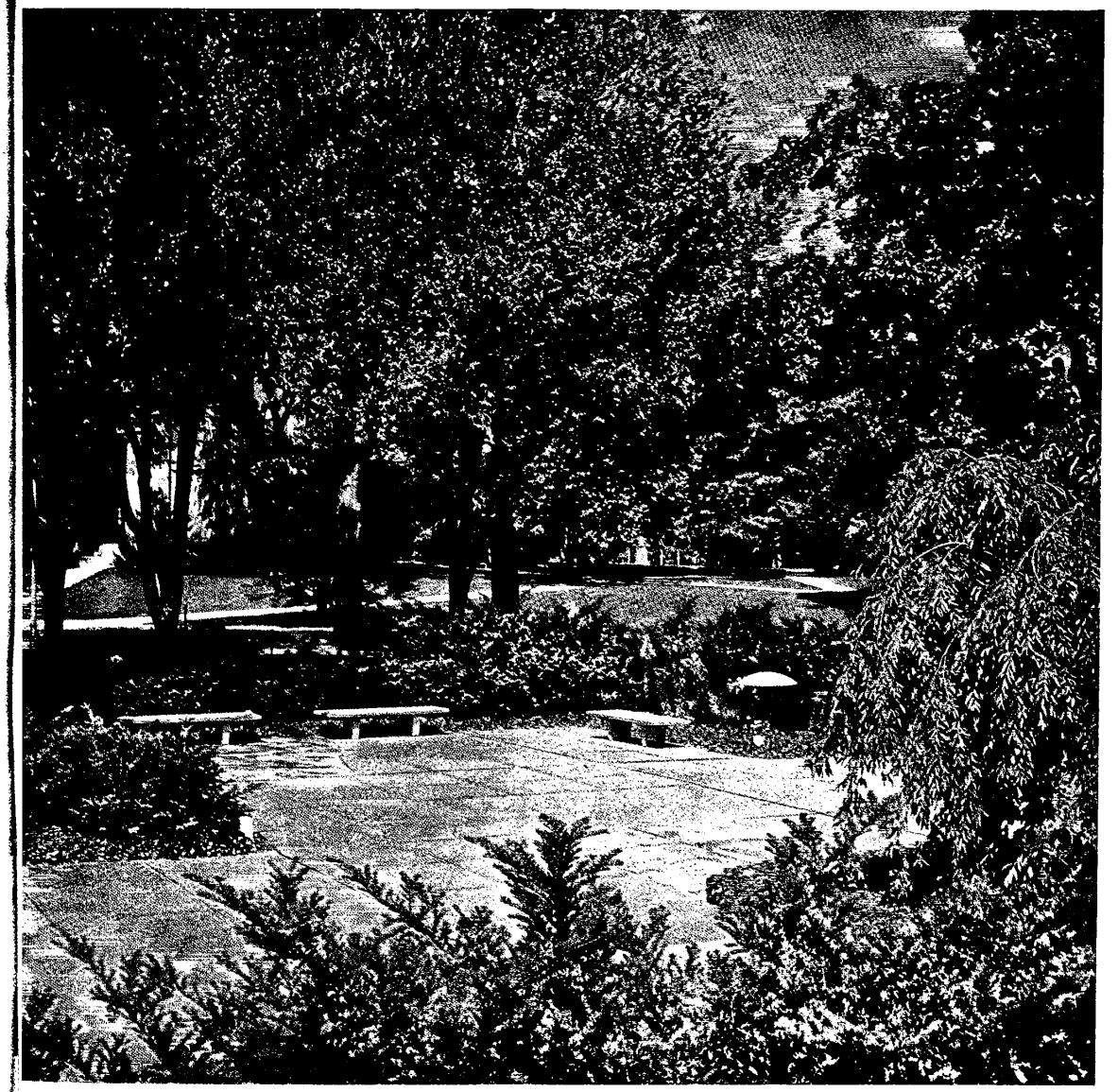
Gardening: this may be carried on spasmodically and should be sited out of general view and laid out in appropriately sized beds bordered by hard paving for definition and tidiness and so that plots can be seeded down to wild white clover in order to keep up fertility while not in use. Some of the beds should be raised for the use of wheelchair arthritic and heart patients, for whom ramped access is essential. There should be a greenhouse, with wide doors to admit wheelchairs conveniently, sited nearby.

Therapeutic: landscape is first appreciated as an outdoor extension of the internal environment and may be primarily conceived as a series of outdoor rooms. Though such areas are highly artificial their therapeutic value is enhanced by the creation of different levels thus providing a progression of areas, some walled in to reduce wind and noise, others more open to permit recreational activity of moderate intensity, for

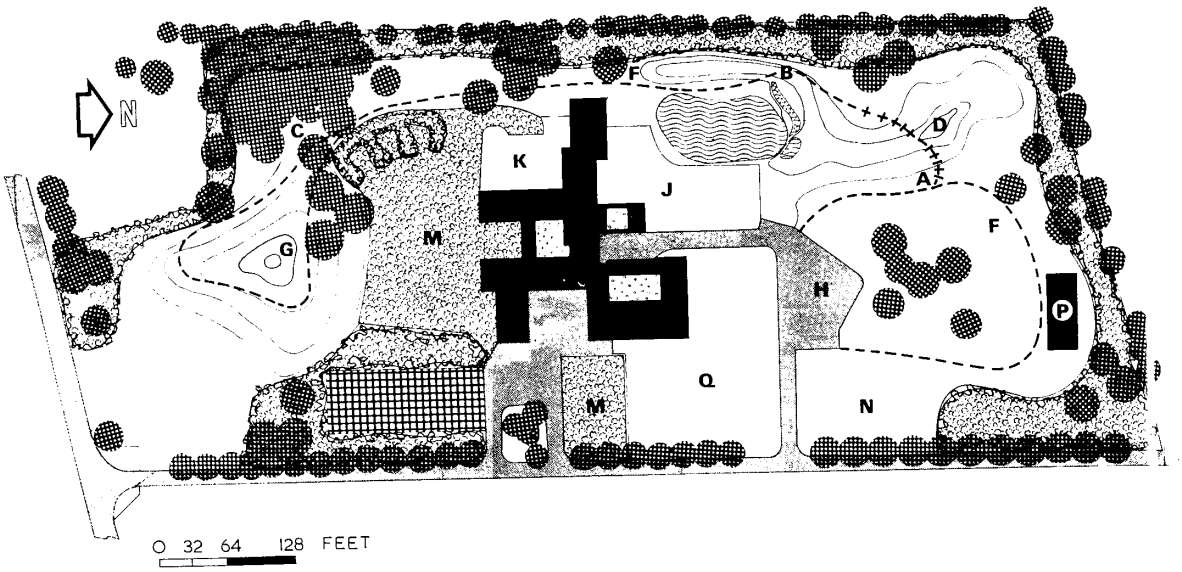


20 (above) A paved space, sheltered by surrounding verandahs and workshops and shaded by a tree, allows occupational therapy to be pursued at all seasons. p.25, para. 54d, occupational therapy.

21 (below) Beds raised to allow a form of trough gardening for non-ambulant patients are ideal for cultivation of alpines and other small plants which can only be fully appreciated on close inspection. p.26, para. 54d, gardening.



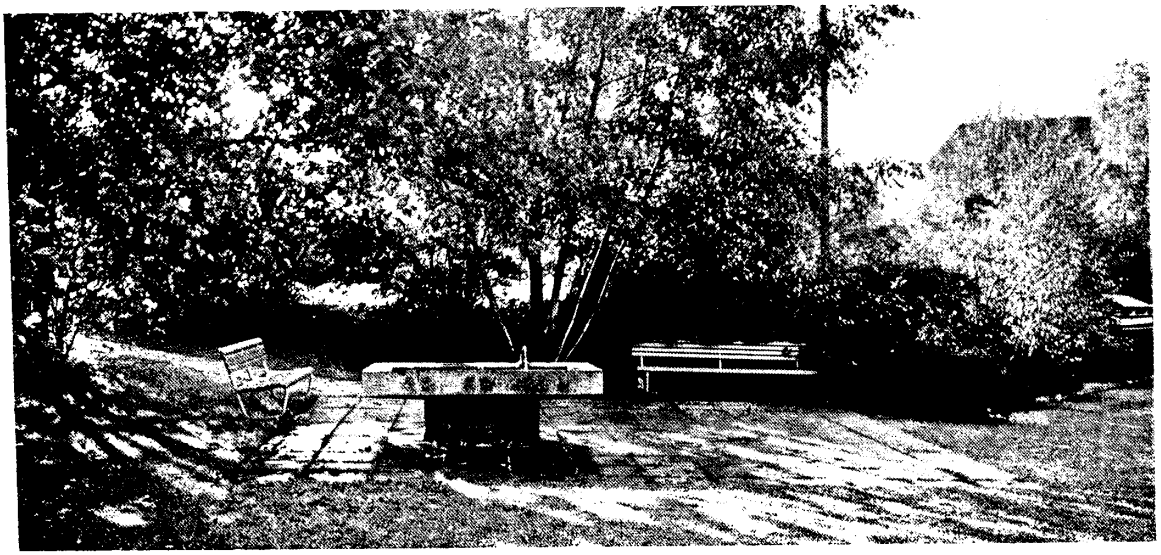
22 An outdoor extension of the hospital. The yew hedges will grow up to enclose rooms without ceilings – sheltered, cosy and intimate. East Lancing, Michigan.
p. 26, para. 54d, therapeutic.



23 Plan of a psychiatric children's garden providing for diversified treatment and activity. Key: A undulating pathway with steps; B grassy mound; C coppice; D stockade; F all weather path; G sunken amphitheatre for play acting; H menagerie; J all weather play area; K toddlers; M quiet garden. N gardening; P hut; Q hard surfaced area for ball games and play. St. James' Hospital, Portsmouth. **p.28, para. 54d, children.**

example, a geodisic dome, mini-golf, bowling, croquet, a gymnastic lawn and a pool. A sunken scooped out area at the lowest level might be used as a small outdoor theatre. The area may be further enlivened by the introduction of a water feature and an open air cafeteria fitted up with suitable outdoor furniture.

Children: there should be an enclosed outdoor space partly under cover for use in inclement weather, draught free with shallow steps, undulating pathways and, if possible, grassy mounds where children can test their weakened limbs. This area should if possible lead out to a small coppice where the young patients can renew acquaintance with the outside world. The design should aim to provide for children's normal activities and imaginative play at all times and seasons. There should be swings, climbing frames and see-saws incidentally disposed around the area to fit the perambulatory pattern of children's play. A switch-back for children confined to wheelchairs should be arranged in close proximity to the muscular distrophy block, with a clubroom and facilities for constructional play for wheelchair patients in the courtyard. Young patients' play areas are appreciated also by children who have to accompany one parent while



25 This lawn is equipped for exercise and incidental play and includes a rock for adventurous investigation by children. Zurich. **p.26, para. 54d, therapeutic.**

24 **(left)** A trough with drinking water in a garden where parents and children can spend time together. Zurich. **p.28, para. 54d, children.**

26 **(above)** A meandering path of differently composed surfaces invites investigation: steps to scale and hop, a mysterious tunnel and a sand pit, allow scope for playful enterprise. Neue Universitäts-Frauenklinik, Cologne. **p.28, para. 54d, children.**

27 Staff quarters sited apart from the hospital building and designed to smaller scale to provide a relaxed and homely environment. Engleskirchen **p.30, para. 54d, staff.**

the other is in hospital; in connection with visits to the outpatient department and by children of staff after the patients have gone to bed.

Convalescence: convalescent patients appreciate sunny seats and provision for gentle walks in sheltered surroundings near their wards; there should also be secluded seats where they can converse with their relatives in some privacy.

Staff: special efforts should be made to create a domestic environment for staff, withdrawn from the work-a-day atmosphere of the hospital with space to laze and to stroll about. Where public recreation facilities are not available nearby provision for swimming and tennis, cricket or bowls should be considered.

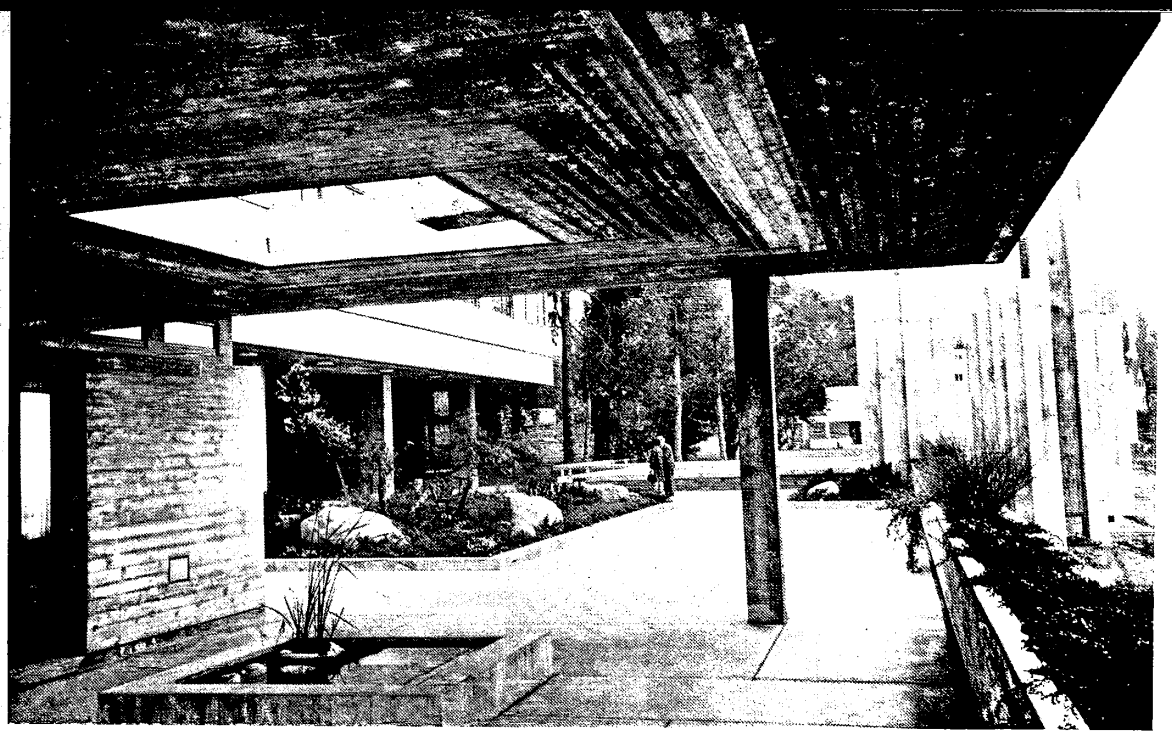
Relationship of Architecture and Landscape

55 A satisfactory interrelationship of architecture and landscape is achieved in various ways; by arranging levels of floor and ground to be coincidental so that the landscape seems to flow into the building; by relating the building to the views; and especially by extending and repeating an outdoor treatment inside the building, literally carrying the design of the garden indoors and *vice versa.* By these means a relationship with the outside world for those confined indoors is established: but concepts of this type need to be thought out in the early stages of architectural planning.

Pedestrian Circulation

56 Few things erode a landscape more quickly than the indiscriminate passage of people. Wherever possible

28 A winding path of easy gradient invites gentle exercise. The seat, on the right, gives an opportunity for rest and conversation. Zurich. **p.30, para. 54d, convalescence.**

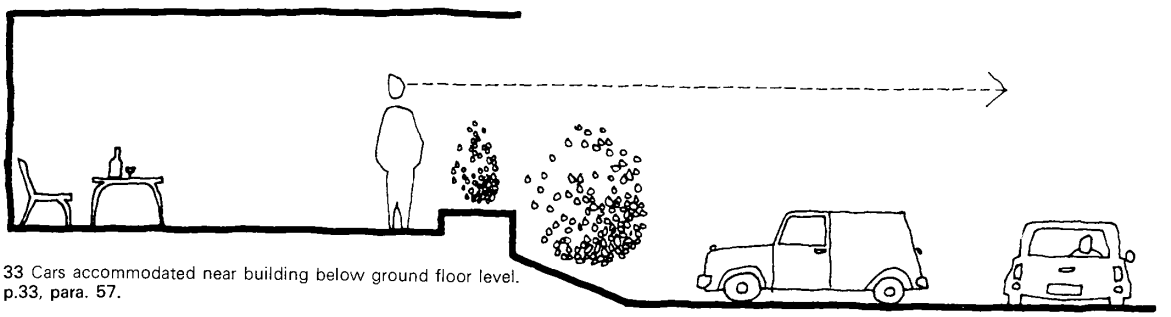


29 The terrace is a logical fine weather extension of the lounges in Bombach Hospital for geriatric patients. There is ample space for wheelchairs and for sitting in sun or shade. Zurich. **p.30, para. 55.**

30 Repetition of planting without and within, also continuation of the terrace at floor level secures a happy indoor and outdoor relationship. Bombach, Zurich. **p.30, para. 55.**

31 Space for cars shaded by trees of wooded parkland. Dense juniper planting provides visual relief below eye level. Michigan State University. p.33, para. 57.

32 Parking space neatly defined by low planting with trees for shade and flags for gaiety. Bombach, Zurich. p.33, para. 57.



33 Cars accommodated near building below ground floor level. p.33, para. 57.

footpaths should follow routes through the grounds which are independent of other traffic. People invariably take the shortest visible route ahead unless their attention is distracted by some feature of special interest. It is necessary to allow for this and to limit vision by variety in order to avoid short cutting. The origin and destination of pedestrian traffic between various elements of the hospital should be studied and the footpaths planned logically so that pedestrians willingly follow them.

Motor Cars

57 Unless appropriately catered for, motor cars are not a landscape amenity. Their presence in considerable numbers must be accepted and steps to accommodate them taken in the early stages of design. It is important to avoid proliferating subdivision of the site by roads and encroachment by parking areas. As a general rule the main parking areas should be at the hospital entrance(s). The visual impact of parked cars *en masse* can be lessened by depressing the level of the parking area a minimum of 2ft so that the parked cars are below eye level and do not interrupt horizontal views across the site; the area can be visually broken up into bays by planting shrubs to grow to bonnet height, and the cars can be screened from above by standard trees carefully chosen and disposed to avoid interference with car movement and parking. Where the ground floor level is sufficiently elevated (say 3ft) it may be convenient to accommodate a number of cars against the walls of the building where they will not spoil the outlook from within. This arrangement is not suitable for short period parking because of noise and fume nuisance.

Propagation, Storage and Rubbish Disposal

58 The facilities which will be needed for the propagation of plants, storage of materials and equipment and for rubbish disposal will depend on the arrangements planned for the maintenance of the hospital gardens and grounds. Increasingly, optimum returns on labour, machinery and equipment are found in group maintenance arrangements, shared by a number of hospitals: in this case propagating would be carried out at a convenient centre and there would be a main depot for servicing and the seasonal housing of machinery and the storage of fertilisers and other necessary materials.

59 Provision should be made for a landscape maintenance compound at every site, partly covered for use in wet weather and for the temporary accommodation of machinery and equipment. It should have an enclosed, partly glazed and frost-free shed for the incidental storage of plants in the normal routine of changing floral decorations.

60 Organic materials such as weeds, prunings and cleared crops, accumulated during the course of maintenance, should be composted for re-use on the land in the interests of soil fertility, while woody and fibrous material and litter should be burned, preferably in the hospital incinerator.[12] Space must be allowed for these activities in the landscape maintenance compound which should if possible be sited to leeward of the main buildings and suitably screened.

Irrigation

61 Wherever plants are to be grown in unnatural conditions they will require regular watering: this will be most economically carried out by irrigation systems built in during construction. Trees in hard surfaced areas are best irrigated underground either by a combined watering and drainage system through open jointed pipes or through 1in perforated, non-corrosive pipes.[5] Beds and plant boxes are best watered overhead through fixed spray systems (which are less vulnerable to interference than moveable spray lines) or through trickle systems using perforated pipes on the surface. Lawns requiring irrigation are best fitted with underground systems which deliver the water through sprinklers or nozzles, flush with the surface when not in use, thus offering no impediment to mowing machines. Specialist advice should be sought.

34 Bombach Hospital is built on the crest of a scarp above farmland. On completion of building works, the whole slope below the summer and winter (glazed) terraces of the hospital was handed back to the farmer thus reducing maintenance costs. The farmer pays the rent! Zurich. p.35, para. 67.

4 Development Concepts

62 Throughout design and execution there should be close collaboration between architects, engineers and landscape architects in order to ensure satisfactory co-ordination of all architectural, paving, road and other design details in the interests of satisfactory landscape design and economical maintenance.

63 Application of the principles outlined above to analysis of the landscape survey and to appraisal of the various user and functional requirements of the hospital will suggest the most attractive and economical way to develop the site and subsequently to maintain it. Regard for maintenance is of prime importance in framing proposals for actual treatment because its annual cost is unlikely to diminish over the years.

DENSITY OF USE AND COST

64 The following paragraphs describe the design solutions appropriate to different situations, rural or urban, and each includes the range within which the capital cost (labour and materials) of the landscape treatment can be expected to fall. The costs do not cover site clearing, stripping of top soil, earth moving and consequential works, the cost of service roads and pavements, parking areas or the cost of tree surgery within the curtilage of building operations. Nor do they include the cost of fencing out the area of the site, to protect features it is desirable to retain, beyond the reasonable building curtilage, the additional cost of which will usually be found to be far less than that of restoration which would otherwise result.

65 While the characteristics of a particular site will normally dictate the basic landscape design solution, most sites will contain limited areas requiring treatment of other, possibly more intensive, landscape types, for example, some urban landscape treatment will probably be required around rest areas and in courtyards of hospitals situated in a wild setting. The probable total cost of the treatment of any given site can be calculated by measuring the various areas requiring different types of solution within it and by applying the appropriate cost estimate to each.

RURAL OR SEMI-RURAL SOLUTIONS

Wild Landscape

66 In undeveloped or marginally developed countrysides, the attractions of exploiting the wild are considerable. This would suggest restoration of the surrounding vegetative balance on practical completion of building works. The type of operation required would be scarification of subsoil and removal of rubbish, collection of top soil from spoil heaps and spreading, providing mowing stones, preparation of seed bed and sowing appropriate wild herbage mixture including temporary protection. The areas involved would be comparatively small and of awkward shape, probably requiring the use of mechanical hand plant.
Cost: 5s. 0d. to 8s. 0d. per square yard

Developed Landscape

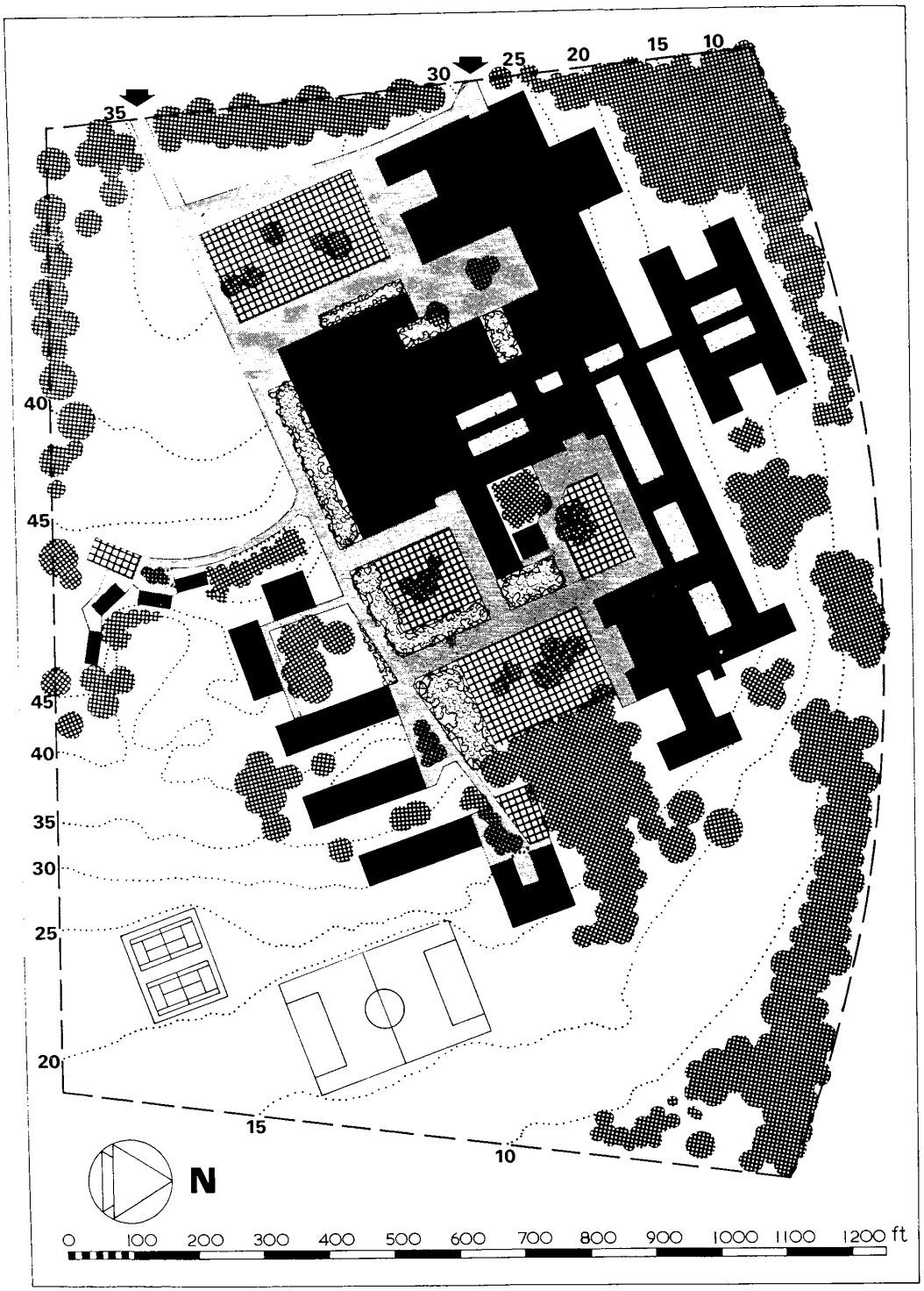
67 Where the land is developed agriculturally, however, thought can profitably be given to the possibility of returning much of it, after development of the hospital, to agricultural use, thereby reducing maintenance responsibilities. The same principle as in paragraph 66 applies to the restoration of the building curtilage using appropriate seed and therefore the cost would be five to eight shillings per square yard. Suitable areas beyond the building curtilage may be returned to agricultural use after practical completion of building works. During the period of building contract, which averages about 4 years, this land will require a holding crop such as wild white clover.
Cost: £20 to £40 per acre

Immediately prior to the return of the land to agricultural use the holding crop should be cut and cleared and the land ploughed ready for the farmer to take possession.
Cost: £5 to £10 per acre

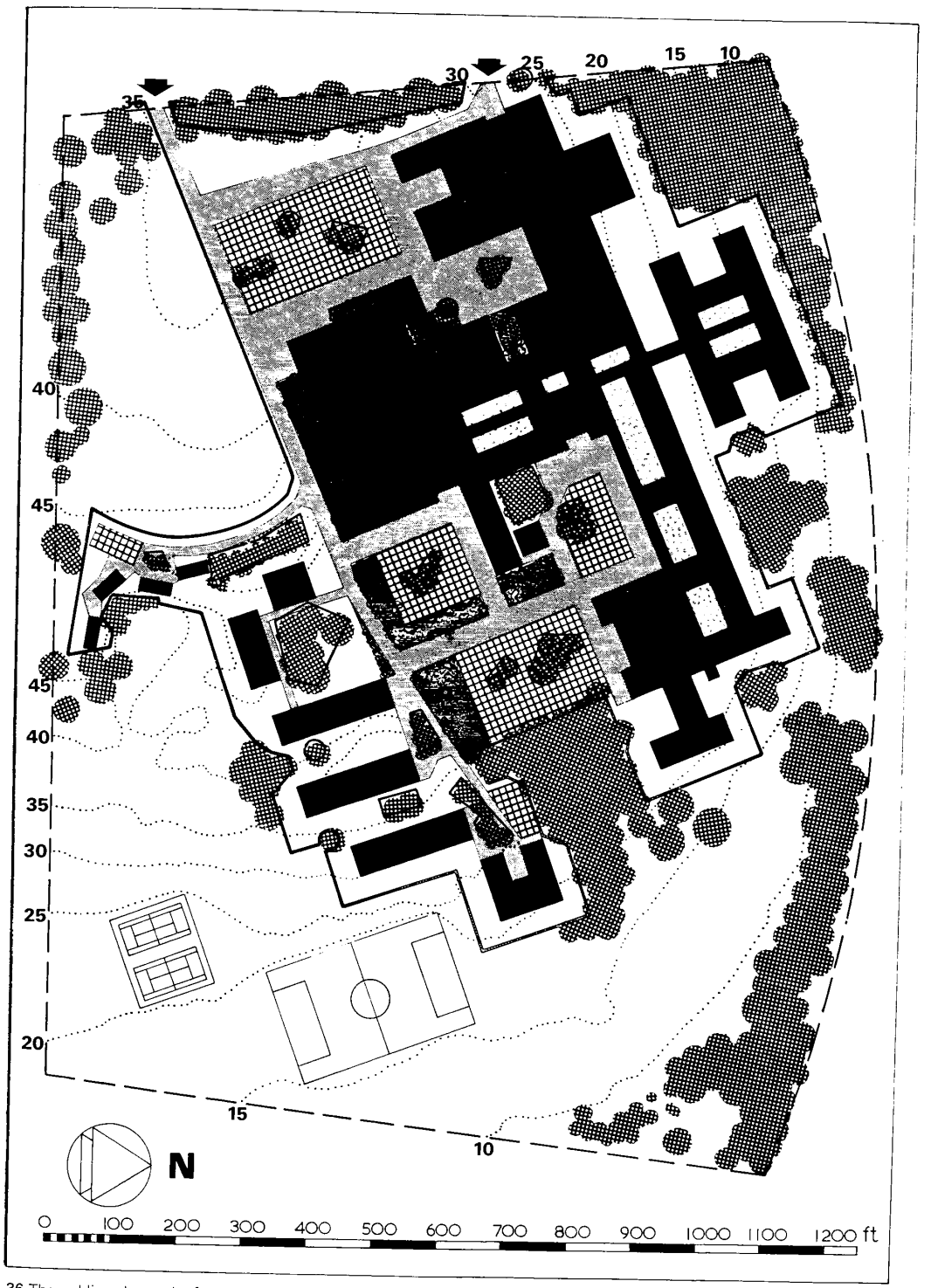
Alternatively some parts of the hospital site beyond the building curtilage may require no more than mowing about 6 times a year until practical completion of the building contract, a period of about 4 years.
Cost: £12 to £30 per acre for period of 4 years

Park Landscape

68 A third possible solution would be development as English parkland. The same principle as in paragraph 66 would apply to the restoration of the building curtilage, using appropriate seed, therefore the cost would be five to eight shillings per square yard. Beyond the curtilage of building operations the ground would need to be graded to falls suitable for drainage and mowing, prior to top soiling and seeding. Standard trees would be planted singly or in clumps suitably protected, shelter and screen planting would be provided on a forestry scale, protected by stock and vermin-proof fences.
Cost: £150 to £195 per acre

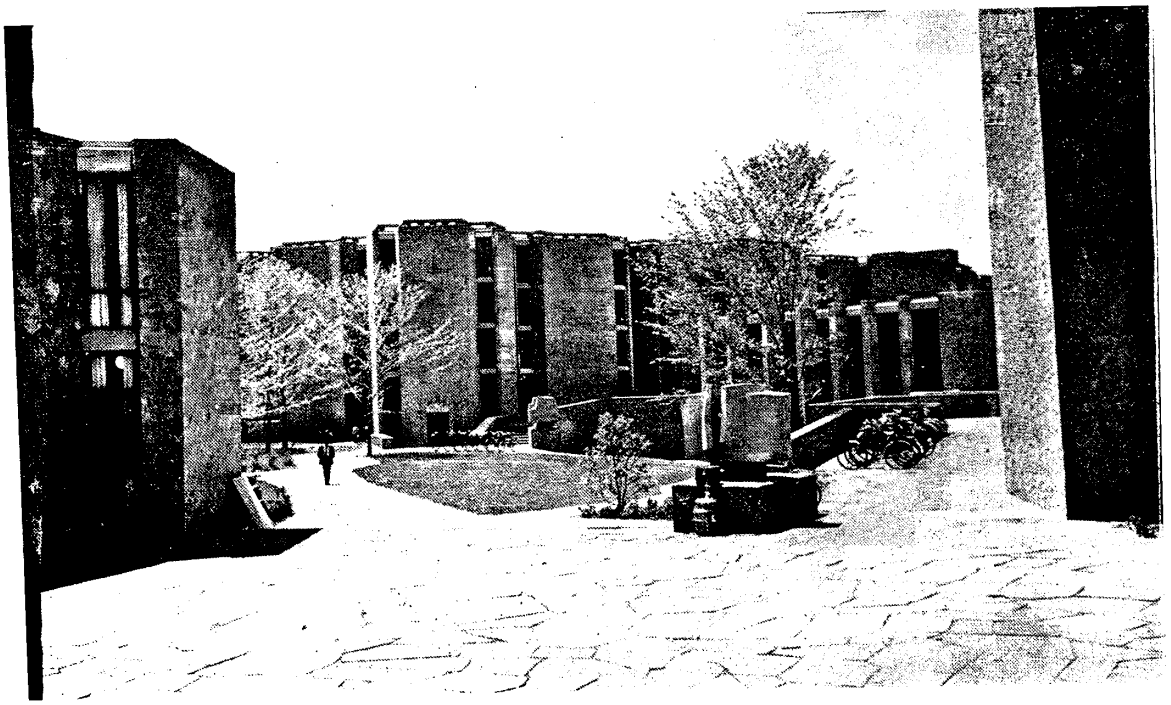


35 A notional design for a general hospital accommodated to the topography of a site in ecological balance, in an ambience of farmland. The design treatment could be for wild, developed or English park landscape. The trees already exist on the site. Domestic quarters are to the south-east. Football pitch and tennis courts indicate how active recreation would be fitted in if required. p.35, para. 66, 67 and 68.



36 The red line shows the fence which should be erected to define the curtilage for building operations with special features which are to be preserved similarly fenced out. There is a suitable area in the south-west corner for contractors' compound if parking areas do not offer sufficient space. To give some idea for assessing the different types of landscape treatment, green areas show garden treatment and the yellow areas urban landscape. p.39, para. 70 and 71, p.48, para. 98.

37 This campus landscape is of wooded parkland with garden incidents. Large summerhouse sited for all-round views should be noted, also attractive paths for strolling and well defined car parking, screened from the main part of the area. Pedestrian circulation is defined by patterning on the ground to avoid kerbs which interfere with grass cutting. University Hospital, Zurich. **p.39, para. 69.**



38 Walls, sculpture and paving are the main components of the landscape, the few trees provide organic foil and grass is a decorative feature. Yale University. **p.39, para. 70.**

SUBURBAN AND URBAN SOLUTIONS

Campus Landscape

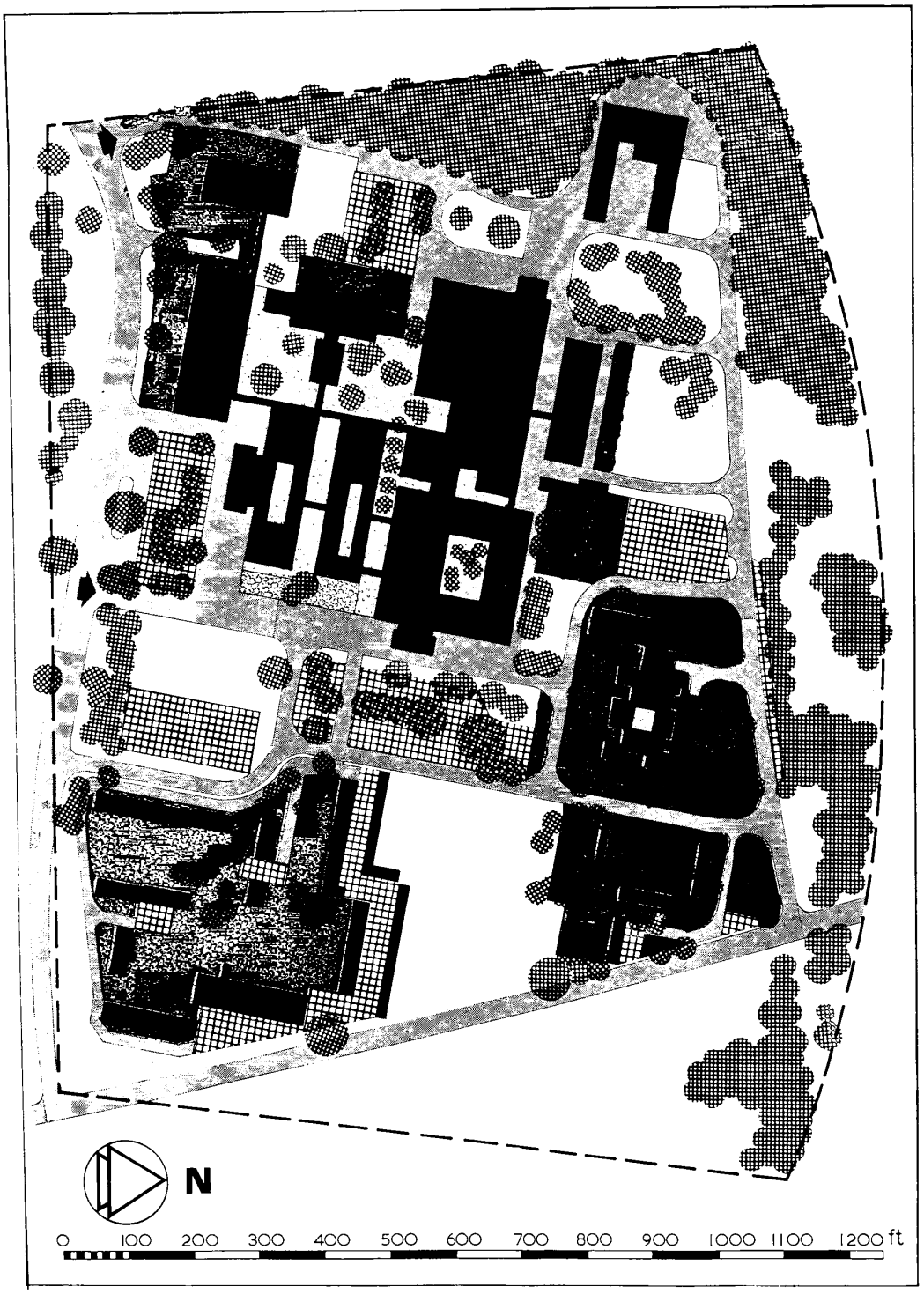
69 The campus solution is basically small scale urban parkland with gardening overtones in which areas of paving and more sophisticated shrub planting to some extent replace grass and trees. Maintenance costs would be higher than for the parkland type.
Cost: £1 to £1 15s. 0d. per square yard

Urban Landscape

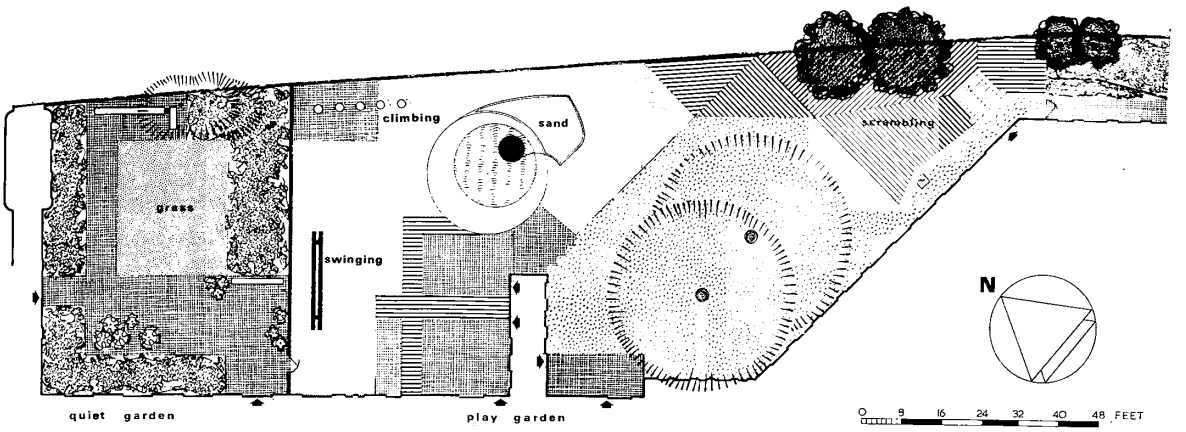
70 In densely populated urban landscapes the hard and soft elements in the design are transposed; the hard elements which in rural landscape provide contrast, become dominant. There would be considerable areas of paving of various types and limited areas of grass, typical of courtyard development with pools, sculpture, tubs of ornamental plants and seats.
Cost: £2 15s. 0d. to £4 5s. 0d. per square yard

Garden Landscape

71 The garden solution consists essentially of lawns, paving, shrubs and flowerbeds. On most sites, some garden treatment will be necessary for the areas close to the buildings. The extent of this treatment will vary from site to site; in rural situations it will be minimal and in urban ones considerable. The price covers the construction of a moderate sized garden with lawns, trees, shrub and rose beds, paths and areas of paving composed of stone flags with small areas of cobble, granite sett and brick pavings.
Cost: 18s. 0d. to £1 8s. 0d. per square yard



39 Actual plan for an urban hospital superimposed on the same site as shown in illustration 35 and 36, retaining many of the existing trees. It shows the greater area occupied by urban and garden landscape indicating more intensive types of landscape development appropriate to its situation. New Lister Hospital, Stevenage. **p.39, para. 69.**



40 Design for a children's courtyard attached to a psychiatric unit. Except for planting in the quiet garden, provided for staff and parents, and some trees, the design elements are non-organic and interest is introduced by a variety of paving materials and climbing structures. The Maudsley Hospital, London. p.39, para. 70.

GRASS AND PLANTING

Grass and Low Ground Cover

72 Whichever of the landscape design solutions is appropriately adopted, a decision on the ground cover is next required. The policy would be to encourage whatever already suitably grows on the site, be it grass, heather or woodland undercover. The two latter would present specialised problems and advice should be sought from the National Agricultural Advisory Service and the Nature Conservancy[13] if either is contemplated. Otherwise, bearing in mind that it is a climax crop, grass should be chosen.

73 Grass is the easiest crop to grow. If it already exists and the site is not too uneven for normal mowing, one of the most satisfactory ways of achieving green sward is to improve what is already there, by using top soil to fill small depressions and achieve a mowable surface and by feeding, mowing and general care.[5] Tough turf is achieved most quickly by these means.

74 Alternatively the ground should be cleaned, levelled, cultivated and fertilised to receive turf (most expensive but quick) or seed (cheapest and longest to establish). Clover may be used (greener colour in drought but slippery, though calling for little maintenance).

75 Low growing shrubs and trailing plants can be used instead of grass, for example, Rose of Sharon (Hypericum calycinum), creeping cotoneasters and brooms (Cytisus), dwarf lavender and heathers (Erica, Calluna), in the sun; and for shade, periwinkle (Vinca minor), ivy (Hedera helix), Oregon Grape (Mahonia aquifolium), Vaccinium. Such low growing shrubs are particularly useful in confined spaces, which might be too small to justify the use of a mower to cut grass. In the interests of maintenance, however, such plants must be set close enough to cover the ground and reduce the invasion of weeds. For the same reason it is useful to use dwarf shrubs and plants under trees or larger shrubs, though in this case special care must be exercised in ecological choice and planting distance.

76 The secret of success in substituting ground covering plants and shrubs for grass is to get every square inch of ground covered and so encourage an ecological form of maintenance. This in turn will depend in no small measure on very careful maintenance of the plants in the first three years, until they become established.

Planting

77 The most important factor in planting is ecological suitability. Congruity comes second in importance: trees and shrubs which are introduced should go with their neighbours, without looking alien and out of place, particularly in open country where the introduction of exotics completely masks the underlying geological character. It is a good rule to plant local species native to the site.

78 It is convenient to consider detailed planting in two categories:

framework planting, trees and shrubs which form part of the definition of the design and which should not be altered during the course of maintenance, and

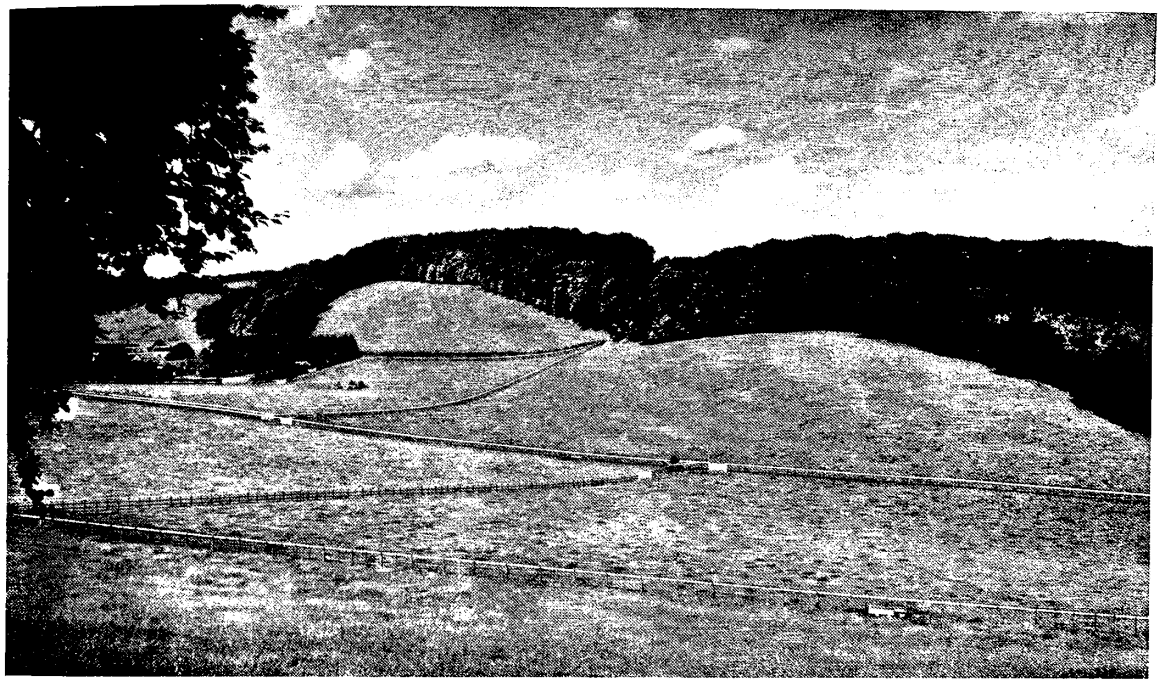
infill planting with which the designed spaces are furnished, including purely decorative planting.

Both can usefully last many years.

79 **Shelter planting** may be required in the form of shelterbelts 50 yards wide or hedges only 2ft wide.[14] Temporary protection, for example, wattle hurdles, may be needed in exposed situations until the trees, shrubs or hedges are established.

80 **Long and short term planting.** Long term planting may take many years to reach a significant size, oak 25ft in 28 years, holly 15ft in 14 years, and it is often felt desirable to plant for quicker effect coincidentally. Poplar and sycamore, for example, will reach about 20ft in 10 years and buddleia 10ft in 2 or 3 years, so that quicker effects can be achieved by mixing quick growing stuff with the slower, and thinning it out when the latter has reached a reasonable size.

81 **Root nuisance.** The roots of trees having high moisture demands can cause a great nuisance on clay soil lacking constant moisture where they suck out too much water in dry seasons causing the clay to shrink. Later the clay expands after rain. These changes may disrupt foundations. This can be avoided by watering the soil or by building on deep strip foundations or short bored piles.[15] The most troublesome trees are poplar and willow, the roots of the former can reach



41 Shelterbelts assist in definition of micro-landscape and provide good backgrounds for building development in addition to their valuable function. Chilterns. p.42, para. 79

42 Trees with open foliage are much appreciated for the shade they afford to buildings with large areas of glazed walling; their crowns can be lifted for unrestricted views nearer the ground. Leverkusen Hospital, Germany. p.44, para. 82.

43 This scheme shows large scale urban planting for continuing floral interest with azaleas planted down one side of a series of two-sided borders which flower in spring, followed by multiflora roses, planted down the other side, in summer. These plantings interlock at the border ends. In the middle of one bed is early summer flowering broom; in another, leaves and berries of barberry for autumn colour; in another, winter flowering heather and so on; ensuring some interest at all times. Crawley, Sussex. p.44, para. 84.

out 120 horizontal feet in search of water.

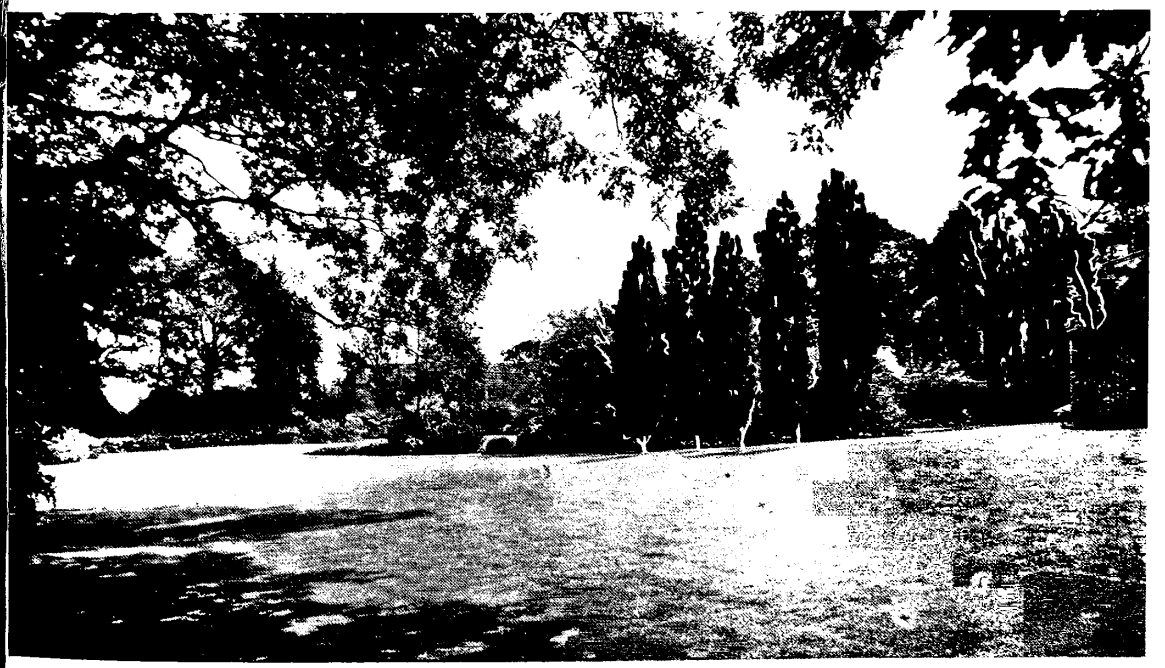
82 Shading. Trees cast shade and obscure light from windows, so that it is bad policy to plant trees close to the facades of buildings. However, the crowns of trees can be lifted to provide clear views underneath, or the crowns can be thinned (*not* lopped) to allow penetration of more light.[5] Conversely, trees planted near the large glazed wall areas of many modern buildings provide welcome shade from glare for those within. Trees with open heads which trap little light can be planted, chiefly Gleditsia, birch and Ginkgo.

83 Difficult situations. Certain situations and soil conditions such as sea exposure, north aspect, roof, desert, swamp, extreme acidity or alkalinity (see micro-climate, drainage, soil type, etc., in Section 2) make it very difficult to establish trees and shrubs, and in consequence choice may be limited. In these cases, it is important to seek expert guidance. Information about this should be sought from the horticultural expert of the Local Education Authority or from the National Agricultural Advisory Service.

84 Continuity of floral interest. In situations where planting is required to provide a continuously sparkling effect, it can only be achieved by constant renewal from the propagating house: wallflowers, forget-me-nots, tulips in spring; geraniums, begonias and fuchsias in summer; heathers and plants carrying berries in winter. This is expensive but justified in the immediate vicinity of buildings where numbers of people can enjoy it. Equally showy seasonal effects can be obtained, however, by the use of roses, heathers and other flowering shrubs. It is possible to use shrubs of these kinds, as the Victorians used bedding plants in some of their more ambitious plantings, so as to provide some colour and interest at every season of the year, without need of renewal.

85 Grouping. Plants and shrubs of a kind should always be planted rather closely together in groups. Treated in this way, the group grows up in the character of the individual, producing a quicker and more telling effect than if planted singly, and inhibiting weed growth, thus reducing maintenance.

44 Beech trees and evergreen shrubs provide framework planting (see overlay). This garden is beautifully furnished with a willowy tree in the mid-background. Superb decoration is provided by the massed, tiered planting of red dahlias surrounded by scarlet geraniums. The herbaceous border on the left provides continuing and colourful decoration throughout the summer and autumn. Clare College, Cambridge. p.42, para. 78.



45 Bolle's Poplar (Populus alba Bolleana), white outline left, and Pyramidal Black Locust (Robinia pseudoacacia pyramidalis), white outline right, shown 4½ years old, demonstrating the quick effect achieved. They will be cut down when the interplanted Wissel's False Cypress (Chamaecyparis lawsoniana Wisseli) and Italian Cypress (Cupressus stricta) have gained sufficient size to replace the early trees (see overlay). Plaistow, Sussex. p.42, para. 80.

43 This scheme shows large scale urban planting for continuing floral interest with azaleas planted down one side of a series of two-sided borders which flower in spring, followed by multiflora roses, planted down the other side, in summer. These plantings interlock at the border ends. In the middle of one bed is early summer flowering broom; in another, leaves and berries of barberry for autumn colour; in another, winter flowering heather and so on; ensuring some interest at all times. Crawley, Sussex. p.44, para 84.

out 120 horizontal feet in search of water.

82 Shading. Trees cast shade and obscure light from windows, so that it is bad policy to plant trees close to the facades of buildings. However, the crowns of trees can be lifted to provide clear views underneath, or the crowns can be thinned (*not* topped) to allow penetration of more light.5 Conifers should not be planted near the la[illegible] all area[illegible] buildings [illegible] me sha[illegible] within. Tr[illegible] head[illegible] can be pla[illegible] Gledits[illegible]

83 Difficult situations. Certain conditions such as sea exposu[illegible] desert, swamp, extreme acidity or alka[illegible] climate, drainage, soil type, etc., in Section 2) make it very difficult to establish trees and shrubs, and in consequence choice may be limited. In these cases, it is important to seek expert guidance. Information about this should be sought from the horticultural expert of the Local Education Authority or from the National Agricultural Advisory Service.

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5 Holding the Landscape Situation During Development

86 There can be a time lag between acquisition of site and start of development, or a considerable period may elapse before the whole of a programme of development is completed on the site. Nature is never static, plants continue to grow and the slow evolution to climax vegetation will be apparent as soon as physical control of sophisticated landscape is relaxed.

87 On completion of assessment of the landscape survey findings therefore, and as soon as the principles for development are determined, thought should be given to the problem of how to 'hold' the landscape situation during the interregnum and what preliminary steps can usefully be taken towards achieving the ultimate landscape design.

88 The main vegetable covering will have been determined. If it is the retention of grass already on the site, it will probably be cheaper to cut this three, four, or six times a year than to allow the invasion of brambles, nettles and other weeds which would all have to be cleared later for the re-establishment of the grass. The quality of the herbage could be improved during the process.

89 If agricultural land is taken over, it should if possible be withdrawn from that use in minimal lots only as it is needed for development. Otherwise it will be more profitable to establish a cover of clover or timothy to suppress other weeds during the period of development than to allow it to be colonised by rank weeds which would have to be got rid of later and would meantime be a nuisance and danger to surrounding land.

90 As permanent plants take a long time to establish, the sooner they are put in the better, especially in the case of shelterbelts which have to be started off as young plants. Plants which have already established themselves, grow away more quickly than those newly planted, so that it pays to encourage any suitable saplings found on the site. Natural regeneration in woodland should be similarly encouraged.

91 So long as property looks cared for and maintained, people tend to respect it. As soon as it looks neglected or abandoned, it is treated as a rubbish dump. This applies equally to building sites. If those parts of the site beyond reasonable building curtilages are fenced off and maintained during development, they can be returned to the hospital landscape on completion, none the worse for wear and with considerable savings in the restoration costs which would have been needed if such steps had not been taken. The costs of maintenance during the period of development are a legitimate development charge.

6 Site Works Organisation

92 Investigation of landform, climate, topographical features, vegetation and the natural biological balance serves to emphasise the importance of the arrangement of buildings on the land in the attainment of satisfactory landscape. The site works associated with building development are no less important: badly conceived site works can negate the best architectural landscape solutions. Thus the buildings themselves and all the physical results of their erection should be regarded as part of the framework for the ultimate landscape solution.

93 Where demolition precedes construction, separate storage of materials should be specified and positions indicated on plan for: brick rubble, concrete and stones, soft subsoil and top soil. All may be re-used in subsequent ground modelling, with probable savings in demolition costs.

Top Soil

94 The conservation of top soil is of critical financial importance. It is a legally protected commodity and costs from £2 to £6 a cubic yard to bring in. Every inch of it therefore should be carefully conserved.[5] It is also expensive to move about so sites for stacking it, where it can remain for the whole duration of the appropriate phase of the development, should be selected early.

95 The depth of top soil mounds should be regulated according to texture, those of heavy clay soil being less than 4ft deep. The heaps should not be built up by means which involve the running of heavy machines and equipment over them; undue consolidation is bad because it destroys the structure of the soil. Light sandy or gravelly soils are less liable to damage by over consolidation and in these cases little deterioration of structure occurs in top soil in stacks of considerable heights over a period of several years, where stacking has been done with light equipment. Any turf cover, unless required for re-use elsewhere, should be treated as part of the top soil and conserved as such. Sides of mounds should be graded to slopes of a minimum of 1 :3 (in case of the need to mow down weeds) and sown with wild white clover or timothy grass to suppress weeds. Young trees can be planted on the mounds to grow during the development of the site. They can later be moved with the top soil in which they are growing.

Preliminary Levelling

96 Preliminary levelling for the buildings, roads, car parks and major landscape features should be organised at the beginning of the site works as one integrated operation. In this way space is provided for large machines to manoeuvre and a logical pattern for site works development is set.

Surplus Excavated Material

97 Surplus spoil may be used to create banks for visual screening or acoustic baffling, for rationalising general levels or simply for visual effect in the construction of land forms. Expense may be saved by providing for the reception of surplus excavated material from building works on the site rather than carting it away. Whenever possible soil should be deposited in layers in the same

46 Trees nursed in top soil heaps, moved in with earth during ground modelling, enhance the entrance to the nurses' home, temporarily being used as a training school. Zurich. p.47, para. 95.

47 Electricity cables and water pipes are now available in pliable forms for laying in trenches, allowing them to wind between and around trees to avoid damaging the roots.
Kew Gardens. **p.48, para. 98.**

relative positions as they originally occupied, keeping top subsoil above that from lower depths and, of course, top soil on top.

Protecting Features During Development

98 Trees, bushes and plants, structures and other landscape features which are to be preserved, must be protected during building operations by fencing around them and making the general contractor responsible for maintaining the protected areas throughout the period of building operations. Ideally trees should be circled by fences beyond the spread of their branches and ground levels should not be reduced or made up within the fences. Where this is not possible a minimal radius of 10ft from tree boles should be ensured. It should be remembered that heavy weights (whether of vehicles or stored materials) damage the roots of adjacent trees, especially on heavy soils. To avoid damage to tree roots service runs should be located beyond the spread of branches overhead. If this is not possible the services should be laid in trenches tunnelled underneath so as to avoid cutting any roots exceeding 2in in diameter.**5**

99 Special care should be taken to see that crane jibs do not foul branches or break the tops of trees which are to be kept. There should be consultation with the contractor to decide what minimal pruning and surgery is needed to such trees where they would otherwise interfere with building operations. An arborist should be called in to do this work *in advance* of building operations.

100 It should be a contractual requirement that no damage is done to any tree, by any means, and a heavy penalty, say £250 for each infringement, should be insisted upon.

Record of Condition of Site

101 A careful survey should be made to record the condition of the site and all its features at the time it is handed over to the main contractor. On occasion this may usefully be accompanied by photographs of trees, etc., by way of description and to avoid later disputes. Such a survey impresses all concerned with the importance attached to the elements of landscape.

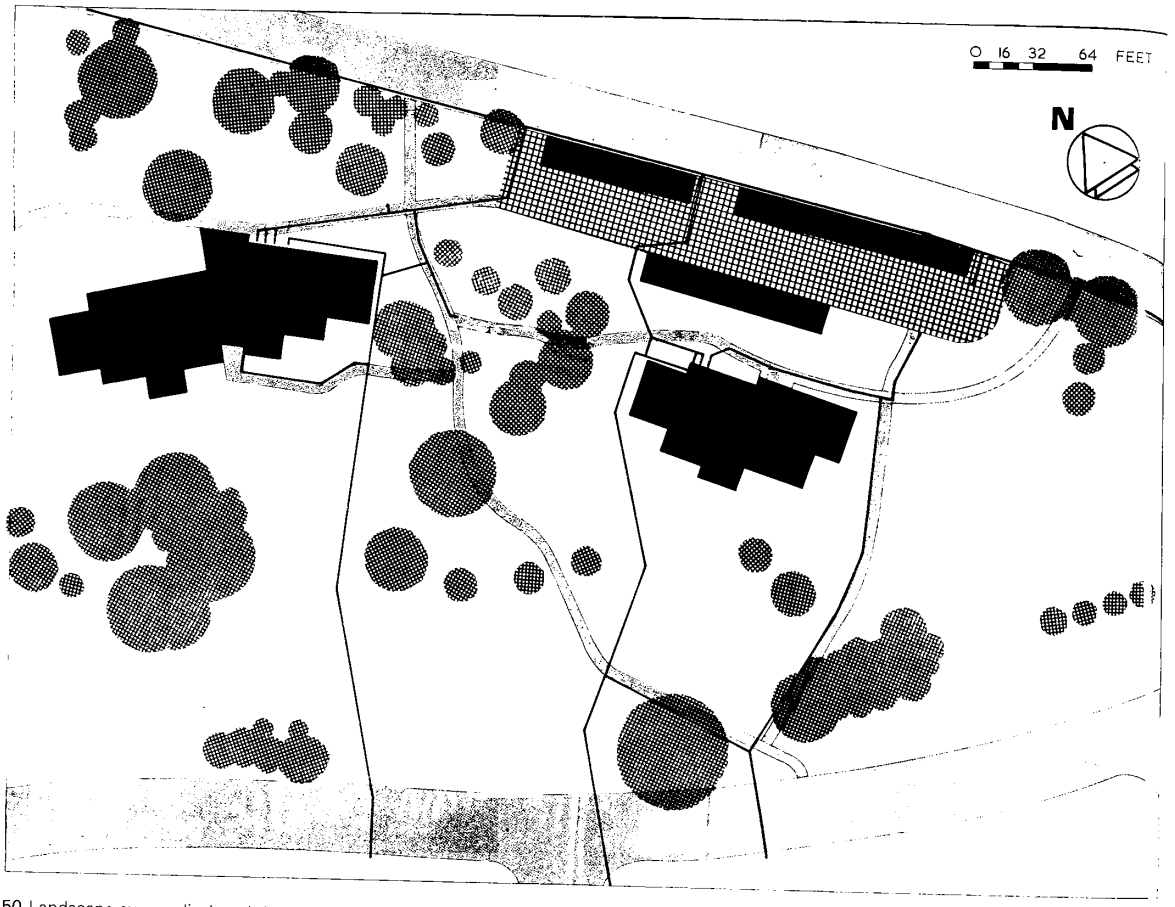
Transplanting Trees

102 Any large trees which it has been decided to move out of the way of development to other parts of the site should be transplanted before they are endangered by the development, and arrangements made for their future feeding, care and watering. If there are suitable trees which are not needed on the site, they should be offered to other authorities.**5**

Interim Maintenance

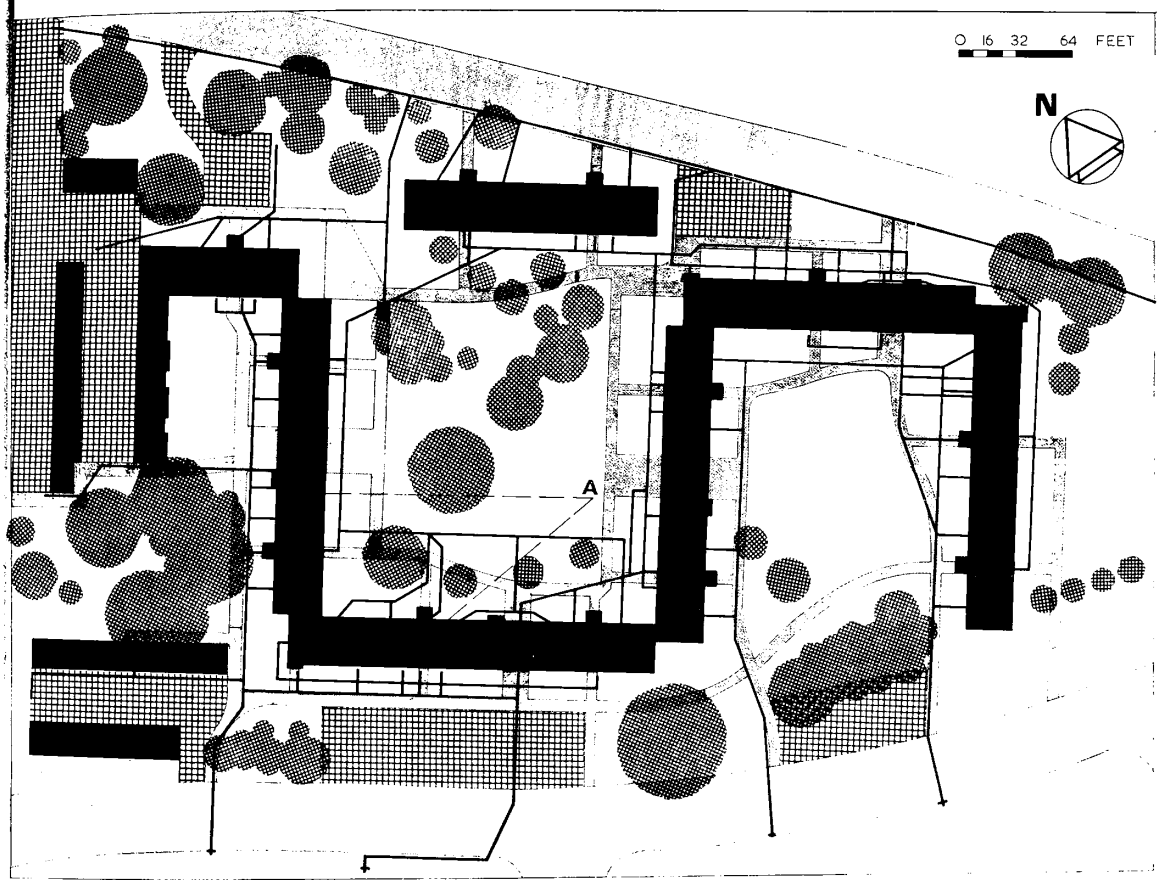
103 The arrangements for maintaining the parts of the site (if any) not needed for development previously

48 & 49 Surplus excavated material is moulded to pleasing landform providing privacy by visual screening and acoustic baffling from adjoining traffic and train noise. Zurich. p.47, para. 97.



50 Landscape survey disclosed that virtually all the trees in this diminutive urban parkland were worth retaining which suggested high rise or serpentine development in order to preserve them. The latter was ultimately chosen, but this plan shows high rise development. Crawley, Sussex. p.24, para. 52.

51 Top soil removed from building curtilage (pegs show position of building) and stacked in background. Chestnut paling to protect the trees should be noted. Illustration 53 shows the same site after development. Crawley, Sussex. p.48, para. 95 and 98.



52 Plan shows the actual serpentine development in the urban parkland in which trees and other features were so carefully preserved that ultimate landscape treatment was limited to tidying up the site, sowing grass, pruning trees and undertaking some shrub planting. One of the fine trees preserved is shown in illustration 53 seen from viewpoint 'A' on plan. Particular note should be made of the service runs (coloured red on the plans) specially routed to avoid damage to tree roots. Crawley, Sussex. p.48, para. 98.

53 View from point 'A' on plan in 52. Crawley, Sussex. p.48, para. 98.

7 Subsequent Maintenance

decided upon, should be implemented in anticipation of the spring flush of growth. If maintenance is not undertaken by direct labour, it should be made the undisputed responsibility of the main contractor directly or by sub-contract.

Contractual Provision

104 Provision for all the requirements listed above should be incorporated in the main specification and bills of quantities, with provision for the contractor to refer problems arising therefrom from time to time to the landscape architect. Many of these works will require execution by specialist landscape contractors, whose operations will inevitably overlap those of the building and engineering contractors on the site. In these circumstances it is wise to arrange for all such specialist landscape work to be sub-contracted through the main contractor in order to preserve the undisputed line of overall site responsibility.

Supervision by Landscape Architect

105 For major developments a landscape architect should be retained to hold a watching brief independently of requests on specific problems, so as to anticipate the risk of costly mistakes. The establishment of a good working relationship between the clerk of works and the landscape architect will reduce the amount of time spent by the latter on supervision.

106 The broad pattern of continuing maintenance will be apparent from the type of landscape chosen for the hospital. Instructions to those responsible for maintenance should be prepared and they should be provided with the necessary machines and equipment.

107 Where the building works comprise additions to existing hospitals, special problems arise in connection with the integration of the new with the existing landscape. Some rationalisation of the design of the old landscape in the interests of future maintenance economies will be called for.

108 Continuing research on the adaptation of existing site layouts for more economical maintenance is yielding valuable information and the King's Fund hopes to publish this in a separate report on maintenance of grounds.

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