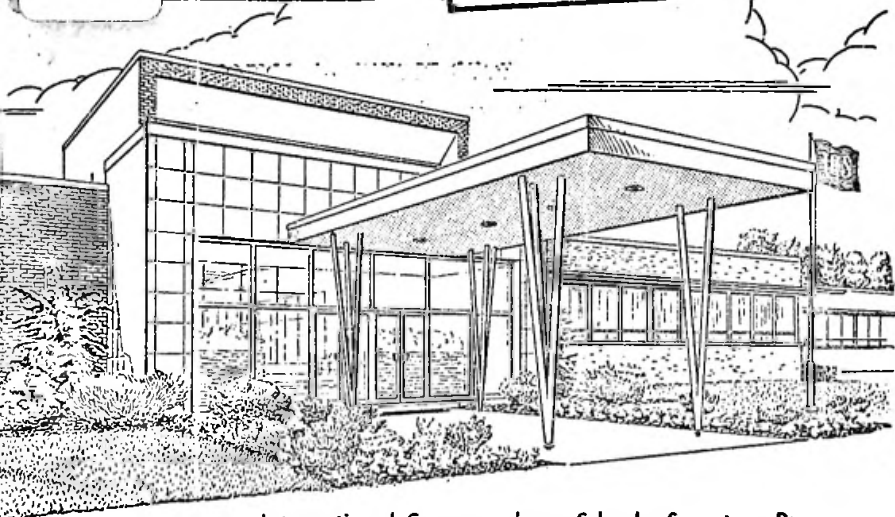


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Fundamentals of Landscape Architecture

By

KARL B. LOHMANN, B.S., M.L.A.

Fellow, American Society of Landscape Architects

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Edition 2

International Correspondence Schools, Scranton, Pennsylvania

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Serial 6417-1

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YOUR TECHNICAL EDITOR

This text, "Fundamentals of Landscape Architecture," has been technically edited by David T. Jones, Director of the School of Architecture and the Building Trades, in which the instructional service for this text is provided. In editing this text, Mr. Jones' aim has been to ensure that the material presented to the student meets the high standards of technical accuracy, ready application, completeness, and readability to which every ICS text must conform.

Mr. Jones is a graduate in architecture of the University of Pennsylvania. He is a member of the American Institute of Architects, the Pennsylvania Society of Architects, and the Construction Specifications Institute. He has had extensive experience in the field of architecture.



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What This Text Covers . . .

Here is an outline of the instruction text you are about to study. Refer to this outline while you are studying. It will give you a helpful general view of the contents of the text. You might also check off each item of the outline as you complete the corresponding section in the text. Later you can use the outline to help find those parts of the text to which you would like to refer again.

1. UNDERLYING PRINCIPLES Pages 1 to 9
A brief description of landscapes in ancient times points up the factors that must be considered in landscape design. Various landscape terms are defined here.
2. LAND AND WATER Pages 10 to 19
Proper use of land and water in landscaping calls for a knowledge of topography, soil, drainage, and surfaces. Water can be utilized as streams, ponds, lakes, dams, pools, and fountains.
3. VEGETATION Pages 20 to 43
Plants, shrubs, and trees offer a variety of sizes, textures, and colors for landscape designs. A lawn forms one of the best ground covers, but requires careful preparation and maintenance.
4. ENCLOSURES Pages 44 to 56
Landscapes are bounded by floors, walls, and ceilings, which may be either natural or man made. Walls may be used to ensure privacy, to hold back earth, or to serve seating purposes.
5. CIRCULATION Pages 57 to 59
Flow of movement in landscaping can be directed by terraces, walks, and paths. Automobile traffic must be provided for.
6. LAYOUT OF HOUSE GROUNDS Pages 60 to 72
The grounds of a house are laid out to include the living and service areas. The landscaping should define the different areas.
7. NEIGHBORHOOD LANDSCAPING Pages 73 to 79
Such initial considerations as access, and planting for windbreaks, shade, and privacy, are explained here. The cluster plan for a community is illustrated.

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Fundamentals of Landscape Architecture

Underlying Principles

Importance of Landscape Architecture

1. Landscape architecture is concerned with the arrangement of land, water, plant forms, and structures, for their best use and greater enjoyment. It deals with land-planning problems such as building sites, gardens, outdoor-living areas, playgrounds, and parks. It requires a knowledge of design and construction that overlaps in the fields of architecture, engineering, horticulture, botany, and other branches of the arts and sciences.

The field of landscape architecture is known by such other names as landscaping, landscape gardening, landscape design, landscape planning, landscape engineering, landscape contracting, and landscape nursery work.

You can realize the importance of landscape architecture by comparing buildings that have been adequately landscaped with those in which the landscaping has been neglected. Such comparison will show that a poor arrangement of the landscape can greatly decrease the value of a well-designed building. Proper landscaping, on the other hand, can provide a beautiful setting for a building. It can add to the comfort of the occupants by providing shade and windbreaks and by screening off undesirable views.

Purpose of This Text

2. The purpose of this text is to give you a working knowledge of the principles and problems underlying the practice of landscape architecture, and of its applications, primarily as they relate to domestic architecture.

A knowledge of landscape architecture, which helps people to achieve a better way of life through the fullest use of the out-of-doors, is especially important to the architect, landscape architect, draftsman, homeowner, landscape contractor, gardener, nurseryman, and realtor.

Landscaping in Ancient Times

3. To understand the principles and problems underlying the present-day practice of landscape architecture, you should be aware of some of the achievements of the past in this field. These achievements have accompanied the development of architecture through the ages.

The gardens of ancient Egypt reflected climatic, physical, and religious influences. The gardens of a high official, for instance, usually occupied a square of land and were surrounded by lofty walls. The dwelling houses within the walls were carefully hidden away and shaded by trees, and the grounds were enlivened by ponds, waterfalls, and green borders. In the middle of the gardens were vineyards and rows of trees.

The gardens of the Persians were rectangular and enclosed by high mud walls. They were divided by intersecting raised paths and low fences, and embellished with little tunnels and blue-tiled pools, pavilions, kiosks, and canopied summer houses. Outdoor features in the early Greek cities included baths, stadiums, open-air theaters, porticoes, and colonnades.

The monasteries of the Middle Ages in Europe were grouped around central courtyards that were framed by colonnades and enriched with central fountains, beds of flowers, and statues of the Christian saints.

Renaissance Gardens

4. Many villas of Renaissance Italy were distinguished for their beauty. They were built upon and were closely adapted to the Italian hillsides. The major lines of the plans of those

villas followed the slopes, with three or four terraces faced with stone and equipped with balustrades and steps. The lower level contained the flower garden proper and the principal approach, the second levels contained the house, and the upper levels included the woodland. Water was used to achieve spectacular effects.

The Spanish gardens of the Renaissance were also notable. They occupied lofty sites and had arcaded courts. They made use of channels, fountains, and jets of water, rows of potted plants and tile decorations. Palms and orange trees framed more distant vistas.

Some of the Renaissance gardens of France achieved great distinction. The grounds at the Palace of Versailles were among the most distinguished and spectacular. They were developed in the so-called grand manner, with no stinting of money, labor, or talent. Among their most outstanding features were an intricate pattern of cross-connecting avenues, an amazing display of statues, cascades, and fountains, and a canal a mile or more in length.

The basic characteristic of the Renaissance garden was its formality; it was balanced and orderly. Its planes, patterns, and shapes were those of geometry, not of nature.

Chinese and Japanese Influences

5. From the Orient, the landscape artist accepted two important concepts. The first is that nature itself is beautiful and good. Chinese painting reflects this attitude toward nature. To the Chinese painter the untouched landscape is the noblest subject matter.

The second concept is that if native forms are the most beautiful, they are to be copied literally. Thus man-made forms are abandoned in favor of naturalistic ones.

Chinese gardens represented or suggested actual scenes, hills, and streams. Paths ran through the gardens in pebbled

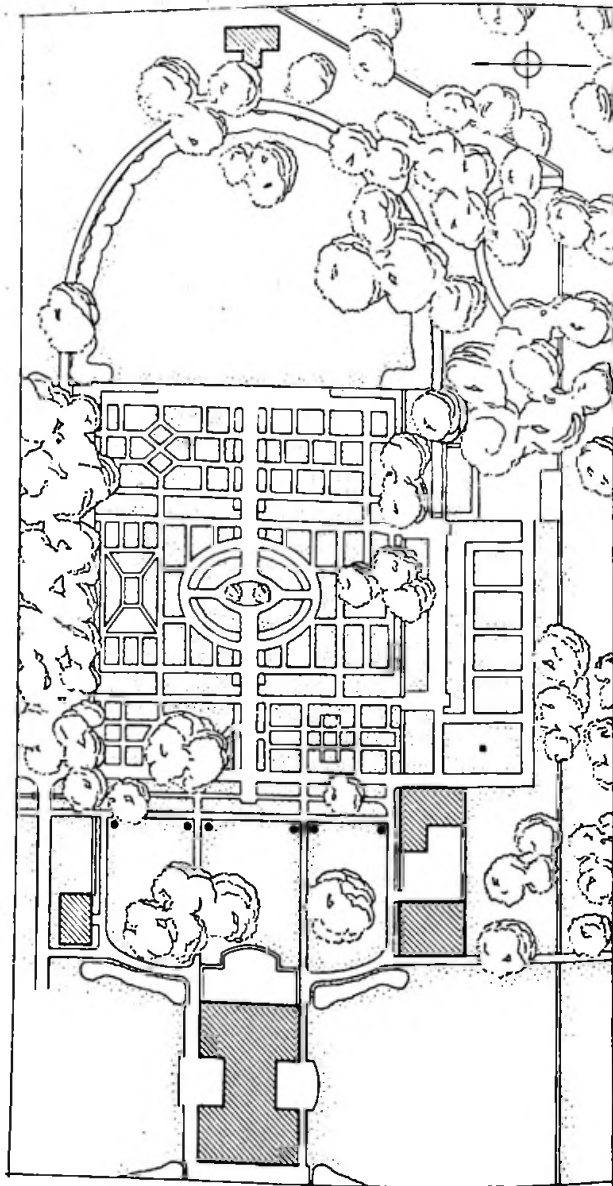


FIG. 1. TYPICAL FORMAL LANDSCAPE

patterns; doors were often circular, or octagonal. Weird, contorted, water-worn rocks and petrified plant forms were used as sculpture, along with guardian dogs and other features of stone. Water flowed quietly, or lay calmly in lakes or ponds.

The Japanese derived their landscape inspiration from the Chinese and included in their layouts meaningful stones and stone lanterns, trees, pagodas, arched bridges, and characteristic fences and gates.

While much of the spirit of the informal and naturalistic garden came from the Far East, it was developed markedly in eighteenth-century England. In the United States the informal garden did not become popular until after 1800.

Landscape Design in the United States

6. Landscape design in the United States has certain qualities in common with all the great landscape traditions of the world: Chinese, Japanese, Persian, English, Spanish, French, and Italian. Originally, these traditions were localized in certain sections of the country: the French influence was evident in New Orleans; the English, in New England; the Spanish, in California. Today, with the development of rapid methods of transportation and communication, sectional differences in the United States have almost disappeared, so that among contemporary gardens, the typical New England or California garden, for instance, is very rare.

New Expression in Landscapes

7. As you have seen, landscape design has developed along the lines of two principal traditions, the formal and the informal. The formal tradition, as shown in Fig. 1, has behind it elements of order, proportion, rational planning, and beauty. It revealed an intimate formality in the earlier English gardens. Too often, however, the formal tradition led to a slavish regard for preconceived patterns and designs, and to undue drafting-board influence.

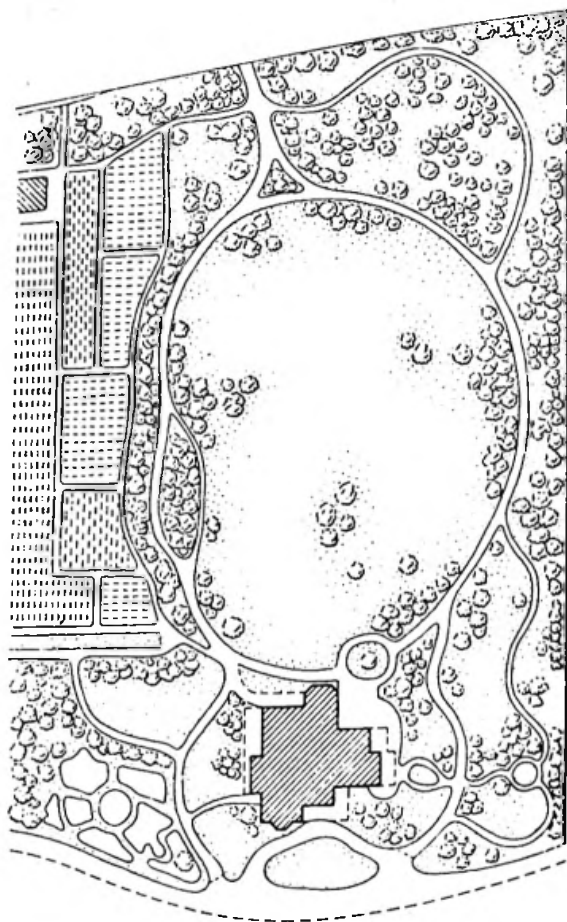


FIG. 2. TYPICAL INFORMAL LANDSCAPE

The informal type of landscape design was irregular, informal, simple. An informal landscape design is shown in Fig. 2. The informal design reached its lowest status when it included a careless scattering of plants and meaningless irregularity.

Today we have a new conception of landscape design, in

which not just views but also the use of space, space relations, and new materials, as well as freedom of form, are important considerations. The design may be formal or informal, or a combination of the two.

Perhaps the biggest change that has occurred in landscape architecture is in the concept of the relation between house and garden. Until recent years the garden was designed to walk in or through. Today the garden is designed to live in, and the use of glass walls has made the garden a part of the living area of the house.

The use of glass, more than anything else, is responsible for the great interest today in Japanese gardens, since the Japanese with their sliding walls have for centuries done away with the ironclad division between the indoors and the outdoors.

In the United States the technological revolution which accompanied the early twentieth century abolished pumps, outhouses, and chicken runs, and eliminated the distinction between front and back yards, thus making it possible to place the contemporary house in the midst of a garden.

Utility and Beauty

8. The business of landscape architecture is to achieve utility and beauty in the out-of-doors. This means that the layout, including construction features, must be practical and functional, and must be artistically composed. To be functional, the layout must operate smoothly and conveniently and fit the topography and surroundings as well as climatic conditions.

Beauty in a landscape usually requires the consideration of certain factors of architectural design.

Design Factors

9. Landscape architecture, like building architecture, is concerned not only with construction but also with such

factors of design as scale, unity, proportion, contrast, color, and emphasis.

Scale. The term "scale" as applied to a building is used to describe the sizes of the parts of a building, such as windows and doors, in relation to their purposes and uses. Since buildings are built only for use by people, the scale should be selected with this fact in mind. The scale for a landscape design should be determined in the same manner. Whether the scale of a design is large or small, is, therefore, determined by the relation which certain of its parts bear to the requirements of man.

Landscapes may vary in scale according to their purposes. In the garden for a residence, for instance, the parts are made small in scale. But in the landscaping for a government building, the parts are made larger and more impressive. In other words, the scale may be larger in public and important landscapes than in domestic landscapes. In any design, however, the scale should be uniform throughout.

Unity. Any landscape design must have unity; that is, the different parts of the design must be united and should express their purpose in a single harmonious composition. Where the landscaping supplements a building, landscaping and building must combine to produce a harmonious whole.

Proportion. Proportion is the relation of the shapes of the various features and parts of a landscape design to each other. There must be a harmonious relation between the various details and the masses of a design, as well as between the masses themselves.

Proportions cannot be determined by any magic general formula. Proportions are conditioned by function and by construction. Proportion is closely allied to scale. A landscape design, for instance, whose proportions are pleasing at intimate scale might be disastrous if the same proportions were duplicated at monumental scale.

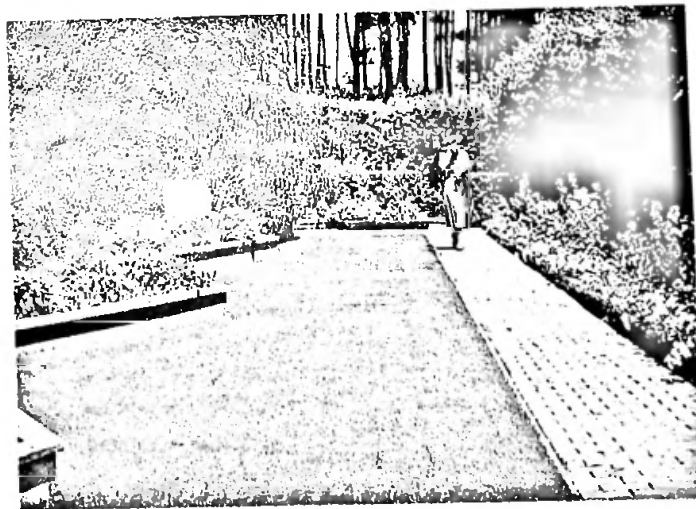


FIG. 3. CONTRASTS IN COLOR AND TEXTURE

Color. The color of the various parts of a landscape design must be harmonious, regardless of the materials used. Where the landscaping adjoins a building, the color of the landscaping must be in harmony with the color of the building.

Contrast. Contrast in landscape design means variety in design. It should not be so apparent as to produce unharmonious results or to affect the unity of the design. Contrast may occur in form, size, color, or texture. It adds variety and interest to a design. A common contrast is dark against light, as, for example, dark foliage against a light building. Contrasts in color and texture are shown in Fig. 3 in the different values provided by the walk, the lawn, the flowers, and the shrubs.

Emphasis. The landscape architect tries to give satisfying form to an area and to the three-dimensional parts that compose it, while at the same time fulfilling various practical needs. He must consider the different ways of covering floor areas, the different types of enclosures and kinds of ceilings. All aspects must be thought of in relation to one another. After these matters have been weighed, the landscape architect may consider the details.

One of his early decisions will be the relative emphasis he wishes to give to the various parts of his composition, and what part he wishes to make the center of interest.

Summary

10. Landscape architecture involves much more than planting a few shrubs around a building after the building has been completed. The primary objective of landscape architecture is to achieve beauty and utility in the fullest use of the out-of-doors. It is concerned with the arrangement of natural and man-made forms, and with land-planning problems of every kind. It requires a knowledge not only of design but also of construction.

The landscaping of a building should be planned when the building is being planned. The building should look as if

it belongs to the site, and the site should blend with the surroundings. Proper landscaping can provide a beautiful setting for a well-designed building. By providing shade and wind-breaks, it can make a building more comfortable.

The history of landscape architecture covers centuries and has developed along the lines of two principal traditions, the formal and the informal. For an appreciation of landscape architecture, you should be aware of past achievements as well as of contemporary movements in this field.

In recent years the biggest change that has occurred in landscape architecture is in the concept of house and garden. Formerly, the garden was designed to walk in or through. Today the garden is designed as a part of the living area of the house.

Land and Water

Nature of Landscape

11. The landscape consists of such familiar elements as ground, water, sky, and structures. The landscape architect deals with humanized landscapes, such as private gardens, the public grounds adjoining buildings, and parks and such areas, which have been planned for use by people.

Problems of the Ground

12. All landscapes are subject to natural or human modification. The landscape architect is concerned primarily with the problems that accompany human modification. The landscape architect has opportunities either to utilize existing earth forms or to model new ones to suit the needs of man. Consideration must be given to the soil, to drainage, grading of terraces, banks, and slopes, balancing and measuring, excavation and filling operations.

Actual examination of the piece of ground to be landscaped is of first importance. Such an examination is facilitated by use of a topographic, or contour, map.

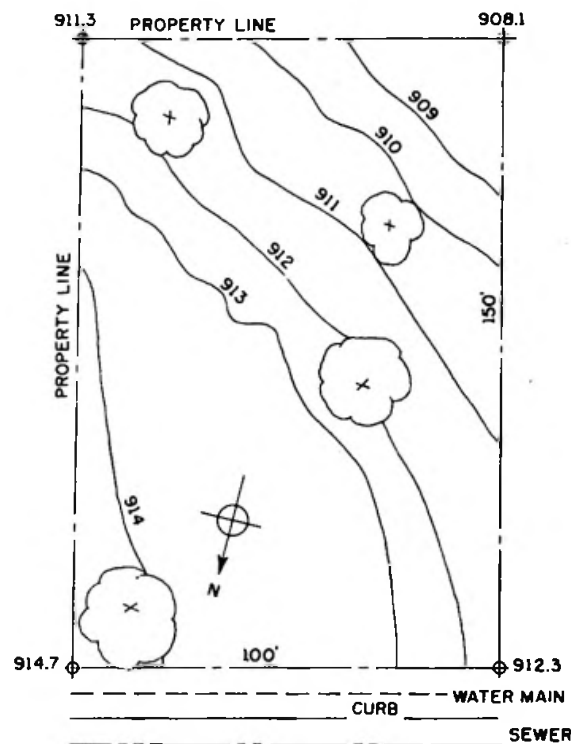


FIG. 4. A TOPOGRAPHIC MAP

Topography

13. A contour map, or topographic map, is shown in Fig. 4. All the points on each contour line are at the same level, since they are a fixed distance above a definite point, or datum. The usual datum is sea level. When the slope is gentle, the contour lines are far apart; when the slope is steep, they are close together. When the slope is uniform, the contour lines are equidistant from each other.

The grading of land may involve leveling, building up, cutting away, or a gradual passing from one plane of earth to

another. The object of grading is to beautify and at the same time to achieve a better use of the land.

Kinds of Soil

14. In planning a landscape, you must take nature into account. To appreciate nature and its elements and to use them effectively in the landscape, you must understand and appreciate the basic natural forms. You must realize, for example, how vegetation is related to certain soils and how it appears as particular families of plants.

There are many types of soil, which may be narrowed down roughly to clay, sand, and loam types. Clay soils have a greater capacity for holding water than other types, but are rather difficult to handle. Their physical structure is improved by the addition of sand, humus, weeds, manures, and grass clippings. Sandy soils are easy to work, but they leach easily. They are improved for growing purposes by the addition of organic material.

Humus consists of organic material such as peat, leaf mold, and compost, and plowed-under cover crops (soy beans, alfalfa, and clover). A mixture of sand, clay, and humus produces a vegetation-sustaining loam. The addition of humus improves the structure and character of the soil as well as its water-absorbing capacity and its texture.

Drainage of the Land

15. The drainage of surface water from land often presents a problem. Good drainage is needed for the protection of the given site; for the comfort of those who are to use it; and, not least, for the good of the plants to be grown upon it. Few plants succeed in cold, damp, undrained soil. Most plants require warmth and air at their roots.

Any water that falls upon the area must be kept moving, though at not too fast a pace. The land needs to be shaped so as to carry surface water away, and to prevent its collecting

or standing in pockets. The water must be spread out or else controlled mechanically or structurally. Some soils, however, are so open and dry as to pose no drainage problem.

The drainage of an area is facilitated by proper surfacing, but it can be assisted by underground drain tiles or pipes laid in lines from 20' (feet) to 40' apart and from 3' to 4' deep, depending upon the kind of soil and climate. For heavy soils, the drains must be closer together. The bottoms of the trenches for the tile must have sufficient fall throughout their lengths to provide ready flow to the outlet.

In general, the land near a house should slope away from the house at a rate of approximately one inch per foot. As far as possible, the existing drainage relations of an area, such as the points of inflow and outflow, should be preserved.

Terraces and Banks

16. Terraces and banks may serve a variety of purposes, and may assume a variety of shapes and sizes. Terraces should be almost level, with a pitch of not less than 1" (inch) to each 10'. Grass banks should pitch not more than 1' vertically for every 4' horizontally. Such banks, especially if they are of a light, sandy variety, may need to be retained with roots of vegetation. The contours of the slopes should have a smooth-curving flow.

Levels and Slopes

17. The level, or nearly level, plane is most suitable for areas where people gather together, such as a terrace, or for areas and courts where physical exercise and games are pursued.

Any grade below 3 or 4 per cent approaches a level plane. This implies less than 3' or 4' in a vertical plane for every 100' of horizontal distance. Slopes of 4 to 10 per cent make walking and running difficult. Slopes that are above 10 per cent are steep and usually require steps for their utilization and treatment. A hill site for a home therefore offers complex problems,

but these are often compensated for by the sense of space that comes from the extended views.

The building up or cutting away of land to achieve a desired result usually involves disturbing the topsoil. This always happens where walks, drives, and foundation walls are being constructed. Where cutting is necessary, the topsoil should be stripped and placed to one side for future replacement as needed.

Convex and Concave Surfaces

18. Besides ground levels and slopes, there are the variations in ground that come into play with convex and concave surfaces. The treatment of such surfaces passing from one plane to another with modulated gradations that shade into each other provides the landscape architect with one of his most interesting problems in design. These gradations are important on embankments, where, instead of abruptly joining planes, there may be a blending of natural forms.

The necessary shaping of the surface can often be determined by eye with the use of a line and stakes. But, on other jobs, the aid of leveling instruments may be required in staking out the plot.

Use of Water

19. Water is one of the most satisfying elements of design the landscape architect has to work with. It varies endlessly in character and emotional appeal. It can be used to provide ever-changing vistas; it contrasts against and reflects foliage and sky. It offers opportunities for the preservation or creation of streams, lakes, ponds, fountains, small dams, and pools. It offers a medium for growing plants.

Lakes

20. Either natural or man-made lakes can serve as landscape features. Man-made lakes depend upon the available

water, the adaptability of the terrain, the possible holding qualities of the lake bed, the depths sufficient to restrain objectionable vegetative growth in the water, and the construction of a water-holding dam. Possible loss of lake capacity through silting should not be overlooked, since it may become a serious threat. Adequate controls of erosion must be established for the feeding streams.

Dams

21. Dams up to 30' in height may be built of earth, rock fill, arched masonry, or buttress and timber forms. A dam constructed of earth is sensitive to the erosive action of water and is subject to speedy deterioration. This type of dam can be advantageously modified by the addition of rock fill. The cost of maintaining timber dams exceeds that of maintaining other more durable ones.

A dam should be fitted into the lines of its lake. This can be done by making it irregular in plan and section, and, upon occasion, by laying the lower courses in natural ledges of rock.

Shore Lines and Islands

22. In man-made lakes the original configuration of the ground itself may produce satisfactory shore lines. In any event, the shore lines should follow long, sweeping curves, with alternating bays and projections. In cross section they may either lead away from the water gently, or break suddenly into cliffs or rocky crags. Large stretches of water require sizable trees grouped boldly on or near the banks. Shore lines can be planted with water-loving plants backed by masses of shrubby growth.

To protect against erosion, and to maintain slopes at steep angles, stones may be thrown together loosely over the sloping surfaces. Concrete walls or stone masonry may be utilized in some instances where flood and ice conditions are severe.



FIG. 5. POOL, ROCK GARDEN, AND STONE STEPS



FIG. 6. POOL WITH NATURAL-APPEARING OUTLINE

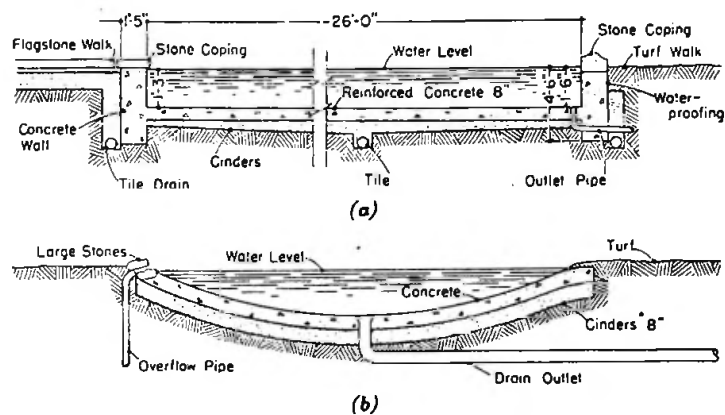
(a) Reinforced concrete pool
(b) Informal pool

FIG. 7. CONSTRUCTION OF POOLS

Planting of native and deep-rooted trees and shrubs—such as black locust, honey locust, willow, sumac, matrimony vine, and aspen—may be used to give special protection to slopes of lakes.

If islands are to be created, they should be placed so as to simulate the results of natural forces. They should appear to be emerging hilltops or extensions of promontories that jut out over the water, or to match irregularities that occur on the adjacent shore.

Pools

23. Garden pools should be located and shaped to suit the style, size, and shape of the garden. They may be geometric or natural in shape. Two natural-looking man-made pools are shown in Figs. 5 and 6.

The depth of a pool will depend on the purpose for which it is intended. As a general rule, the pool should be shallow where there are children. For growing lilies, a depth of 18" to 24" is required. Moving water is desirable for fish.



FIG. 8. WELL PROVIDING A FOCAL POINT AGAINST GARDEN WALL

Pools are commonly constructed of concrete, brick, or tile. In Fig. 7 are shown sections for two pools whose basins are to be constructed of concrete. A pool should always be constructed so that it can be drained and cleaned when desired.

Fountains

24. Many garden pools include a fountain of some kind. Fountains may be free standing and serve as central ornaments in themselves, or they may be part of a terminal vista, say at a wall or on a terrace. A well used against a garden wall in this manner is shown in Fig. 8.

Fountains may be quite simple, with but a single jet, or with additional jets operating from different points so that their streams interlace. Or they may be complex, including

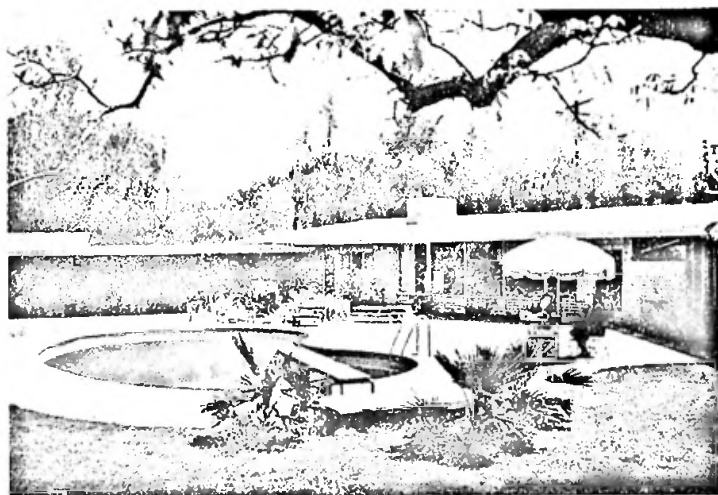


FIG. 9. FREE-FORM SWIMMING POOL

elaborate sculptural creations. Fountains should always be in proportion to their basins.

Swimming Pools

25. Private swimming pools have become quite popular. Although swimming specifications ordinarily call for rectangular proportions and for specific relations of deep to shallow portions, private pools need not adhere too closely to these requirements. Whatever the type of pool, it should respect the use, form, and space relations of the garden. An irregularly shaped pool is shown in Fig. 9.

Summary

26. The landscape consists of such familiar elements as ground, water, sky, and structures. Landscapes are subject to change brought about by man and by nature. The landscape architect is interested primarily in landscapes altered by man. The process of grading a landscape, a man-made

change, involves the consideration of plane, concave, and convex surfaces.

Water is one of the most satisfying elements the landscape architect has to deal with. It provides a contrasting and reflecting surface for sky and foliage, and may be used in either formal or informal landscape designs. It becomes an element of landscape design in the form of lakes, pools, dams, and fountains. It offers a medium for growing plants.

Vegetation

General Characteristics and Uses

27. Among the most important materials used by the landscaper is an infinite variety of plants, including shrubs, vines, trees, grasses, perennials, and annuals. The proper use of these plants can contribute greatly to the usefulness and beauty of a landscape. Depending upon the effect desired, the landscaper may group them in masses, arrange them in rows, or set them out individually in isolated but strategic positions.

Plants have varying characteristics of flowering and fruiting; varying degrees of suitability to soil, temperature, light, and moisture; and varying resistance to pests and disease.

Plants may be used for a landscape cover or for enclosure. They may be used to provide shelter and fragrance; to yield fruits, herbs, and vegetables; to enrich the landscape. The use and choice of plants is affected by the demands of design, the physical needs of the plants, and human preferences.

With their varying habits, forms, textures, and colors, plants may be used to create interest and beauty as well as to serve practical needs.

The design and maintenance of a landscape are closely related. The manner in which plants are used often depends upon the amount of care that can be given to them. Where care must be limited, it may be necessary at the outset to substitute paving for grass, to depend largely upon structural

elements, or upon plants and flowers that are easy to manage, and to avoid plantings that require laborious trimming.

Plant Forms

28. Plant forms should be chosen to fit the spaces for which they are intended. Nowhere will you find this rule more generally violated than at the foundations of homes, where an overabundance of planting or meaningless vertical forms are frequently seen. The selection of plant forms is subject to the guiding principles of good design, such as scale, balance, rhythm, unity, harmony, and proportion.

A three-foot hemlock may look just right under the window when it is planted, but it is a forest tree, and in five years will cover the window entirely.

Textures

29. Plants vary in texture according to the size and shape of their leaves. Leaf sizes range from the smallest leaves of heather and juniper to the sizable leaves of magnolias, palms, and elephant ears. Leaves may be linear, like pine needles, or lance, oval, or heart shaped. Individual leaves may vary too in their edges and points, their degree of thickness or stiffness, their veining, and their smoothness or roughness. The foliage arrangement—thin, dense, even, bunched, erect, stiff, pliable, tremulous—may affect the texture. Trees may lose their leaves in winter and show their branches and trunks.

All these factors account for the different textures in vegetation, ranging from soft, delicate textures to the coarse textures of large leaves. Textures in turn may produce emotional reactions in the viewer, such as cheerfulness at the sight of glossy, gay leaves sparkling in the sun. An impression of majesty is conveyed by thick textures, one of quiet restfulness by uniform textures, where leaves are small, regular, and thick. Sparse, scattered, and broken textures may produce restless effects.

























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50-75	2-3	40-60	30-40		AILANTHUS <i>Ailanthus glandulosa</i>	20-40	1-2	20-40	25	80-100	4-8	70-80	60-70
70-80	2-3	35-50	40-50		APPLE <i>Malus Pumila</i>	75-100	3-4	50-60	50-60	60-80	2-3	40-50	40-50
50-75	1 1/2-4	40-50	30-40		ASH, WHITE <i>Fraxinus Americana</i>	60-70	2-3	40-50	40-50	40-100	2-3	40-50	40-50
50-75	3-4	30-50	30-40		BEECH, AMERICAN <i>Fagus Americana</i>	40-70	2-4	30-40	30-40	60-80	2-3	40-50	40-50
50-75	1-3	30-50	30-40		BEECH, EUROPEAN <i>Fagus Stryrata</i>	60-80	2-3	20-30	30-40	60-80	2-3	40-50	40-50
					BIRCH, WHITE (EUROPEAN) <i>Betula Pubescens</i>								
													
													
													
													
													
													
													
													
													
													
													
													
													
													
													
													
													
													

FIG. 10. DECIDUOUS TREES
















H	D	S	OC.	H	D	S	OC.	H	D	S	OC.		
80-100	3-4	30-60	50-60		LINDEN <i>Tilia (Species)</i>	70-90	2-4	50-60	40-50	80-100	3-6	40-100	400
60-80	2-3	50-60	50-60		MAGNOLIA (CUCUMBER TREE) <i>Magnolia Acuminata</i>	80-120	3-5	40-50	40-50	70-80	3-4	50-60	50-60
75-100	3-5	40-50	30-40		SWEET GUM <i>Liquidambar Straciflua</i>	75-100	3-5	50-75	50-60	75-100	3-5	50-75	50-60
					POPLAR, CAROLINA <i>Populus Canadensis Engelm</i>	100-120	3-4	50-60	50-60	30-40	1-2	30-40	30-40
					POPLAR, LOMBARDY <i>Populus Nigra</i>								
					WEeping WILLOW <i>Salix Babylonica</i>								
													
													
													
													
													
													
													
													
													
													

FIG. 10.—Continued

Small textures may be used to give the illusion of distance when contrasted with larger textures close by.

Colors

30. Color plays a large part in the selection of plants for a landscape. It is present most strikingly in flowers and fruits, and, to a lesser degree, in foliage and plant structure. Foliage ranges from gray to green to purple and red. In certain sections of this country, foliage bursts into riots of color in the autumn. Different types and colors of plants are available in different climatic zones, but in any zone plants can be selected to obtain agreeable color patterns. The bark of trees varies in color from the whites (of birch) through the grays, browns, and reds to near black.

In general, color should be used in a disciplined manner as part of the overall design. Strong accents may be used to strengthen the visual effect. Gaudy showings in fancifully conceived shapes without organic relation to anything are to be shunned.

In selecting plants, you should be familiar with the ranges of color available, and the possibilities for harmony and judicious contrast.

Trees

31. Trees are found in a variety of sizes, forms, colors, and textures. They may be symmetrical like a sugar maple or irregular like a mossy-cup oak. They may be square (when clipped), round, elliptical, pyramidal, columnar, vase shaped, low branched, or high branched. Trees may have colorful leaves, flowers, fruit, or bark. They may vary in texture, as do a plane tree and a Kentucky coffee tree, a catalpa and a honey locust, or a tulip tree and a willow. These differences in texture make it possible for the landscape architect to achieve various harmonies and variations. The sizes and formation of various trees are shown in Figs. 10, 11, and 12.

Ht. Height D: Trunk Dia.	S: Spread Occ. Spacing	H D S			H D S			H D S			H D S		
		H	D	S	H	D	S	H	D	S	H	D	S
		100'	150'	5'	100'	150'	3'	100'	150'	3'	100'	150'	3'
Mature Tree		CYPRESS, SAWARA <i>Chamaecyparis</i>			MAGNOLIA, ISOTHERN			PINE, RED (NORWAY) <i>Pinus Resinosa</i>			PINE, RED (NORWAY) <i>Pinus Resinosa</i>		
Young Tree		BALD CYPRESS <i>Taxodium Distichum</i>			MAGNOLIA, ISOTHERN			PINE, RED (NORWAY) <i>Pinus Resinosa</i>			PINE, RED (NORWAY) <i>Pinus Resinosa</i>		
		100'	100'	10'	100'	100'	12'	80'	100'	5'	80'	100'	5'
Mature Tree		FIR, WHITE <i>Abies Concolor</i>			LIVE OAK <i>Quercus Virginiana</i>			PINE, WHITE <i>Pinus Strobus</i>			PINE, WHITE <i>Pinus Strobus</i>		
Young Tree		FIR, WHITE <i>Abies Concolor</i>			LIVE OAK <i>Quercus Virginiana</i>			PINE, WHITE <i>Pinus Strobus</i>			PINE, WHITE <i>Pinus Strobus</i>		
		60'	100'	2'	60'	100'	4'	60'	100'	2'	60'	100'	2'
		HEMLOCK, CANADA <i>Tsuga Canadensis</i>			PINE, AUSTRIAN <i>Pinus Nigra</i>			SPRUCE, COLORADO <i>Picea Pungens</i>			SPRUCE, COLORADO <i>Picea Pungens</i>		
		50'	60'	1'	50'	60'	1'	50'	60'	1'	50'	60'	1'
		LARCH, EUROPEAN <i>Larix Decidua</i>			PINE, MONTEREY <i>Pinus Radiata</i>			SPRUCE, NORWAY <i>Picea Abies</i>			SPRUCE, NORWAY <i>Picea Abies</i>		
		50'	60'	1'	50'	60'	1'	50'	60'	1'	50'	60'	1'

FIG. 11. EVERGREEN TREES



SMALL DECIDUOUS TREES				SMALL EVERGREEN TREES			
H	D	S	O.C.	H	D	S	O.C.
H: Height D: Trunk Dia				S: Spread O.C.: Spacing			
20' 35'	Clumps, 15' 20' Under	1'	10' 20'		40' 50'	1' 2'	25' 30' 40'
20' 25'	9" 1'-0"	20' 25'	20' 30'		20' 30'	1' 2'	25' 30'
GREY BIRCH <i>Betula Populifolia</i>				HOLLY, AMERICAN <i>Ilex Opaca</i>			
MAGNOLIA SAUCER <i>Magnolia Soulangiana</i>				ARBOR VITAE <i>Thuja Occidentalis</i>			
CRABAPPLE FLOWERING <i>Malus (Species)</i>				BOX TREE <i>Buxus Sempervirens</i>			
DOGWOOD, FLOWERING <i>Cornus Flacida</i>				JUNIPER (Red Cedar) <i>Juniperus Virginiana</i>			
HAWTHORNE <i>Crataegus (Species)</i>							

FIG. 12. SMALL DECIDUOUS AND EVERGREEN TREES

A few trees are listed here according to certain characteristics.

Small trees noted for bloom

Acacia, cherry, carnelian cherry, crabs, flowering dogwood, hawthorn, magnolias, redbud, and shad-blow

Small trees noted for autumn color

Flowering dogwood, Amur maple, Tatarian maple, and sour gum

Large trees distinguished by autumn color

Sugar maple, oaks, sassafras, and tupelo

Small trees conspicuous for fruit

Mountain ash, cockspur thorn, and wahoo

Trees desirable for street planting

Sugar maple, Norway maple, oaks, tulip tree, sycamore, hackberry, American linden, ashes, sweet gum, Chinese elm, and locust (These trees are long lived, strong, neat, not brittle, free of insect damage, with good foliage.)






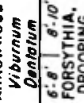

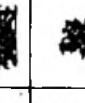

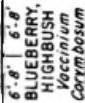




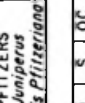
Trees undesirable for street planting

American elm (currently threatened by Dutch elm disease and phloem necrosis), silver maple (brittle and dropping branches), box elder, tree of heaven (messy), catalpas (untidy flowering), poplars, and willows

Columnar-shaped trees

Deciduous trees: Pyramidal European linden, columnar Norway maple, columnar English oak, Bolle and Lombardy poplars

Conifers: Arbor vitae, Cryptomeria, red cedar, Hick's yew

DECIDUOUS SHRUBS				EVERGREEN SHRUBS			
Ht-Height D-Tree Dia		S-Spread OC-Spacing		H S OC		H S OC	
	8'-10'	6'-8'	15'-25'		6'-30'	6'-15'	5'-15'
LAGERSTRÆMIA <i>Indica</i>				RHODODENDRON <i>Rhododendron</i> (Species)			
	8'-10'	6'-8'	15'-25'		7'-15'	7'-12'	6'-10'
MOCK ORANGE <i>Philadelphus</i> (Species)				HOLLY JAPANESE <i>Ilex</i> <i>Crenata</i>			
	5'-6'	4'-5'	10'-12'		10'-12'	10'-15'	10'-15'
PRIVET, REGELS <i>Ligustrum</i> <i>obtusifolium</i> <i>Regeianum</i>				BOX DWARF <i>Buxus</i> <i>Suffruticosa</i>			
	5'-6'	5'-6'	10'-12'		12'-15'	12'-15'	15'-15'
SPIREA VAN HOUTTE <i>Van Houttei</i>				FORSYTHIA, DROOPING <i>Goxythia</i> <i>Suspensa</i>			
	2'-3'	6'-9'	10'-12'		6'-8'	6'-10'	6'-8'
COTONEASTER <i>Coloneaster</i> <i>Horizontalis</i>				JAPANESE <i>Taxus</i> <i>Cuspidata</i>			
					6'-10'	6'-10'	6'-10'
				PITTOSPORIUM TOBIRA			
					6'-8'	8'-12'	10'-15'
				OLEANDER <i>Nerium Oleander</i>			
					6'-8'	8'-12'	10'-15'
				PINE MUGHO <i>Pinus Mugo</i> <i>Mughus</i>			
					4'-10'	4'-8'	4'-8'
				MOUNTAIN LAUREL <i>Kalmia Latifolia</i>			
					6'-8'	6'-8'	5'-10'
				CHINESE PISTACHE <i>Pithecellobium</i>			


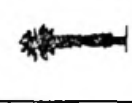

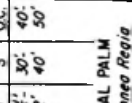
PALMS			
Ht-Height D-Tree Dia		S-Spread OC-Spacing	
	80'-100'	3'-5'	50'-60'
DATE PALM <i>Phoenix Canariensis</i>			
	60'-90'	3'-4'	20'-35'-40'
WASHINGTON PALM <i>Washingtonia Robusta</i>			
	40'-100'	12'-18'	40'-50'
COCONUT PALM <i>Cocos Nucifera</i>			
	4'-5'	4'-6'	4'-6'
BARBERRY <i>Berberis</i> <i>Thunbergii</i>			

FIG. 13. DECIDUOUS AND EVERGREEN SHRUBS AND PALMS

Weeping trees

Horticultural varieties of numerous species: Maple, birch, beech, poplar, oak, willow, and elm

Trees for Windbreaks and Solid Screens

Poplar, willow, spruce, hemlock, American beech, white pine, and hornbeam

Evergreen trees

Fir, cypress, Cryptomeria, holly, juniper, spruce, pine, hemlock, thuja (arbor vitae), and Sciadopitys (Evergreen trees retain their green mantle throughout the year and have many valued uses in landscapes. Some are pyramidal (firs), loosely pyramidal (umbrella pine and Japanese cypress), strong and beautiful (pines), graceful and dignified (hemlock). They are chiefly fine and dense, and vary greatly in color. Their character is distinct, positive, assertive. They complement and intensify the warm colors of other plants; they furnish dark shadows and heavy contrasts.)

Shrubs

32. Shrubs offer a wide range of characteristics. They, too, are both deciduous and evergreen and grow to various forms and heights. Some of the shrubs are shown in Fig. 13. A few shrubs are classified here according to certain characteristics.

Low-growing shrubs

Deutzia, Kerria, yellowroot, Thunberg's spiraea (or spiraea), goldflower, coralberry, and snowberry

Medium-growing shrubs

Withe rod, Regel's privet, aralia, flowering currant, Japanese snowball, Van Houtte's spiraea, Rhodotypos, dogwood, forsythia, and Japanese bush cranberry

Tall-growing shrubs

Tatarian honeysuckle, Japanese bush honeysuckle, mock orange, weigela, sheepberry, hybrid golden bell, lilac, and wayfaring tree

Smaller evergreens

Prostrate juniper, mugho pine, dwarfish Japanese yew

Broadleaf evergreens

Azalea, hybrid rhododendron, Pieris, Japanese holly, mountain laurel, abelia, mahonia, and leucothoe (These are available in dwarf and tall varieties, in diverse form and foliage.)

Shrubs for edging of walks and garden borders

Hardy evergreen azalea, dwarf box, small-leaved holly, barberry, meadow rose, and Tom Thumb arbor vitae

Shrubs for hedging

Low: Barberry, box, yew, Cotoneaster, dwarf cranberry, Spiraea Anthony Waterer, snow garland, and thyme
Tall: Acanthopanax, arrowwood, winged euonymous, and Regel's and Amur privet

Shade-loving shrubs

Acanthopanax, coralberry, ninebark, and privet

Shrubs with showy fruit

Japanese barberry (red), yellow honeysuckle, bittersweet and Cotoneaster (orange), fringe tree (blue), and buckthorn (black)

Shrubs according to soil preference or tolerance

Clay: Cornus species, Crataegus, forsythia, Kerria, spiraea, and Viburnum opulus
Sandy soil: Cotinus, Elaeagnus, Ligustrum, Lonicera, Rhus, spiraea, symphoricarpos, viburnum, and yucca

Calcareous (limestone) soil: Alnus, Berberis, Betula, Ceanothus, cercis, Cornus, Corylus, Crataegus, Kerria, and rhamnus
Peat soil: Arbutus, andromeda, kalmia, leucothoe, rhododendron, and vaccinium

Seasons of bloom among shrubs

April: Daphne, golden bell, Juneberry, and Japanese quince
May: Barberry, white kerria, lilac, and silverbell
June: Fragrant amorphia, Kerria, japonica, Deutzia gracilis, and oleaster
July: Button bush, pepper bush, St.-John's-wort, and Spiraea Douglasii
August: Sweet alder, Hydrangea paniculata grandiflora, and blue spiraea
September: Witch hazel, blue spiraea, and Spiraea conspicua

Annuals

33. Annuals are flowers that grow from seed, blossom, and die down in one season. They are obtainable in every color, can be used in a variety of ways, and can be raised at small cost. They may be mixed effectively with perennials.

A few of them are listed here for convenient reference:

Some hardy annuals

Larkspur, calliopsis, poppies, sweet alyssum, nigella, cornflower, pansies, and zinnias

Drought-resisting annuals

White: Dahlias, larkspur, baby's-breath, candytuft, petunias, sweet alyssum, and verbena
Yellow: Sunflower, zinnias, calliopsis, marigold, and portulaca
Orange: Heliopsis, African marigold, and California poppy
Red: Cockscomb, Helichrysum bracteatum, poppy, and rose moss
Lavender: China aster, Drummond phlox, and hemiptelea

Blue: Cornflower, larkspur, lupine, ageratum, verberna, and forget-me-not

Annuals according to height

Less than 1': Sweet alyssum, ice plant, lobelia, pansy, and portulaca

1'-2': Baby's-breath, marigold, mignonette, and petunias

2'-3': Amaranthus, Bertolonia, cotton, poppy, and scabiosa

Over 3': Castor bean, cosmos, giant hemp, and Nicotiana

Perennials

34. Perennials are flowers that live on for three or more seasons, while the so-called biennials live but for two years — they grow from seed one year, and flower and die the next. There are some 2000 species and variations of perennials, and if the iris and the dahlia are included as well, the number amounts to some 5000.

Perennials are easy to manage and need little care. They grow under trees, among shrubs, in rockeries, along ponds, on banks, in borders, and in shade or sun.

Most effective results may be obtained by planting perennials in masses of lights and darks, in a harmony of hues and tones, rather than by introducing many kinds with spotty results.

A few of the perennials are listed here in selected groupings:

Perennials for massing

Delphinium, Pyrethrum, columbine, Shasta daisy, violet, sweet lavender, coreopsis, sweet william, foxglove, and Canterbury bell

Perennials according to height

Less than 1': Candytuft, English daisy, forget-me-not; moss pink, rock cress, and shooting star

1'-2': Achillea, ptarmica, fragrant balm, columbine, Funkia subcordata, Lychnis viscaria, and Iceland poppy

2'-3': Bleeding heart, Canterbury bell, cardinal flower, flameflowers, gas plant, and peony

3'-4': Adam's-needle, giant daisy, larkspur, Oriental poppy, sunflower, and tree peony

4'-6': Coneflower, hollyhock, Japanese eulalia, joe-pye weed, and zebra grass

Over 6': Bugbane, giant rye grass, giant reed, sacaline, and sunflower

Ground-cover perennials for embankments

Moss pink, Japanese spurg, bearberry, and periwinkle

Perennials according to color

White: Achillea, ptarmica, Adam's-needle, Astilbe japonica, daisy, day lily, and rock cress

Lilac, magenta, purple: Beardtongue, blazing star, gas plant, fringed pink, rock cress, and shooting star

Blue: Anemone blanda, Clematis davidiana, Rock Mountain columbine, forget-me-not, Iris laevigata, and larkspur

Yellow: Columbine (chrysantha), coneflower, gaillardia, golden tuft, Iceland poppy, and sunflower

Pink: Bleeding heart, hollyhock, Lychnis viscaria splendens, moss pink, peony, and dianthus

Red: Anemone japonica, fragrant balm, cardinal flower, Clematis viorna coccinea, coral-bells, and peony

Fragrant perennials

Gas plant, golden tuft, groundnut, rock cress, rocket sweet, and Scotch pink

Perennials for shady places

Anemone Pennsylvania, bluebell, bugleweed, Helleborus niger, Phlox divaricata, and shooting star

Drought-resisting perennials

Coneflower, inula, sedum, and Yucca filamentosa

For moist or low ground conditions

Fragrant balm, cardinal flower, Funkia, Iris laevigata, joe-pye weed, and Ranunculus aquaticus

Perennials with striking foliage

Adam's-needle, Anemone japonica, eulalia, Funkia, giant reed, and plume poppy

Peonies and Chrysanthemums

35. Hundreds of varieties of peonies are available. Peonies can be had in a variety of colors — red, crimson, pink, white, yellowish white, or purple. While they may be planted in a perennial border, or in front of shrubbery, they do best in separate beds.

Chrysanthemums are one of the glories of the autumn. They include large-flowered, pompon, and button varieties, in many shades and mixtures of color.

Roses

36. The principal types of roses are the hybrid teas, hybrid perpetuals, polyanthas, hardy climbers, and shrub roses, including the rugosa hybrids. The hybrid teas are the most common. The hybrid perpetuals are quite hardy and are especially suited to the more northern states. Polyanthas are dwarf and bush plants. Hardy climbers are suitable for fences, arbors, trellises, and banks.

Bulbs

37. No garden should be without its bulbs and their brilliant and beautiful flowers that appear throughout the summer. Nothing can exceed the brilliance and variety of color of bulbous plants, although few of them are desirable for their

foliage alone. For that reason, they show up best if grouped with other foliage-covered plants. Many of them thrive and blossom year after year. A friable, well-enriched, sandy loam suits them best. The hardy bulbs can remain in the ground from season to season, while the more tender ones, such as gladioli and dahlias, must be lifted and wintered under cover.

Hardy bulbs

Hyacinths, tulip, narcissus, trillium, spring colchicum, crown imperial, dog's-tooth violet, and anemone

Sequence of bloom

April or earlier: Crocus, crown imperial, Chionodoxa, grape hyacinth, snowdrop, and Leucojum vernal

May: Daffodil, hyacinth, jonquil, Leucojum aestivum, and tulip

June: Anemone, harebell, Spanish iris, and Cuban lily

July: Blazing star, star hyacinth, tigerflower, and zephyr flower

August: Blazing star, gladiolus, giant summer hyacinth, hyacinth squill, and tigerflower

September: Starry hyacinth, Guernsey lily, meadow saffron, and autumn snowflake

Iris

38. The irises are among our most beautiful flowers and come in a considerable range of colors. Many of them are hardy and easy to grow. They include the bearded, or German, iris in low, intermediate, and tall forms. This type grows from thick roots, or rhizomes. The beardless and bulbous group includes the Siberian, Japanese, and water irises, well suited to the southern California climate.

Bearded irises can be planted in a perennial border, in front of shrubbery, or in a bed by themselves. Dwarf types can be used as edgings for flower borders.

Vines

39. Vines that cling to brick, stone, or concrete, or climb trellises or wires, provide shade, concealment, and ornamentation. Such vines need to be used judiciously. Overuse and overgrowth of vines can smother structures otherwise worth looking at. Vines can be employed to advantage on railings and trellises. One kind of vine can often be used with another kind, or with an associated shrub planting.

Twining vines, such as Actinidia, Akebia, and Hall's honeysuckle, can be grown on any type of wall merely by attaching wire to the surface. Clinging vines should not be used on wooden houses, because they make repainting of the house difficult and tend to keep the wood surface damp.

A few vines and their classifications are listed as follows:

Clinging types

Boston ivy, English ivy, trumpet creeper, and winter creeper

Climbing types

Actinidia, bittersweet, clematis, Hall's honeysuckle, rambler roses, and wistaria

Woody perennial vines

Akebia, bittersweet, matrimony vines, silk vine, trumpet creeper, and Chinese wistaria

Annual vines

Balloon vine, scarlet runner bean, canary-bird flower, ipomoea, and maurandia

Most popular vines

Actinidia, Boston ivy, clematis, cobaea, Dutchman's-pipe, honeysuckle, English ivy, perennial pea, trumpet creeper, and wistaria

Valuable vines for flowering effects

Rosa wichuriana hybrids, clematis, American trumpet vine, wistaria, and honeysuckle

Vines and fragrant flowers

Actinidia, Akebia, cinnamon vine, groundnut, honeysuckle, and Periploca

Vines with valuable fruiting characteristics

Akebia, Japanese clematis, bittersweet, rose, matrimony vine, Virginia creeper, and Actinidia

Valuable vines for shade

Boston ivy, Engelmann's creeper, Hall's honeysuckle, Virginia creeper, and winter creeper

Rock Gardens

40. The purpose of a rock garden is to show off either existing rock outcroppings or boulders with exciting sculptural values, or to create rock effects. Whatever the purpose, a rock garden provides a home for diminutive plants. The treatment of the component rocks and flowers in such a garden requires a high degree of artistry. A common mistake is to try to form a rock garden from a pile of rocks in a small, level front yard.

Placement of Rocks

41. The rocks in a rock garden should look as though they belong to the site. They should be set solidly and firmly. If possible, stones native to the region should be used. Cut stone with flat surfaces should not be used. Sedimentary rocks which occur in nature with horizontal cleavage lines should be laid horizontally. Stones that are longer than they are wide should be laid horizontally. The largest stones should be placed at the bottom, with the broadest face down and the weathered surfaces exposed. Each stone should be laid so as to contribute

to a look of stability. Rock arrangements are subject to the same general principles applying to other phases of landscapes. Each stone should be laid so that water runs back into the rock openings.

Rock Garden Plants

42. The purpose of a created rockery may be to keep soil from washing down along steps or to serve as a dry wall for flowers. Since alpine and other plants used in rock gardens require a maximum of winter sun, they should be planted with that in mind. These plants should not be allowed to burn in summer. Ample drainage must be provided.

The pockets and crevices that are created for plants should contain soil favorable to their growth, or else plants should be selected to fit the existing soil. A deep, moist soil is good for most rock garden plants. Peaty soil is best for members of the heath and orchid family. A soil composed largely of crushed rock or gravel is best for mossy and starry saxifrages and low-growing sedums. Leaf mold favors the primrose and lily families.

Planting Details

43. The rock garden should not be planted too thickly. Enough space should be available for each plant to develop. Several plants of a kind grouped together are more effective than individual plants scattered here and there, each plant different.

Plants such as low-growing sedums should be placed in the sunniest positions; the more delicate ones, such as alpine primulas, should find shelter in nooks. Such plants as cerastium and dwarf phlox may be used to overhang ledges. Some plants, wild ginger for one, can get a foothold on the steepest slopes. On the tops of rocks and in most conspicuous locations, the *Acanthus mollis*, *Spiraea aruncus*, and columbine can be used to advantage.

Because spring-blooming bulbs bloom early and don't interfere with rock plants, they may be spread in masses among the alpine plants.

There are thousands of alpines and dwarf perennials for you to choose from. Some dwarf annuals may be included, or dwarf species of bulbs, iris, and broad-leaved evergreens. Among the numerous plants that can be used in rock gardens are the following few classified groups:

Plants to be used in soil pockets

Golden tuft, Carpathian harebell, Scotch pink, hardy candy-tuft, tunica, double-flowered lychnis, shooting star, stonecrop, and gypsophila

Plants for overhanging ledges

Arabis alpina, *Daphne cneorum*, *Phlox subulata*, stonecrop, *Veronica rupestris*, and myrtle

For deepest recesses

Lily of the valley, showy lady's-slipper, large yellow lady's-slipper, bleeding heart, Japanese spurg, violets, polygonatum, and *Trillium grandiflorum*

For conspicuous positions

Columbines, gas plant, foxglove, eryngium, lychnis, Oriental poppy, and fritillaria

In moist positions

Calla, Indian paintbrush, forget-me-not, *Potentilla*, and buttercup

Evergreens

Mugho pine, andromeda, dwarf box, *Erica vagans*, spreading yew, *Daphne cneorum*, and *Retinospora obtusa*

Value of Lawn

44. A lawn is the best general-purpose ground cover. Few things are more satisfying to the eye than a great expanse of well-attended lawn. Such a lawn may give a marked impression of size and restfulness. A satisfactory lawn should have good drainage, and proper construction and seeding and should be easy to keep up.

Preparing Ground Surface

45. One of the first requirements for a lawn is that the ground be well graded and free of debris, trash, clods of earth, and stones. This means that there must be even slopes and gently flowing curves, with all irregularities, hummocks, or off-level places eliminated and smoothed into evenly flowing surfaces.

When a house or other structure is to be erected, the topsoil should be removed and piled up for future use before any excavation is undertaken. It is well to remove the topsoil for a distance of 15' to 25' beyond the outlines of the building. To divert drainage from the foundation walls, the soil surface should be sloped away in all directions from the structure. At the bottom of the foundation, drain tile may be needed with connections to the storm sewer in the street.

The real home of grass roots is in the topsoil layer to a depth of from 5" to 6". If there is not sufficient depth of topsoil present, soil should be brought in.

Improving Soil

46. As the grading for a lawn approaches its final level, additions can be made to the soil to improve the physical condition of the soil. The organic additives that may be used include natural manures, sewage sludge, and cottonseed or soybean meal. The inorganic materials are the chemical fertilizers. When the grading has been completed, the surface is ready to be smoothed down and rolled.

Seed and Planting

47. The best time to plant grass seed varies with the climate. The spring is the time favored in the South, whereas in the North early fall is best, although seeding can be done in the spring as soon as the ground can be worked.

In choosing seed, you should keep in mind the qualities of texture, density, smoothness, and uniformity that you desire. A coarse-leaved texture is less pleasing to the eye than a fine-leaved one. Timothy and orchard grass have coarse foliage; the red fescues and bent grass are fine in texture when closely mowed.

You should know what grasses will grow in a particular locality, in a particular soil, in sun or in shade. Here are a few of the grasses available and their special characteristics.

Kentucky bluegrass has creeping underground stems and a vivid bluish-green color. It is semidormant during summer, and requires a sunny exposure and a fairly good, well-drained soil. It takes three years to mature fully, lasts indefinitely, and improves constantly. Short mowing to less than 1½" seriously weakens the grass and gives weeds a chance to grow. This grass is slow to start, and a temporary, or nurse, grass is sown with it.

Marion Kentucky bluegrass is a bluegrass that looks something like Kentucky bluegrass but withstands closer mowing. It is slow in developing a thick sod and should be sown with a temporary grass.

Rough-stalked bluegrass is best for moist, shady spots, but is unsuited to hot, dry conditions, or to areas to be used for play and other activities.

Fescues have stiff, wiry leaves that make them hard to mow, but good for use in playgrounds and athletic areas. They like well-drained, fertile soil, but grow on droughty soil, in either sun or shade. They dislike clipping to less than 1½" and are not favored by hot and humid weather.

Colonial bent grass is a dense and mat-forming turf. It grows rapidly and thrives in summer when Kentucky bluegrass and the fescues are rather dormant. It withstands close clipping, but suffers the disadvantage of starting late and stopping early. Its moisture and fertility needs are high, and it is susceptible to disease.

Creeping and *velvet bents* form a densely matted lawn and are used primarily for putting greens. They require frequent mowings, and top dressings once a year.

Redtop and *rye grasses* germinate rapidly and are used either alone for temporary lawn effects or in mixtures to hold soil in place until slower grasses take hold. They do not stand up long under close clipping.

Meyer zoysia makes a dense turf, but it is a warm-weather grass that turns completely brown with the first frost and remains so until late spring.

Clover makes an early start in the spring. It will grow on poor soil and will help to supply the soil with nitrogen. It offers the disadvantage, however, of growing in patches with uneven results. Also, it stains clothing and is slippery in wet weather.

Bermuda grass is the most common and desirable grass in the South. Other creeping types used in that area are centipede blue couch grass and the Manila grasses. These are propagated better vegetatively than from seed.

Grass-seed mixtures are preferred to a single species, because mixtures produce satisfactory turf more quickly than do single species of grasses.

The nature of the soil upon which the turf is to be grown will have a lot to do with your choice of grasses. Kentucky bluegrass, for example, is a lime lover. Bent grasses and fescues tolerate moderate acidity; fescues give best results on sandy soils; redtop and meadow fescues prefer wet soils, while sheep fescues thrive in dry soils.

48. Immediately before any seed is sown, the soil must be raked and smoothed. The seed can be sown either by hand or with a seed spreader, and preferably on a calm day so that the seed will not blow about. After the seed has been sown, the ground should be rolled to embed the seed in the soil. Where erosion presents a possible problem, slopes can be covered with hay, straw, or burlap (with strips staked down), to keep the seed from washing away before it can take root.

Watering and Mowing

49. The seeding should be followed by a fine spray of water. The seeded area should thereafter be watered twice a day. As the seed germinates, the amount of water applied at one time may be increased and the frequency of application reduced.

The grass must be mowed often, but not too closely; it must be well fed and leaves must be raked off. Later, it may need repairing, reseeding, and rebuilding. Certain bugs may appear, such as beetles, chinch bugs, sod webworms, and ants. Lethal doses of chemicals, such as Chlordane, DDT, or lead arsenate, will be necessary to rid the lawn of these pests. If and when weeds make their appearance, there are potent weed killers available for dealing with them, or they can be pulled by hand with the aid of a weeder. Brown patches of fungi are treated with fungicide.

Sodding

50. For immediate lawn effects in any season, for steeply sloping areas subject to erosion, or for edges of drives and walks, you may employ sodding. The main objections to sodding are cost, the difficulty in securing sod, and the possibility of its heaving in winter.

Sod is cut into pieces of convenient length, width, and thickness, and the pieces are put in place without crowding to ensure an even surface. It is best to prepare the sod the

afternoon of the day before it is to be laid. Both the ground and the bottom of each piece of sod are moistened, and the sod is laid. The junctions of the pieces are filled with fine soil and the sod is beaten down gently with a sod pounder.

Summary

51. Plants include a wide variety of trees, shrubs, vines, flowers, and grass.

They may be used to provide color, fragrance, fruit, ground cover, shelter, shade, and enclosures. As an element in design, they should be selected according to the compositional and functional effects desired.

Enclosures

Types of Enclosures

52. You are familiar with the way in which the space in a house may be subdivided. In a similar way, you may subdivide the space in a landscape to fit the purposes to be served. Like the rooms of a house, landscapes have floors (floorscapes of lawn, ground cover, structural materials), walls (wallscapes of vegetation, screens, masonry), and ceilings (skyscapes of overhanging trees, arbors, sky). The man-made or natural enclosures must be integrated with the design pattern created for the area.

The enclosures of outdoor space help to establish the lines of a design pattern. Enclosures may also be used to provide partial or complete vistas, or to conceal objectionable views. Enclosures help to promote privacy, prevent or direct movements either of people or of domestic animals, reduce sounds and winds, and lessen the glare of the sun.

The careful selection and arrangement of enclosures is of fundamental importance in landscape design.

Requirements of Floor Enclosures

53. The living materials that can be used on the floor, or

the earth spaces, of a landscape have already been discussed in connection with plants and lawns.

There are also structural earth-floor surfaces that are available for use. Structural earth-floor surfaces have to meet such a variety of specifications that they can never completely measure up to them. For example, they should have the right texture. In many cases, they must be smooth enough to permit dancing, and yet rugged enough for games. They should combine well with other surfaces, not only in the landscape but also in the house itself. Furthermore, they must be dry and clean, durable, not too costly, and not too hard to construct.

No one surface can be expected to fill *all* of these requirements. The following observations apply to a few of the structural kinds, as distinguished from the living kinds, that you may use.

Bark, Gravel, and Crushed Rock

54. Bark, especially the bark of oak, cut into small pieces, makes an attractive and comfortable earth-floor surface. One drawback of bark is that it scatters unless it is confined between headers. It is useful on paths and under apparatus in a playground. The practice is to place this material over a 2" to 3" gravel or sand foundation.

Gravel makes a clean and durable surface. It is, however, rather uncomfortable underfoot, and weeds tend to grow through both gravel and crushed stone. Gravel is also apt to get kicked or rolled out of place, onto grass or other pavements.

Soil, Cement, and Asphalt

55. Cement and garden soil mixed together produce a hard, dry surface, which is not, however, as strong as concrete. Asphalt, if properly installed, produces a surface almost as tough as brick or concrete, and is one that can be quickly installed. A disadvantage of asphalt is its heat-retaining qualities and its unattractive appearance. Some varieties are suit-

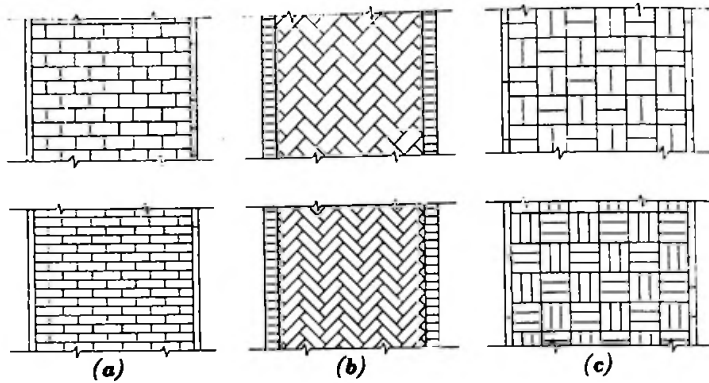


FIG. 14. PATTERNS FOR BRICK WALKS

able for use on a patio or terrace, but an improper mixture of asphalt can retain prints and tracks and exude tar on hot days.

Brick, Tile, and Flagstone

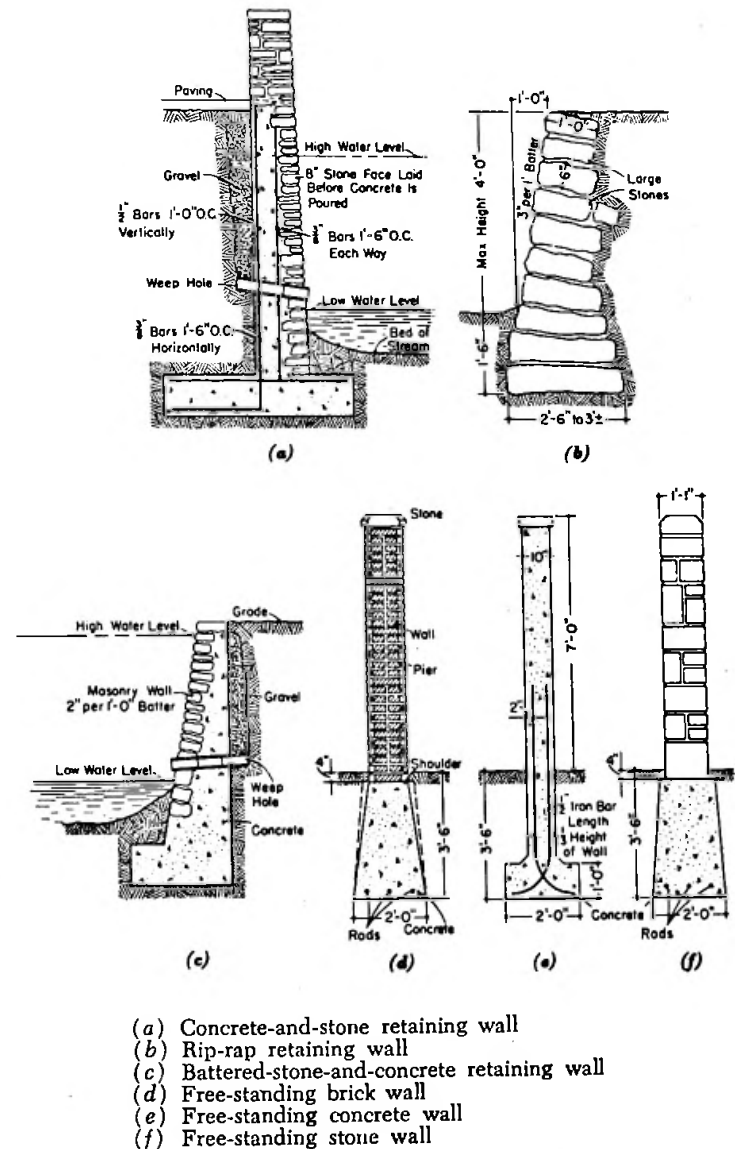
56. Brick makes a solid, durable surface, with warm colors and pleasant contrasts. The units are small in scale, which makes them suitable for domestic use. Brick may be laid in sand, but for greater permanence should be set in mortar over concrete. All sorts of paving patterns are possible with brick. Various patterns for brick walks are shown in Fig. 14.

Different kinds of tile may also be used as a surfacing; they are laid in sand or mortar, or over concrete.

Flagstones provide an excellent surface. Flagstones come in subdued colors, and in irregular shapes and thicknesses. You should select them with discrimination. If the soil is well drained, you need no other foundation than the earth itself. Otherwise, there must be a 2" foundation of sand or a concrete-slab foundation.

Concrete and Pebble Mosaic

57. Concrete gives a hard finish in a variety of surface



(a) Concrete-and-stone retaining wall
 (b) Rip-rap retaining wall
 (c) Battered-stone-and-concrete retaining wall
 (d) Free-standing brick wall
 (e) Free-standing concrete wall
 (f) Free-standing stone wall

FIG. 15. MASONRY WALLS

treatments. The surface may be smooth, it may be brushed with a push broom for a broom finish, or it may have the aggregates exposed. Moreover, concrete can be treated for different color effects.

Simple or elaborate mosaic surfaces may be produced with pebbles placed in mortar.

Vertical Enclosures

58. Vertical enclosures include structures, screens, and plants of different heights and varieties. Low railings, low, solid walls, and seats serve as enclosures without obstructing the view. Wire mesh fences, latticework, or stiff thorny plants may be used to keep children or dogs in or out of an area.

Some enclosures do not obscure the view. Among them are trellis or lattice frames, with or without glass or other fillers; rows of poles; louvered, split-wood, or other open-joint fences; and masonry provided with openings. Taller barriers of solid wood, masonry, or sheet materials are used to block both vision and movement.

Enclosures may consist of wood, masonry, sheet materials, or vegetation. They may be of split, rough-sawn, or finished lumber; concrete block; brick; tile; stone; poured concrete; or stucco on a wood frame or on concrete block. They may be of sheet materials such as plywood, glass, plastics, or metal. Trees and shrubs often make the best enclosures, particularly shrubs that grow erect and have little spread. If privacy cannot be obtained with plants, structural enclosures are used.

Walls

59. Walls are used to define areas, to ensure privacy and protection, to hold up earth, and to serve seating purposes. The requirements of masonry walls are stability and attractive appearance. For stability, the foundations of any masonry wall should extend below the frost line. Various kinds of masonry walls are shown in Fig. 15.

Stone, brick (with or without mortar), and concrete are among the most favored materials for walls. The easiest stones to use for walls are of stratified horizontal limestone, shale, or sandstone. They split and chip rather readily, however, unless mortared solidly to prevent water infiltration. Granites, on the other hand, are tough and durable.

Brick walls have many uses and offer attractive possibilities in texture and color.

Stone Walls

60. There are two kinds of stonework: 1) the rubble type, in which uncut stones are fitted into the wall in a natural, irregular pattern, with no continuous joints, and 2) the ashlar type, in which cut stones are placed in regular courses.

The stones when placed should produce harmonious and pleasing patterns. A large proportion of the more sizable stones should appear in the lower courses. Stones of the same shape should be kept apart; they should not be placed side by side. To ensure proper bonding, each long stone should be overlapped by two smaller ones.

Dry walls are built of flat stones fitted together without the use of mortar. Some dry walls are free-standing; others are built to retain earth. High dry walls require large stones throughout. Such walls must not be more than 4' to 5' high, and must be at least 2' thick at the top, with the bottom somewhat thicker for stability. When these walls are built to retain earth, the stones must be placed with the back ends tipped into the ground and the stones slanting slightly upward toward the front. The crevices are filled with rich soil and plants. Retaining walls generally need provisions for carrying water through or around them, such as ditches, gutters, drain tile, weep holes, or gravel backfill.

Brick Walls

61. Brick walls which are to be a foot or two high and to

withstand but little lateral pressure can be 4" thick. Higher brick walls need to be 8" or more in thickness, and are sometimes reinforced with vertical steel rods. Curved brick walls 4" thick may be built without pilasters.

Concrete Walls

62. Concrete walls are excellent for holding back a slope or for retaining an elevated planting bed. They can be poured to any shape, and may have a variety of surface effects: they may be smooth, treated with spatter, sand grits, or pebble dash. They may have tile attached to them, and may be given various tints. The tops of concrete walls may be smoothly finished, or they may have redwood or other planks attached to them.

Seat Walls

63. Walls can be built for use as curbs around planting beds, as display shelves for potted plants, or as seats or even tables. They may be straight or curving, short or long; and, if used for seats, they should be the proper height.

Seat walls may be constructed of wood, stone, brick, or concrete. When wood is used, sturdy construction is necessary, with supporting posts not over 5' apart set 18" or so into the soil or into concrete. The planks used for the seats should be knot-free redwood, cedar, or cypress, and should be bolted into place. The planks should be sandpapered to remove splinters, and should be set so as to allow rain to drain through them. Space for swinging feet back and forth should be allowed beneath the seats.

When not over 1' or 2' high, brick seat walls should be 4" thick. They should be capped with planks at the time the last course of brick is laid. The planks should be fastened at intervals to the brickwork.

Types of Fences

64. Fences may be of either the closed or the open type.



FIG. 16. HORIZONTAL SLATS USED FOR FENCING

They may be used to afford privacy, security, weather control, and beauty. Maximum privacy can be secured with fences of the closed type, such as board fences, louvered fences, or fences of closely set grape stakes. Fences of the open type, such as wire-lattice, picket-and-post, and rail enclosures, afford less privacy and security. Maximum security is provided by tall fences, in most cases consisting of chain-link fencing. For control of weather, glare, winds, or frost, panels of plastic screen or glare-reducing glass can be used. Living fences of shrubs and vines also are useful for this purpose.

Wire Fencing

65. Wire fences, although not especially attractive in appearance, find an important use for marking boundaries or for enclosing areas such as vegetable gardens, kennels, or swimming pools. The fences frequently consist of wire mesh attached to wooden posts. Wooden rails may also be added for an interesting effect. Wire fences also may be all steel. The wire must be stretched taut, and the steel posts ordinarily are set at 10' intervals and in concrete. In rural areas, barbed wire is often used.

Fences of Pickets, Slats, Stakes, and Boards

66. Typical wooden picket fences are 3' high, with pickets 3" wide spaced 3" apart. Picket forms, however, are subject to considerable variation. Pickets may be narrow and widely spaced or broad and closely spaced; the tops may be rounded, squared, dart shaped, or dressed ornamentally. Wooden pickets require periodic painting or whitewashing.

Fencing can also be made of long, narrow slats set either horizontally, as shown in Fig. 16, or vertically. Such fencing provides tall screens that give privacy and security, and are also effective as wind controls. Grape stakes, associated with the training of grapes in vineyards, make good rustic fences. Broad unfinished boards are also used.

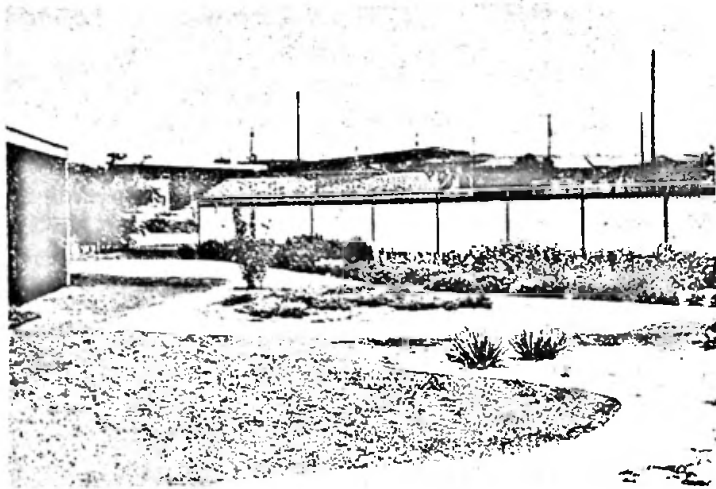


FIG. 17. CORRUGATED ASBESTOS FENCING

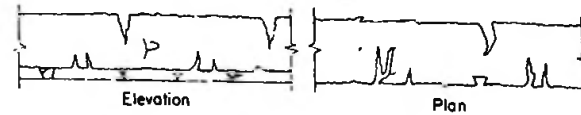
Solid Panels

67. Various manufactured materials may be used in panels to form screens. An outdoor variety of plywood may be used for either straight or curving panels. The edges of this plywood, including a cap along the upper edge, must be protected against moisture.

Some corrugated materials afford interesting shadow patterns. Corrugated asbestos, for instance, can be used vertically, as shown in Fig. 17, or horizontally. Heavy paneling must be securely attached to steel or heavy wooden posts. Corrugated aluminum sheets can be used for lightweight panels. The bright aluminum surface can be contrasted with the darker parts of a landscape composition.

Louver and Lattice Fencing

68. Louver enclosures, which consist of sloping slats or boards, give a certain measure of privacy when used vertically, yet do not cut off light, air, or the view. For absolute privacy,



SPACING FOR HEDGES			
Type of Hedge	Height	Single Row	Staggered Double Row
Barberry	1'-6"	1'-0"	1'-3"
Privet (Amurensis)	3'	1'-6"	2'-0"
Yew (Hicksii)	2'	1'-0"	1'-3"

FIG. 18. SPACING AND INDICATIONS FOR HEDGES

the louvers must be installed horizontally. Louver fencing is apt to be quite costly to build, since it requires a greater amount of material than other types of wooden enclosures.

The word "lattice" is from the French *latte*, "lath." A lattice is a fence-like structure of wooden strips. It may be used for screening out views, for concealment, for directing traffic, for supporting vines, or for ornamenting a wall surface. It may be simple or complex in design. It is necessary that a lattice have strength and durability, and be in harmony with its surroundings. Lattice fencing is made from white pine, redwood, or cypress; its posts are white cedar, redwood, or cypress.

Rail Fences

69. Rail fences are associated closely with pioneer days. The earliest rail fence was in zigzag form. As time went on, this pioneer zigzag fence became a straight one and began to shed rails. The present fence has become a two- or three-rail variety. When the old zigzag rail fence is constructed today, it is usually for a picturesque effect.

Hedges

70. Informal hedges with irregular outlines and widths, or more formal hedges with plants established in single rows or staggered regularly, may be used. Hedges that are to be care-

fully trimmed, such as small-stemmed privets, should be set from 10" to 14" apart in the row. Barberries and fragrant honeysuckles may be set 15" to 20" apart. From 2' to 3½' may be needed between such plants as hemlock and yew. The spacings for various types of hedges are shown in Fig. 18. Also shown is the method of indicating hedges on plans and elevations. Hedges must be kept well back from sidewalks, paths, or adjacent properties, so as not to reach out over them. The best hedge plants include privet, box, taxus, arbor vitae, hemlock, barberry, rugose rose, hornbeam, lilac, mock orange, crataegus, and viburnum.

Overhead Enclosures

71. In addition to vertical enclosures, there are horizontal overhead enclosures for you to consider. These may provide for either partial or complete overhead protection, through extensions of the house, independent structures, or overhanging foliage. There may be open structures of laths, trellis-work, or netting, or outdoor skylights with translucent materials such as canvas, plastics, or glass to give diffused light. These materials can be set in removable panels.

Trees with their branches overhead may be depended upon to provide shade, to cut off heat, and to reduce glare and sound. Since some trees are out of all proportion to the size of a place, be cautious in selecting the number and sizes of trees. Choose small trees for small places. A balance of light and shade should be sought.

Open and Semienclosed Structures

72. Pergolas, arbors, and lath houses are open-type structures, while garden houses, bathhouses, pavilions, and overlooks are semienclosed. You should think of both types in terms of their function and structure and their relation to space. They furnish overhead, or horizontal, as well as vertical, planes of enclosure.

Pergolas and arbors overarch walks, and may be used to lead to more substantial terminals of interest. They may be used as terminal features in themselves. As vine-supporting elements, they provide a basis for imaginative design. Such structures may be made entirely of wood or metal, or partly of wood and partly of brick, stone, or concrete. They may be quite rustic wooden structures, with bark retained or removed, or they may be made of planed wood such as redwood, Douglas fir, or cypress. Because of termites and fungi, wood supports need to be anchored in concrete. Supports, however, may be made of stone, laid up in cement mortar, with capstones of the same material.

Materials that are lighter than wood and just as strong, such as aluminum, which is rustproof, may be used. The strength and character of pergolas will depend upon the vines they are expected to support. Wistaria, for example, requires large, strong structures. When a solid roof is to be added, additional bracing will have to be provided.

Turf is not practicable for the floors of pergolas, because of the dense shade of the covering vines. Brick, slate, or stone floors are good for this purpose. Cement floors are the least desirable.

Lath Enclosures

73. In the hot sun of southern California, many plants will not grow out of doors in the direct rays of the sun. Hence, the lath house is frequently used as a protective covering to cut down on the amount of direct sunlight. Such a structure usually has a pitched roof; its wood laths are spaced one lath apart on the vertical sides and the top. Or the top may be formed with alternating laths above and below the framework for more even lighting effects. Joists must be heavy enough to support hanging baskets of flowers, if desired. Glass panes can be used if protection is sought from rain, with slight overlaps of the panes; for such purpose, a well-framed struc-

ture is needed. When glass is used, roller shades of muslin or other material can be used to control the light.

The Garden House

74. The garden house can be a pleasant, semienclosed structure, located somewhat away from the house and connected to it by an arbor or a path, or it may stand at the corner of a terrace or in the corner of a walled garden. It can serve as a focus of special interest. It should be an integral part of the garden scheme.

Work and Storage Centers

75. In any garden there is often need for a work center. This can be located in almost any part of the garden. Adequate storage facilities can make garden work less laborious and much more agreeable, and can be made to fit in well with the overall scheme. Quite an assortment of materials may be stored in such a center, including tools needed in lawn upkeep, seed sowing, propagating, transplanting, and potting; fertilizers, soil conditioners, and pest eradicators may also be stored.

The work center can be simple, consisting merely of an L wall upon which things can be hung and within which things can be stored. Or it can be subdivided by enclosures of panels and fencing. The work center should include work bench, pot racks for plants, and easy-to-clean floor surfaces.

Summary

76. Like the rooms in a house, outdoor space may be enclosed by floors, walls, and ceilings. Enclosures may be natural or man made. They are an element of landscape design.

Floor surfaces may consist of vegetation or structural materials of various kinds. Vertical enclosures may consist of trees, hedges, shrubs, wood, masonry, or sheet materials, and structures such as garden houses and storage centers. The ceiling may be formed by the sky, trees, vines, or structures.

Circulation

Flows of Movement

77. In a well-planned house, the movements between and within the rooms are minimized for convenience by placing close together rooms that are interrelated in purpose, such as the kitchen and dining room. Openings between rooms are established for easy passage and convenient placement of furnishings. Furnishings and equipment are located in logical sequence for the purpose of saving steps.

Flows of movement are equally important in outdoor areas. Movements from one position to another, in and out and across and around the area, from and to the house determine the logical routes of terraces, walks, and paths. They help to determine the advantageous placement of structures and functional areas. They are important factors in the overall design of the landscaping.

Paths

78. Paths may serve to lead people to and from entrances, to points of special interest, around a sizable lawn space or meadow, they may run beside a terrace, a lake, a stream, a pool, or into and through a nearby woodland.

Paths are often omitted in the modern garden, where they are supplanted by spreads of lawn or paving that invite one to stroll in any direction.

A modest path might be $3\frac{1}{2}'$ to $4\frac{1}{4}'$ wide for two persons walking abreast. Where numerous people are expected to gather, the width must be enlarged accordingly. A path may be planted in grass if it is not to be used intensively; otherwise, harder material must be used, such as gravel, broken stone, tarvia, brick, or cement.

Steps

79. Steps enable people to go from one level to another, and are particularly important on steep garden sites. They

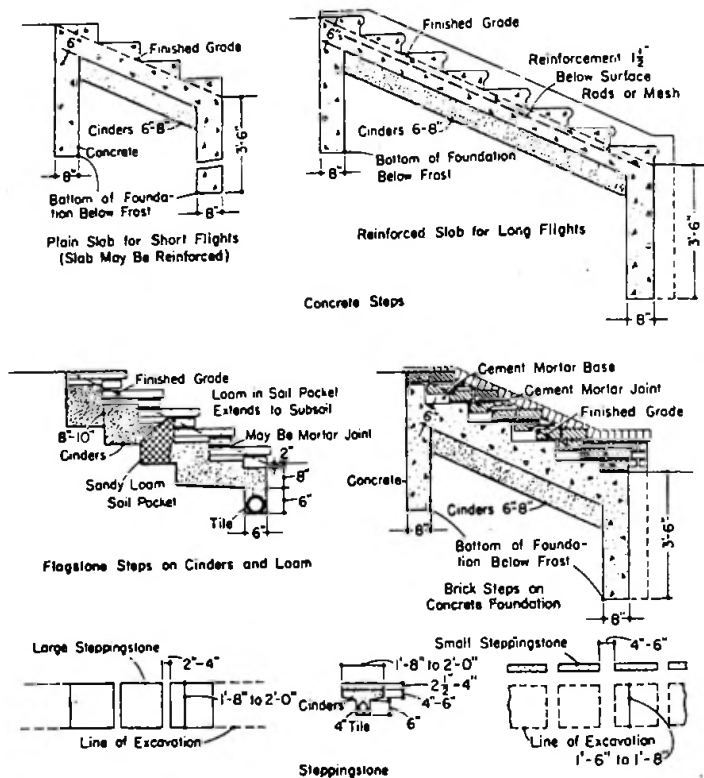


FIG. 19. VARIOUS TYPES OF STEPS

can be few or numerous, narrow or broad, straight or curving, simple or divided. Above all, steps are for use by people and so should be scaled to the human figure.

Long, unbroken flights of steps are to be avoided, and landings need to be provided where the vertical distance exceeds, let us say, six feet. For outdoor steps, it is customary to make the tread wider and the riser lower than for indoor steps. In some circumstances, a tread of 14" or 15" and a riser of 5" or 6" are both pleasant to climb and to look at. A rule of thumb that is often followed is that twice the riser plus the

tread should be made to equal 24". The widths will vary to suit traffic requirements.

Steps may be constructed of stone, brick, concrete, wood, or even of grass-covered soil. Due consideration must be given to stability, drainage, and frost action. Steps should harmonize with the wall or other structures of which they are a part. Various types of steps are shown in Fig. 19.

Automobile Traffic

80. We live in the age of the automobile. Automobile traffic, and the need to provide for it, is one of the most challenging problems of our day. Access for the automobile is a problem that is present in the landscaping of most domestic properties.

There are three main possibilities for entrances to modern houses. One of these is to allow for a large forecourt in which transient cars can park and turn around and leave again over the same drive. This must allow for free circulation of traffic and space for parked cars. There should be room for turning, and there should be room adjacent to the forecourt for driving into the garage.

Another possibility is a horseshoe drive giving access to the front door. In such a case adequate parking should be set apart near the garage or along the curving drive.

The least desirable possibility, but often the only practical solution on a small property, is a road leading straight into the garage. This requires backing out the length of the drive. The only way to provide for parking is to widen such a drive so as to leave room for at least an extra car.

Summary

81. The movements within and around an area must be considered in the overall planning of the landscaping for that area and in the specific location and construction of paths, walks, steps, drives, and terraces.

Layout of House Grounds

General Considerations

82. The landscape layout of a domestic property should begin before the house is placed; it should, in fact, be part of the earliest considerations of location and design. Too often, however, the landscaping has been considered only when the house is complete or nearing completion.

Houses vary in size, shape, plan, and construction materials. Houses with but one story cover more land than do houses with two stories and an equal number of rooms, with the resulting advantage of closeness to the ground of all rooms. Some houses are simple, boxlike structures; others ramble irregularly and have numerous corners, angles, and curves. Some houses have no overhangs, while others have wide overhangs. All these features have a direct bearing on the layout of the house grounds.

Houses, moreover, differ widely in the number, placement, and outlook of windows and doors. The floor level may be even with, below, or above ground level. These details establish a variety of relationships with the outdoors.

83. Properties vary in size, in shape, and in the presence or absence of trees, boulders, structures, or other existing features that may need to be recognized, preserved, or removed. And of obvious importance is the local climate, which determines the nature of the planting and the extent to which the outdoors can be used.

The layout of domestic properties must not only take into account physical and climatic characteristics, but must respect as well family needs and attitudes and such economic considerations as initial outlay and the cost of maintenance.

The outdoors, like the house, should be designed for people, not for plants and garden furniture. A layout depends upon the size and makeup of the family, and on the

needs and preferences of elders and children. Some members of a family may be fond of gardening; others may devote themselves to outdoor play and sports. Still others may enjoy the pleasures and comforts of outdoor living and beautiful surroundings.

The areas decided upon for living and service should be clearly defined by the landscaping. A close relationship must be established between the house and these outdoor areas.

Placing the House

84. Today, with the emphasis on indoor-outdoor living, it is difficult to think "house" without also thinking "garden." The fact that the house has been shrinking in size has made the planned garden important as a factor in increasing the living area, actually and visually. And as mentioned in Art. 7, the disappearance of pumps, outhouses, and chicken runs, common in the 18th century, has made it possible to place the contemporary house in the midst of a garden.

The house should be placed so as to allow for the most effective use of the grounds. The front yard should be of such proportions as to conform to local set-back requirements, and should provide a suitable setting for the house. It should include access by walk and drive to the house and garage, and a space for parking.

The best arrangement of house and grounds is the one that offers the maximum amount of ground for the garden area. For the typical city lot, longer than it is wide, usually more space is released for garden use if the house is placed to the front and to one side. Space at the front of the house generally has little family use since it is open to public view. Such space, however, can be given privacy by the use of screens and planting. In placing the house, orientation should always be considered; in most sections of the country the afternoon sun shining into the major glass areas is unac-

ceptable. Such glass areas are usually oriented to the east. And in all cases, the outdoor areas should be adjacent and accessible to those indoor areas which they are to extend and supplement. When properly planned, the indoor and outdoor areas will often appear to be one space.

Living Areas

85. The outdoor living area should be adjacent to and accessible from the indoor living area. It is a poor plan that provides the only access to the outdoors by way of the kitchen. The outdoor living area extends the functions of indoor living to the outdoors. It provides a place to sit, entertain, eat, sleep, and sunbathe.

The elements that are a part of the outdoor living area are likely to be the lawn, terraces, paths, trees, flowers, screens for privacy, pools, garden houses, fireplaces, and barbecues.

The terms "terrace" and "patio" are often used for much the same thing. Originally, the terms were quite different in meaning. The word "patio" referred traditionally to an inner courtyard, or hollow square, open to the sky. The word "terrace" referred to a raised level space or platform of earth supported by a wall or bank of earth. Frequently, it referred to a level strip of raised ground parallel with a house.

Today, either term suggests one of the most important areas of outdoor living. It may be away from the house or it may be near the house and surfaced to permit dancing; it may be small or large. It is related in proportion and size to the house and the uses intended for it. It may be rectangular, curving, straight, or angled, informal or formal in outline. It may reach out some distance, even at unpredictable angles, seek a tree here for shade, a vantage point there for a view or breeze. It may encompass lawn spaces, trees, or other features. Its floor may be of brick, flagstone, lawn, or other materials.

A pool, if a part of the living area, may take a variety of forms, with shallow depths for wading or reflections, or greater depths for swimming. It may be set apart in an area by itself or it may be located in or near the center of the living area.

The sound and sight, reflected light, and playful motion of fountains make them important focal points in the outdoor living area.

Dining Area

86. Outdoor dining areas have the same requirements as indoor dining areas. The surroundings should be beautiful, private, and quiet. The outdoor dining area must relate to the indoor food-preparation area, even though food-preparation facilities may be part of the outdoor area. This does not mean that outdoor dining should be confined to one space. Actually, variety in the dining places makes for interest. However, the regular dining area should be conveniently located in relation to the kitchen.

The outdoor dining area may be a visual extension of the kitchen and may include such related features as a barbecue, or a herb and vegetable garden. Seasonal vegetables are often beautiful in their own right. A vertical wall or fence of strawberry plants, for instance, can be a useful and decorative feature.

Play Areas

87. Some people are interested largely in areas for outdoor play and sports, while keeping in mind possible conversion of such areas later on to more passive uses as the children grow up and leave home.

The assortment of possible recreational facilities includes swimming pools; archery ranges; bathhouses; bowling and putting greens; courts for tennis, badminton, volleyball, and

basketball; shuffleboard; quoits; croquet; paddle tennis; and clock golf.

Small children require a sunny play area near the house, near a covered porch, and within view of the kitchen. This area may be combined with a drying yard; or it can be a small grassy plot, fenced in and containing a sandbox, a swing, a seesaw, climbing apparatus, and a space for playing croquet. Such an area might be used in later years for teenage games.

While grassy surfaces are generally best for small children's play, there should be smooth, hard spaces upon which they can ride tricycles and scooters and roller-skate. Also included might be a wading pool, so located that, when the children are grown, it could serve as a reflecting pool.

A playhouse for children has all sorts of possibilities, both in its architecture and inside equipment. A large tree may suggest the construction of a tree house.

Service Area

88. The service area complements the activities of the house. It should include space for clothes drying, for the growing of fruits, vegetables, and herbs or cut flowers, for the storage of tools, implements, summer furniture, and firewood, and for the disposal of garbage. The walking distance between the house and service areas should be short. The service yard, since it is near the area where the mother will be working, is sometimes used as a play yard for small children.

The kitchen garden is often found in the service area. Although its plant arrangement is, of course, primarily functional, it may also be aesthetic.

Enclosures

89. Enclosures are useful for defining the various areas, for hiding views of service areas, and providing protection,

shelter, and background. Enclosures may be formed of structural or living materials. In properties that are greatly restricted, walls, screens, and treillage will be particularly useful. There may be pergolas or creeper-covered bowers, or permanent structures with roofs and openings equipped perhaps with sliding screens.

Shrubbery or fences properly planned will insure the required privacy.

Garden Furnishings

90. People need places to sit in outdoor living areas; they need tables for food, drinks, and reading matter. They need outdoor cooking facilities, either permanent or movable.

Permanent seats should be carefully placed in relation to the landscape design, whether against a wall or hedge or in the open. They are usually placed to take advantage of a view, and an adequate stretch of paving is provided beneath and in front of them. They should be capable of withstanding all sorts of weather.

Outdoor fireplaces or barbecue stands are important garden furnishings. They may serve as a focal point on a patio or terrace, and should be accessible to the kitchen. They may be set in the midst of grass or paving. They may take the form of fire pits or low-level or counter-high grills, with or without chimneys, sheltered or unsheltered.

Garden sculpture should be used sparingly, and should be carefully placed. It should be well conceived and executed. It may include urns, vases, sundials, statues of humans or animals, or imaginative forms.

A birdbath is a charming garden feature, with its attraction for birds and the life, color, and song they add to the scene. It should be placed in a favorable position for watching birds. It should be set on a high pedestal that is well away from

plantings or other hideaways for cats and other predatory animals. The pedestal should be given a firm foundation and should have a direct pipe connection with the water supply.

Sundials depend a great deal for their success on proper placement. They may be located centrally or in a secluded nook, preferably with a substantial foundation. A sundial of simple outline can be quite effective.

Planting

91. The planting of garden areas must be related to the interests, time, ability, and pocketbook of the individual owner. This is one of the many reasons why the initial concentration in the design of neighborhood landscaping should be on the major tree planting for the whole community rather than on small-scale planting within the individual property lines. One family might prefer colorful, exotic plants which require time and exacting gardening knowledge; another family might prefer a more maintenance-free garden and use perennials which provide year-round beauty with a minimum of care. In selecting plant material, it is important to know and select plant material that is indigenous to the region, so that maintenance can be held to a minimum. Also, keep in mind the expected size of a plant, its rate of growth, and its longevity. These characteristics will determine the place of a plant in the garden, as well as the necessary maintenance.

You should know the colors and textures of plant material, their seasonal changes, the size of their leaves, and their shininess or dullness. You should know how to combine these elements so that they blend or contrast with the architectural background provided by the building.

Flowers generally flourish best in sunny portions of the outdoor living area. They may be planted in separate beds or in continuous borders.

Trips to nurseries will familiarize you with the kinds of

plants available, their color, foliage, size, longevity, branch patterns, and care. Careful planning is necessary if beauty is to result.

Maintenance

92. An important factor in the design of outdoor areas is maintenance. A garden, for instance, changes from season to season and from year to year. Someone must guide its growth; someone must maintain it. The question of who will maintain the outdoor areas should be decided in the initial planning of house and outdoors.

Some garden elements require more maintenance than others. Among those requiring perhaps the greatest amount of care are annual and perennial flowers, trimmed hedges, trimmed shrubs and trees, plants requiring special soil and frequent watering, and lawns that are too small to be cut with a power mower.

Lawn, however, usually makes the best cover for large areas, and if large enough to warrant a power mower, is not too difficult to maintain. Trees and shrubs which do not need great care should be chosen. Many plants may be potted and moved from indoors to outdoors and back again. Raised flower beds enclosed by masonry curbs make the flowers easier to reach and to care for.

Surfaced areas can be beautiful and are often the easiest areas to maintain. Flagstone and brick walks and terraces have a charm of their own; attractive results have been obtained with colored concrete. Keep in mind that masonry surfaces hold the heat and may require shade or washing down at night.

The Layout

93. Variations in such factors as the plan of the house, physical and climatic conditions, orientation, family needs and

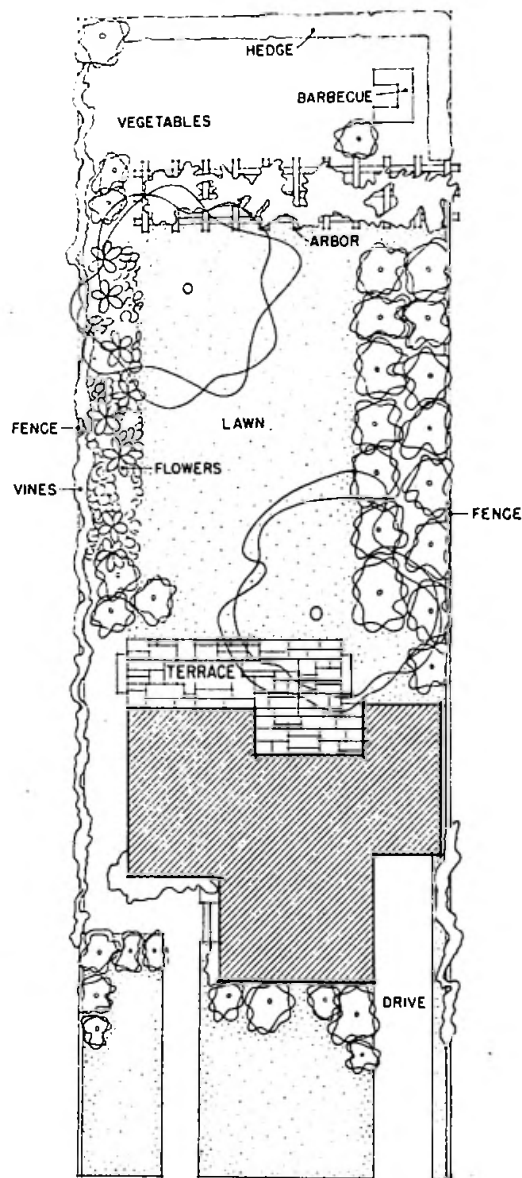


FIG. 20. LAYOUT OF GROUNDS FOR A CITY LOT

budgets for outlay and maintenance pose complex problems for the designer. These problems can be solved by a variety of treatments. Economics may limit the treatment but it need not limit beauty. In each layout the overall treatment should aim for simplicity, directness, dignity, comfort, and beauty. The success of any layout can be measured by the extent to which it achieves these objectives.

The layout drawings for a house should always show the house in relation to its immediate site and the street on which it is located. Also, they should show the location of the living and service areas, the trees, the lawn, and all the planting. In a well-planned layout, the planting is used to help define the layout, as in Fig. 20, which shows a house on a city lot.

The layout for a country house is shown in Fig. 21. The planting schedule is indicated by numbers, which are identified in the legend.

Of particular interest is the layout in Fig. 22, which shows how outdoor areas can be related to indoor areas.

In this layout, the living-dining room has an outdoor dining area which is accessible from the kitchen. Also adjacent to the living-dining room are two quiet gardens, one of which can be reached from the den. Accessible from the living-dining room by way of the vestibule is the entry garden. The bedroom suite has its own garden. Notice that the service area, which can be reached from the kitchen and garage, is screened from the other outdoor areas.

Summary

94. The landscaping of a domestic property should be one of the earliest considerations in the design of the house. In fact, house and grounds should be designed at the same time. Too often, the landscaping is considered only when the house is completed or nearing completion.

The layout of the landscaping for a domestic property

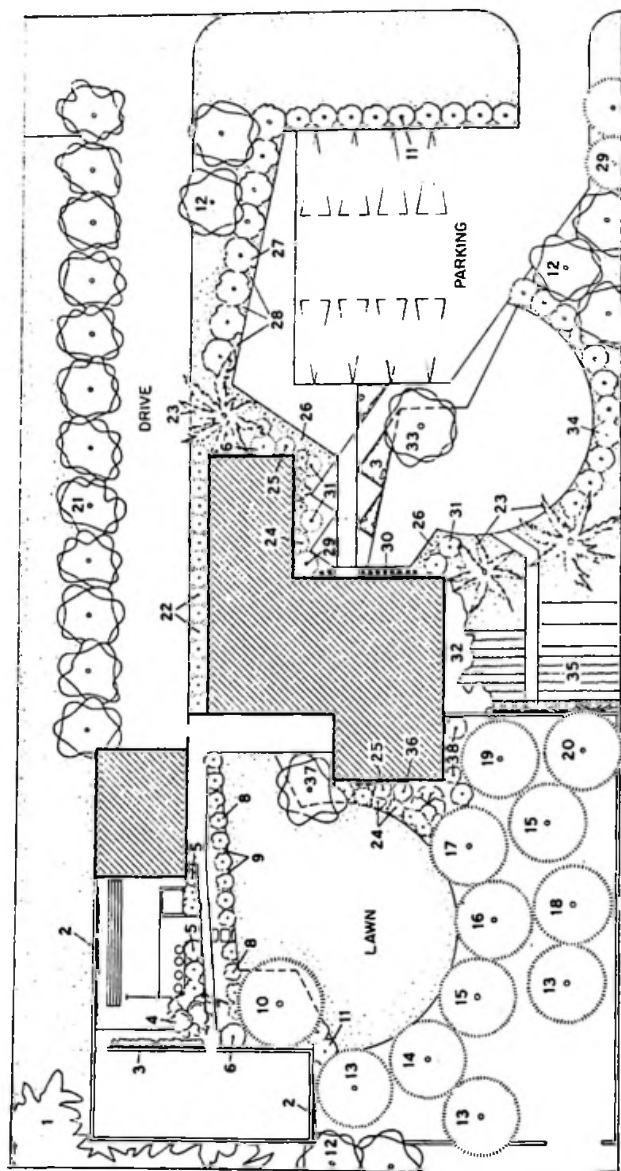


FIG. 21. LAYOUT OF GROUNDS FOR A COUNTRY HOUSE

LEGEND FOR FIG. 21

- | | |
|--------------------------------------|---------------------------------|
| 1. Monterey pine | 20. lime |
| 2. table grapes | 21. Eucalyptus polyanthemus |
| 3. star jasmine | 22. azaleas and camelias |
| 4. transcendent crab | 23. deodar |
| 5. wax-leaf privet | 24. juniper pfitzer |
| 6. rose of Sharon | 25. flowering quince |
| 7. wild strawberry
(ground cover) | 26. Strelitzia reginae |
| 8. sweet olive | 27. goldmine loquats |
| 9. herbs (under shrubs) | 28. dichondra |
| 10. jacaranda | 29. Podocarpus macrophylla |
| 11. Photinia serrulata | 30. Agapanthus africanus |
| 12. liquidambar | 31. Magnolia santangeana |
| 13. avocado | 32. poinsettias |
| 14. apricot | 33. persimmon |
| 15. orange | 34. white oleander |
| 16. peach | 35. cut flowers and rose garden |
| 17. plum | 36. mock orange |
| 18. lemon | 37. purple-leaf plum |
| 19. apple | 38. pyracantha |

should aim for simplicity, directness, dignity, comfort, and beauty. You will find that the following factors usually affect the layout:

- a) The type of house and its position on the site. Houses vary in shape, size, number of stories, relation to ground level, position on the site, and orientation.
- b) Physical and climatic characteristics of property.
- c) Family needs and attitudes. The outdoors, like the house, should be designed for people, not for plants and garden furniture.
- d) Economic considerations: initial cost of planting and cost of maintenance.
- e) Relationship between outdoor areas and indoor areas. Outdoor areas should be adjacent to and accessible

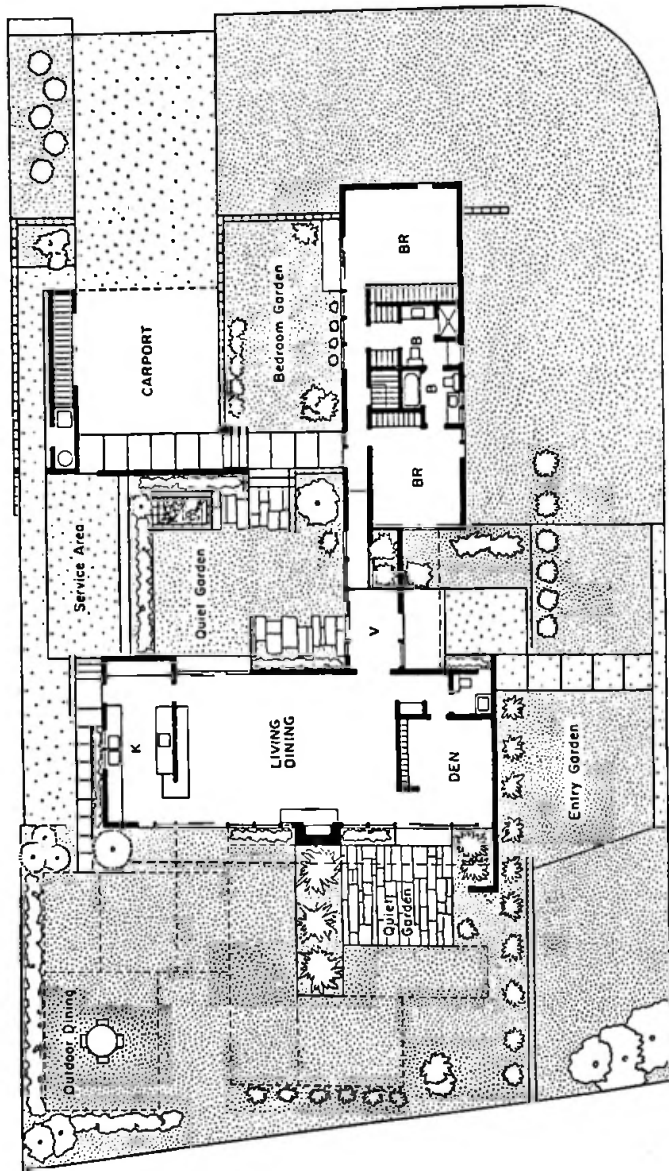


FIG. 22. SPECIFIC GARDEN AREAS RELATED TO INDIVIDUAL ROOMS

from those indoor areas which they are to extend and supplement. When properly planned, the indoor and outdoor areas will often appear to be one space.

Neighborhood Landscaping

Fundamental Considerations

95. For the individual home owner, problems of landscaping are usually confined to the relations that exist between an individual house and lot. Frequently, one of these problems is to make the best of a lot in a neighborhood in which little thought was given to landscaping when the area was originally subdivided. Today, fortunately, there is a realization that it is a short-sighted policy to develop an area solely with the idea of obtaining as many lots as possible, and that the best results are obtained when the landscaping is considered in the initial stages of planning the neighborhood.

It is not within the scope of this text to consider the many aspects of site planning. However, in planning any neighborhood, basic considerations such as access, privacy, shade, and windbreaks are fundamental.

Cluster-Type Plans

96. In planning a neighborhood, it is desirable to plan the access roads so as to discourage through traffic while still affording a direct approach to each plot. Various types of plans can be used to accomplish this end. One of these is the cluster-type plan.

A cluster-type plan may include a few or many clusters of houses. Each cluster is built around a court. Parking space is provided in the court. The access roads afford an approach to the neighborhood but discourage through traffic.

A single cluster of homes arranged around a central court

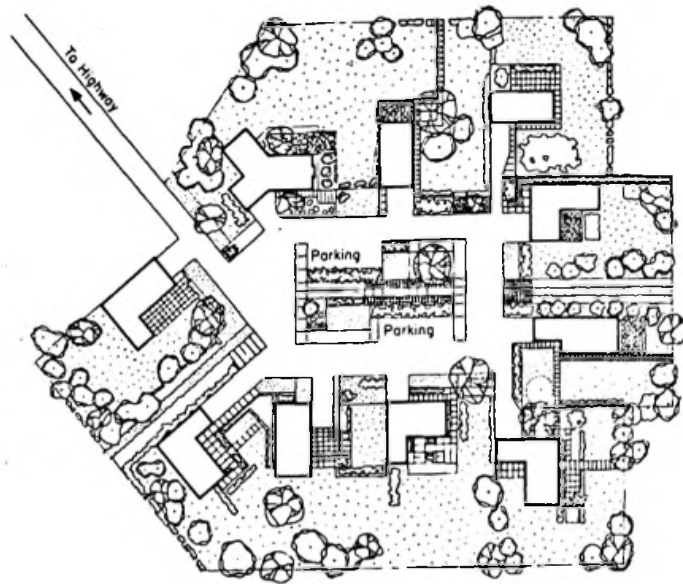


FIG. 23. CLUSTER OF HOUSES AROUND COURT

is shown in Fig. 23. Access is by a road which does not permit through traffic. The houses are on small lots but are surrounded by open greens. Notice the variety in appearance afforded by the manner in which each house is placed. Notice also the extent to which each house enjoys privacy. In Fig. 24 is shown a neighborhood site plan which contains several clusters. The whole neighborhood is surrounded by open areas which include walking and bridle paths, a golf course, a sewage-disposal plant, a recreation center, a shopping center, and a natural play area. Religious and educational facilities, though not shown on this plan, are not too far distant.

The cluster plan has several advantages. It preserves the rural character of the land by retaining stretches of open fields and stands of trees, and by leaving undisturbed such natural

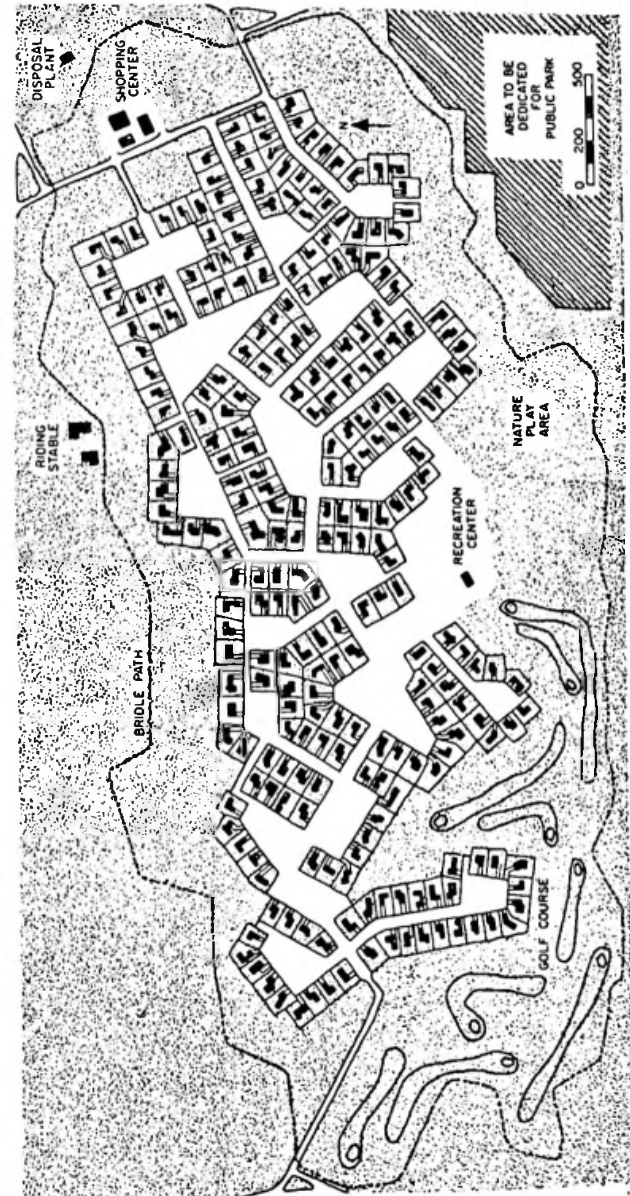


FIG. 24. CLUSTER-TYPE PLAN FOR A COMMUNITY



FIG. 25. TALL TREES FOR WIND Baffles; MEDIUM-HEIGHT TREES FOR SHADE; LOW SHRUBBERY FOR PRIVACY

assets as brooks and hillocks. Natural obstacles can be bypassed. Roads and utility costs thus are greatly reduced. By retaining the natural conditions of land and trees, it is often possible to save money in development and to have a more valuable and attractive neighborhood in the end.

The common facilities of a neighborhood, such as the sewage-disposal plant, recreation center, bridle paths, and golf course, can be owned by the municipality or by a private association of the homeowners.

Better looking streets and more interesting vistas can be planned where roadways are curved and the houses are set back from the street on large lots and in staggered fashion.

Community Planting

97. Since visual environment is an important psycholog-

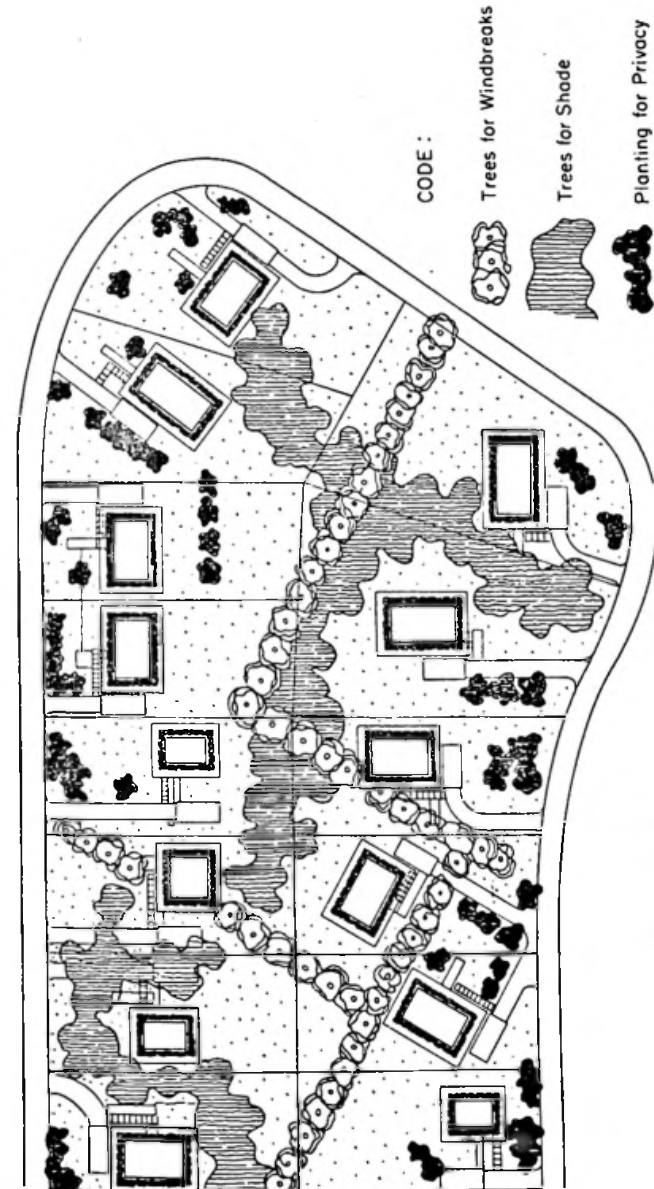


FIG. 26. PLANTING FOR WINDBREAKS, SHADE, AND PRIVACY

ical factor in everyone's life, the overall landscape problem should be considered in advance. In planning a new neighborhood, whether it is part of a large tract or a small piece of land, and whatever type of plan is to be used, the lots should be planned to permit houses to be so located as to preserve the best trees. Many fine trees have been destroyed by builders who felt that they could save time by building on completely cleared land. The landscape architect should survey the area and mark the trees which should be saved. He should take into consideration the future locations and orientations of the houses in order to give each home the best view while still securing shade and maximum privacy. As in nature, a continuity of major tree planting can create a unified appearance by relating houses to each other as well as to the surrounding terrain.

Planting is necessary for sunlight and wind control; such control is important if space is to be livable. Plant materials can be classified according to use into three major groupings, as illustrated in Fig. 25.

1. Tall trees for wind baffles, such as poplars, cypresses, and elms.
2. Medium-height trees for shade, such as maples, walnuts, olives, and peppers.
3. Low shrubbery for visual screens and control of wind-blown debris, such as boxwood and privet; as a rule, planted screens can be more beautiful than man-made screens.

In Fig. 26 is shown the layout of a neighborhood that has been planned with consideration for these three types of planting. The straight geometric lines of trees, in this particular case, are placed to control storm winds. This tall tree pattern is rigid. In pleasant contrast, the random planting of medium-height trees, indicated on the drawing by vertical hatching, forms intimate shade areas. The solid black areas

indicate the low shrubbery which provides privacy between lots and around the house.

Summary

98. Although, you may find that most of your landscaping problems will be confined to the relations that exist between an individual house and lot, you may at some time or other become involved in the development of an entire neighborhood. In such a case, you should keep in mind such fundamental considerations as access, privacy, and the control of wind and sun.

When a neighborhood group of homes is being planned, the existing trees, natural grades, and elevations of the entire site should be carefully considered. By retaining the natural conditions of land and trees, it is often possible to save money in development and to have a more valuable and attractive neighborhood.

99. This completes your study of this text, but we hope not your study of landscaping, which is closely related to many of the problems of everyday living.

You have learned that the object of landscape architecture is to achieve utility and beauty in the fullest use of the outdoors. The outdoor space consists of such familiar elements as ground, water, sky, and structures. Many of the same factors govern landscaping as govern architectural design; some of these are scale, unity, proportion, contrast, and color.

Fundamentals of Landscape Architecture

Serial 6417-1

Edition 2

Examination Questions

Notice to Students.—Study this instruction text thoroughly before you answer the following questions. Read each question carefully and be sure you understand it; then write the best answer you can. You will profit most if you answer the questions in your own words. When you complete your work, examine it closely, correct all the errors you can find, and see that every question is answered; then mail your work to us. DO NOT HOLD IT until another examination is ready.

1. What aid is generally required before you can lay out the landscaping for a house on a hill site?
2. In planning the landscaping for your home, how can you utilize a pool as an element in the design?
3. Explain briefly what considerations you would keep in mind in selecting trees for your home site.
4. In planning an outside area, what consideration should determine the location of walks, steps, and paths?
5. What are the primary objectives of landscaping?
6. What basic change has occurred in recent years in the concept of garden design?
7.
 - a) Name *five* trees, each with different physical characteristics.
 - b) Name *five* perennials, each with different physical characteristics.
 - c) Name *five* vines, each with different physical characteristics.
8. Where would you place the outdoor living area of a house in relation to the house?

I O S