

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**

**O. M. BEKETOV NATIONAL UNIVERSITY  
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Methodological Guidelines

for practical and independent work  
on the discipline

**“ARCHITECTURAL DESIGN:  
INDIVIDUAL RESIDENTIAL BUILDING”**

*(for second-year full-time foreigner students  
first (bachelor's) level of higher education  
specialty 191 – Architecture and town planning)*



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## INTRODUCTION

The methodological guidelines provide the material necessary to perform practical tasks and tasks for independent work of students in the study of the discipline “Architectural design: Individual residential building”.

The purpose of these recommendations is to acquaint students with the peculiarities of the formation of individual houses of increased comfort.

In the methodical recommendations the theoretical information on designing of individual apartment houses of the increased comfort is considered, regularities of their formation are considered, the typological characteristic is resulted, and features of formation of an art image of an individual apartment house are considered. The peculiarities of the formation of the planning structure of both a residential building and a plot in the form of a small garden are described, as well as the basics of constructive solutions of individual residential buildings of increased comfort with the use of the most modern materials.

When studying the discipline of architectural design of graphics, students need to perform architectural and construction drawings, complete a general plan of the territory and visualization of the interior and exterior of an individual residential building. Acquiring the skills of reading and executing project drawings, mastering modern methods of creating graphic images of an individual residential building, the ability to arrange equipment in such buildings is an integral part of the process of preparing a future architect.

# 1 CLASSIFICATION AND STYLISTIC FEATURES OF FORMATION OF INDIVIDUAL RESIDENTIAL BUILDINGS

In construction and designing it is necessary to consider classification of individual apartment buildings on size, stardom, storeys and location. Changing social and economic conditions in our country has made it possible to realize the dream of many people is to build their own home.

In previous years, own housing was understood, first of all, as a rural individual house, limited to an area of 60 m<sup>2</sup> and, to some extent, a garden house on 6 acres. In the last decade, housing estates have grown around the cities from their own family houses. As design practice shows, in recent years the approach of the investor (customer) to solving the problem of building your own home is changing. This is largely due to increased information on the design and construction of single-family housing. A large number of magazines devoted to the design and construction of their own houses are published, some architectural magazines publish catalogs of single-family housing projects, and interesting houses are built.

The analysis of individual residential buildings of increased comfort, taking into account the occupied area of the house, number of storeys, the composition of the premises, the nature of their location and the relationship allows us to identify the following objects (Table 1.1).





*Residence* is a very expensive residential building with an area of more than 1 000 m<sup>2</sup> with a large plot of land located in a prestigious area of the city or suburban area.

*Villa* is a very expensive, highly comfortable, large manor house, located on a large territory in the natural environment area. The total area of the building is 400–600 m<sup>2</sup> and more. The composition of the premises is individual. As a rule, in addition to the main living and utility rooms design various rooms for non-family communication and recreation – living rooms and fireplaces, home theater, library, health complex with gym and pool, winter garden and much more. The architectural solution of the interior has original shapes and style. The architectural form of the house reflects the extreme individuality of the owner. Design of some buildings are became close to the palace architecture.

*Mansion* is an expensive comfortable house, mainly in urban development, a large area on several levels, has an individual planning and architectural and artistic solution. The area of the premises significantly exceeds the normative ones. On the first floor of the mansion there is a hall, a living room, a kitchen, a dining room, a common room, an office (library folder), a terrace, a veranda, on the second floor there are bedrooms, dressing rooms, games rooms, several bathrooms; in the attic

(third) floor there are rooms for guests, in the basement (basement) there is a garage for 1–2 cars, a workshop.

Table 1.1 – Typological characteristics of residential buildings

Typological characteristics		
TYPOLOGICAL CHARACTERISTICS OF INDIVIDUAL RESIDENTIAL BUILDINGS		
Type of residential building	Brief description of residential building	Priority types of intermediate recreational space
<p>VILLA</p> 	<p><b>Villa</b> is a large manor house, located in a natural environment. The total area of the house is more than 400 m<sup>2</sup>. The villa has a well-developed composition of the premises. The area of a small garden is 1-5 hectares.</p>	<p>GARDEN ON THE ROOF WINTER GARDEN</p> <ul style="list-style-type: none"> <li>➤ BALCONY</li> <li>➤ LOGGIA</li> <li>➤ BOW WINDOW</li> <li>➤ TERRACE</li> <li>➤ PATIO</li> </ul>
<p>MANSION</p> 	<p><b>Mansion</b> is a medium-sized house with an area of 300-400 m<sup>2</sup> for average and large families. It is built of natural materials with the inclusion of elements of the natural environment. The area of the small garden is 0.12-2 hectares.</p>	<p>WINTER GARDEN</p> <ul style="list-style-type: none"> <li>➤ BALCONY</li> <li>➤ LOGGIA</li> <li>➤ TERRACE</li> <li>➤ PATIO</li> </ul>
<p>COTTAGE</p> 	<p><b>Cottage</b> is an average house (from 100 to 300 m<sup>2</sup>) for middle-class families with the predominance of typical planning schemes and the inclusion of elements of the natural environment. The area of the small garden is 0.6-0.12 hectares.</p>	<p>WINTER GARDEN</p> <ul style="list-style-type: none"> <li>➤ BALCONY</li> <li>➤ LOGGIA</li> <li>➤ TERRACE</li> <li>➤ PATIO</li> </ul>
<p>BUNGALOW</p> 	<p><b>Bungalow</b> is an one-storey small residential building up to 100 m<sup>2</sup> for low-income families, usually with a simple planning structure. The area of the small garden is 0.3-0.6 hectares.</p>	<ul style="list-style-type: none"> <li>➤ BALCONY</li> <li>➤ TERRACE</li> <li>➤ PATIO</li> </ul>

*Cottage* is a small two-storey house with rational planning structure of building. On the first floor of the cottage a hall, a common room, a kitchen-dining room, toilets, a living room and a firebox are designed, on the second floor are designed bedrooms and a bathrooms. A garage, storage room and other additional premises are being designed in the ground floor. The garage can be attached to a residential building. The composition of sanitary facilities and equipment depends on the level of wealth of residents. Open spaces elements of buildings: terraces, verandas, loggias, greenhouses allow increase the level of living comfort.

The presented classification of individual houses allows the investor to approach the choice of the project of the future construction more responsibly, which in turn will allow to use the invested funds more effectively.

Present-day residential architectural styles are often short-lived trends and is mostly bound to what is popular within a specific region at a particular point in time. House design themes are often diverse interpretations of various earlier historic architectural styles, and due to the fact that many current residential architectural styles does not fit into a single category because of new regularly emerging eclectic mixes, fitting a home into one specific style group can be quite impossible.

Concept Plans' floor plan designs does not have any particular theme implied, allowing you the uninfluenced freedom to decide on the final style after selecting your ideal plan. Our floor plans are divided into only four simple plan categories (box shaped, traditional, classical and freeform) from which a multitude of house styles can be derived [1].

Below follows a list of the most distinctive underlying architectural styles used for house theming. This information might help you pick out the architectural style you want your ideal house floor plan to follow.

### **Contemporary style**

Contemporary house design is rooted in the moment and is an ever-changing term. It is used to define what is trendy and in style now. Usually an approach, with a strong emphasis on line and form, is taken and is often designed to incorporate the surrounding landscape into their overall minimalist look. Often large panes of glass, has a lack of embellishments, and have unusual mixtures of wall materials – stone, brick, and wood, for instance. Contemporary houses are designed with abundant open space and natural light in mind, which makes them feel airy and expansive. Because there is not any clutter, every element counts.

You will often hear the terms *contemporary* and *modern* tossed about interchangeably, but they are not really the same style. Modern refers to a specific design movement that arose in the early 20th century and follows stricter guidelines; contemporary, by definition, is more fluid and tolerates a bit of rule-breaking (Fig. 1.1).

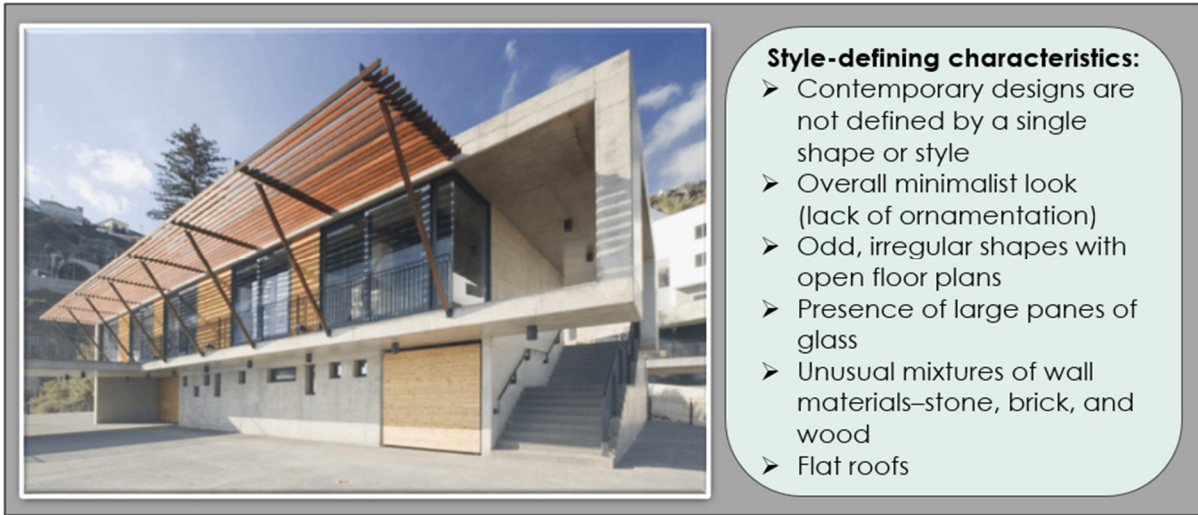


Figure 1.1 – Contemporary style house design

### Modern

Although in a way similar to the Contemporary style, Modern and Contemporary styles tend to get confused. Modern architecture is generally characterized by simplification of form and an absence of applied decoration, but the term *modern* indicates an exact time period in architectural design history during the mid-20th century and strongly reflects the emergence of new technology and advances in engineering.

Modern architecture refers to design inspired by the historical art movement of modernism. Modernism was a rejection of the ornate trimmings of other design styles and usually has a flat plane, minimalist look. It also plays heavily on clean & straight vertical and horizontal lines and has a utilitarian form follows function aesthetic. World War II brought new materials, such as steel, chrome and plywood and are often used with primary materials and colours. These are the basic themes of modern design, although the actual application can vary greatly (Fig. 1.2).



Figure 1.2 – Modern style house design



## Farm (Ranch) style

Farm style homes are inspired by farmer's houses built after World War II, and are designed to resemble rural Western farm houses or ranches. Changing lifestyles were reflected in these floor plans and this western inspired architecture typically has single storey wide open floor plans for with limited interior walls and vaulted ceilings.

Farm style homes is also designed so that they are easily accessible with wraparound patios and porches and sliding-glass doors creating new ways to connect the interior to the outside spaces. Automobile ownership became a necessity due to the wide-spread community living and most farm (ranch) homes also feature attached garages. Focused on accessibility and practical living, farm or ranch style homes is usually a minimalist design style but exterior facades may vary significantly (Fig. 1.3).



Figure 1.3 – Farm style house design

## Neo-Classical style

At the end of the 18th century, many western societies felt that ancient Greece expressed the ideals of democracy and their architecture reflected classical ideals of order and symmetry. In its purest form it is a style principally derived from the formal proportions and classic beauty of the architecture of Classical Greece and Rome.

Greek revival houses can be identified the style by its entry, full-height, or full-building width porches, entryway columns sized in scale to the porch type, and a front door surrounded by narrow rectangular windows. Roofs are generally low pitch gabled or hipped. Large and imposing, homes built in this style convey a sense of wealth and authority (Fig. 1.4).



**Style-defining characteristics:**

- Symmetrical shape with elaborate doorways and evenly spaced windows
- Tall columns supporting triangular pediments
- Light or white painted plaster exterior
- Shallow-pitched gable roofs
- Bold mouldings and embellishments

Figure 1.4 – Neo-Classical house design

**French provincial style**

This formal style has a lot of decorative appeal and a romantic feel and is inspired by the manor homes, or chateaus, built by the nobles in the French countryside in the 1600s. In the original versions of this style, perfectly balanced and symmetrical windows and chimneys, steep hipped roofs, balconies and porch balustrades, rectangle doors set in arched openings and double French windows with shutters are the most common defining characteristics.

Today’s housing developments are incorporating the French provincial style with symmetrical building and window proportions, steep roofs often including small balconies in mostly neutral colours (Fig. 1.5).



**Style-defining characteristics:**

- Symmetrical & well balanced proportions
- Steep hipped roofs
- Balconies and porch balustrades
- French windows with shutters
- Top level windows often have a curved head that breaks through the roof line
- Rectangular doors in arched openings

Figure 1.5 – French provincial house design

## **Mediterranean (Spanish Eclectic) style**

Mediterranean-style homes mimic those traditionally found in Mediterranean countries, particularly Spain, Portugal, Italy and North Africa. Because this house style often combines many different styles, some people use the term Spanish Eclectic. The word eclectic is used to describe architecture that mixes traditions. These early 20th century homes combine details from Spain, the Mediterranean, and South America. They capture the flavour of Spain without imitating any one historic tradition.

These houses usually have low-pitched red clay half-round tiled roofs, white rough plastered walls, and rounded windows and doors. Other elements may include arches, especially above doors, porch entries and main windows elaborate wrought iron grilles, door hinges, handles and decorative tiles around doorways and windows are also common features. Also, a U-shaped layout with courtyards, patios and open arches that allow for breezes to flow freely through the house and verandas is often associated with this lifestyle (Fig. 1.6).



Figure 1.6 – Mediterranean house design

## **Tuscan style**

Tuscan themed design exemplifies the romance and aesthetic of the Italian region of Tuscany. From Pisa to Florence, the picturesque Tuscan landscape is filled with quaint villas and homes built with elegant, classic exterior lines in rustic, earth-tone colours on the sloping hills of the Italian countryside.

Present day Tuscan-themed houses combines modern elements with classic Italian design, resulting in an attractive fusion of Old-world charm and simple elegance. Tuscan designs are in some ways similar to Mediterranean style and typically feature plastered exteriors sometimes with stone accents on the corners, terracotta roof tiles and tall windows with shutters (Fig. 1.7).



Figure 1.7 – Tuscan house design

### **Tudor style**

The Tudor style is a revival style of home that borrows from Great Britain between the 15th and 17th century which often seem indicative of childhood fairy-tale castles. It typically has exposed heavy dark beams arranged in perpendicular, horizontal, and some at a forty five degree angle against the facade.

The exterior walls are usually plastered between the beams. Some refer in style to humble cottages with thatched roofs, whilst other were built on a grander scale as vast mansions. The lower story is usually of brick or stone. Boxed bay windows diamond shaped panes and large chimneys are common features (Fig. 1.8).



Figure 1.8 – Tudor house design

### **Gothic style**

Often associated with medieval churches and cathedrals of the 12th century, the Gothic revival style's attractive and romantic architecture, reflects people's taste

for buildings inspired by old-fashioned design. Gothic is an architectural movement that began in the late 1740s in England. Its popularity grew rapidly in the early 19th century, in contrast to the neoclassical styles prevalent at the time.

Gothic Revival is a variation of the Victorian architectural language characterized by a vertical emphasis, church-like appearance. Gothic Revival architecture often has certain features, derived from the original Gothic architecture style, including: steeply pitched cross-gable roofs, decorative patterns, Gothic arches and pointed windows. Floor plans are usually asymmetrical and irregular (Fig. 1.9).



Figure 1.9 – Gothic house design

### Victorian style

This type of architecture stems from the Victorian period. Victorian refers to the reign of Queen Victoria (1837–1901), called the Victorian era. Mass-production and mass-transit made ornamental parts affordable and architects and builders of the time applied decoration liberally. As a result, late Victorian homes became increasingly ornate and you'll find lots of brackets, spindles, scrollwork and other machine-made building parts.

Even though a common mental image of a 'Victorian' home is commonly associated to a dollhouse with elaborate trim and bright colours, this style is actually combination of several different well-known styles including Gothic, French and even Egyptian! The Victorian style of the 1880s came into fashion at the height of the mass-production of architectural trim. These elaborate, brightly coloured homes with excessive ornamentation and lacy wood or metal trimmings are usually the image when people think of a typical Victorian home (Fig. 1.10).



**Style-defining characteristics:**

- Complex, asymmetrical shape
- Decorated with lacy elaborate wood or metal trim,
- Steep and pointed roofs – sometimes with round or octagonal towers
- Large wraparound porches with ornamental spindles and brackets
- Combinations of multiple, vibrant colors
- Tall, narrow windows
- Decorative wooden brackets, patterned shingles, clapboard siding

Figure 1.10 – Victorian house design

**Art Deco style**

The Art Deco style resonated origins of the Machine Age with geometric decorative elements and a vertically oriented design language. Rich colours, bold geometric shapes, and lavish ornamentation often including the zigzag patterns found in Aztec and Mayan art often characterize the eclectic style.

Art Deco first appeared in France in the 1920s, flourishing internationally in the 1930s and 1940s where after its popularity waned after World War II. Although this style was never commonly used in residential buildings, it was very distinct in the urban landscape of public and commercial buildings of the period and represented luxury, glamour, exuberance, and reliance in technological progress (Fig. 1.11).



**Style-defining characteristics:**

- Eyebrows (cantilevered window shades) in the building's structure
- Use of Ziggurat's (stepped pediments)
- Rounded Corners
- Flat roofs
- Groupings of three elements together
- Horizontal banding on the facades
- Centrally balanced geometric forms

Figure 1.11 – Art Deco house design

## 2 DESIGNING OF A GENERAL PLAN OF THE TERRITORY NEAR AN INDIVIDUAL LOW-RISE RESIDENTIAL BUILDING

- 2.1 Site for location of individual residential building
- 2.2 Architectural and planning solutions of master plans
- 2.3 Implementation of the master plan drawing

### 2.1 Site for location of individual residential building

A site can be where an existing house or apartment is located or where you design or build a new one. For estimate of existing situation you need to do site evaluation. You need to choose site on topographic map of territory scale 1:2000.

Planning controls can have a major influence over your design.

Decide which climatic features need to be taken into account, in order of priority, and assess the impact these features will have on your planning. Determine which climatic features to enhance and which to mitigate in order to increase comfort and decrease energy use. Decide whether solar access or access to cooling breezes takes priority. Is one or the other more important in your climate? Consider the likely impacts of a changing climate (Fig. 2.1, 2.2).

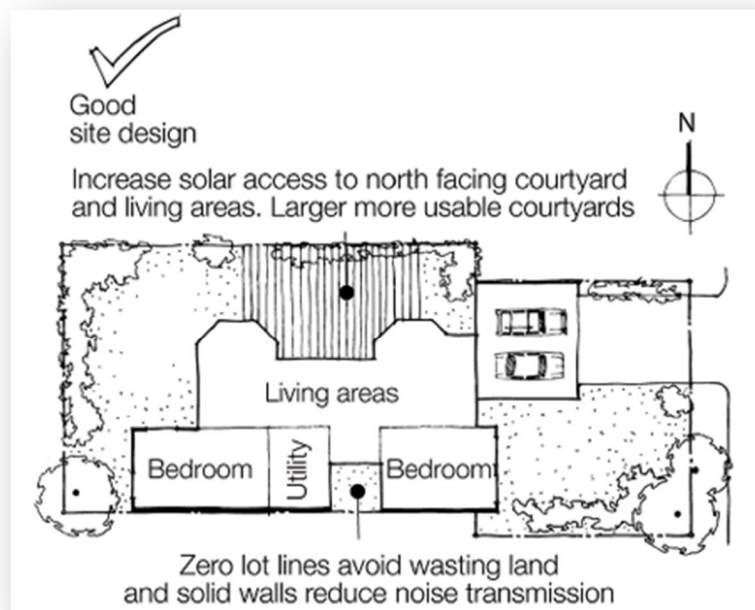


Figure 2.1 – Good site design

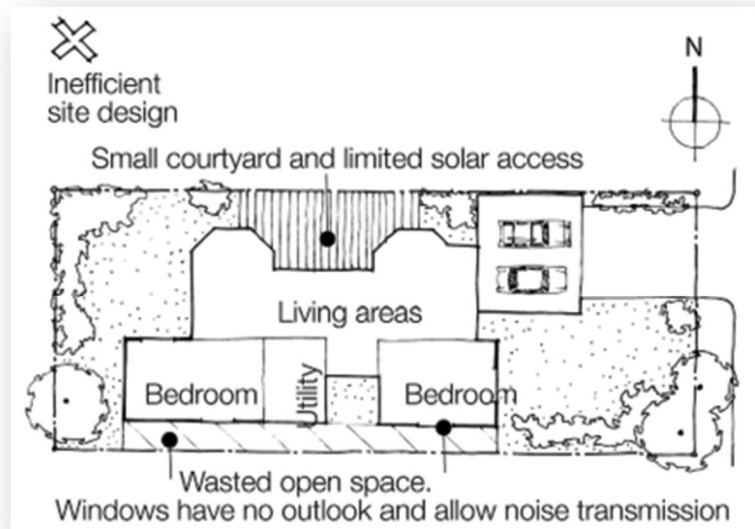


Figure 2.2 – Inefficient site design

Note the size, orientation and slope of the site. Ensure that the opportunities for solar access are appropriate to the climate. Assess the microclimate (e.g. seasonal temperatures, humidity levels, prevailing winds).

Observe the potential for overshadowing, loss of privacy and noise from neighboring areas. Shadow impact is influenced by latitude, height and spread of trees, and may affect the way the house is sited.

Identify vegetation that can be incorporated into open space, used for wind protection or used as part of the site drainage system. Make it a priority to retain native vegetation where possible. Identify rare or endangered plant and animal species associated with the site.

Investigate the geology and topography of the site. Is there a threat of landslide, soil slip or creep?

Assess potential natural hazards such as bushfire risk and flooding.

Identify any natural site drainage patterns and determine how they can be maintained. Steeper sites usually generate more storm water runoff.

Consider how your plan interacts with the site. A house can be almost any shape provided the living spaces are orientated and designed to maximize the benefits of solar access, cooling breezes, summer shading and wind protection.

A house designed to respond to site conditions can optimize lifestyle, improve energy efficiency and protect the quality of the natural environment.

Carefully consider the relationship between the floor plan and the site. Good indoor-outdoor relationships are a desirable aspect of lifestyle in all climates. Where possible, avoid having your windows and outdoor living areas directly facing those of neighbor's buildings (Fig. 2.3) [2].



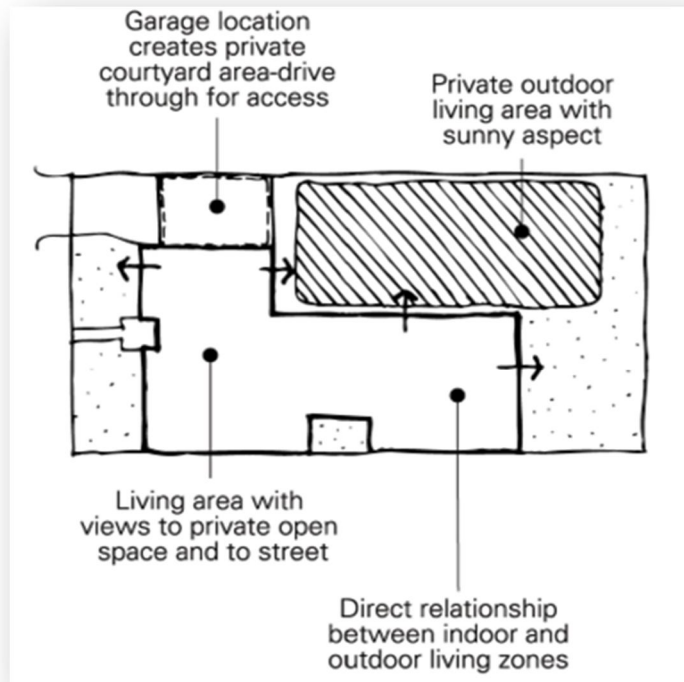


Figure 2.3 – Indoor-outdoor relationships

## 2.2 Architectural and planning solutions of master plans

The building, other structures, and paved areas should be located outside natural drainage ways on a site to escape flooding and avoid negatively affecting the quantity and quality of water flowing through a site. To minimize grading, the house and site structures should be located on relatively level ground or parallel to the contours, as portrayed in Figure 2.4.

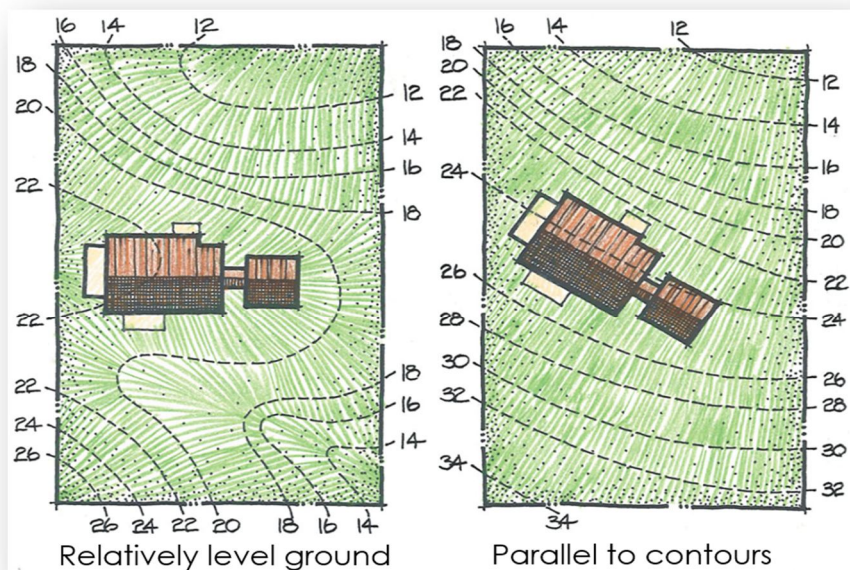


Figure 2.4 – Location of building

Before being able to effectively design with sun, it is necessary to understand the movement of the sun throughout the day and at different seasons of the year. The sun's relative position in the sky is constantly changing in its plan orientation as well as its angle above the horizon (Fig. 2.5).

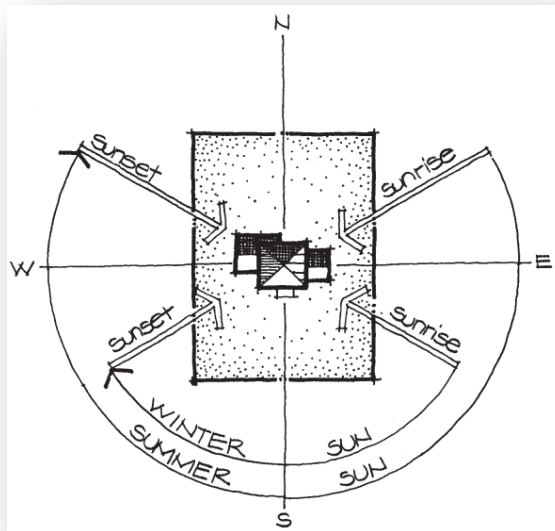


Figure 2.5 – Sun's relative position

In the second stage, after selecting a site for the placement of a residential yard according to the above criteria, a design project is developed, which takes into account:

- compliance of the organization of a small garden with the recreational needs of the residents of the house (taking into account demographic factors);
- presence of an original design is the concept of forming a residential yard, taking into account the demographic composition of the family;
- need to form an individual artistic image of a small garden, taking into account the natural factors of the environment;
- application of modern materials and technologies in the formation of architectural and landscape environment.

The design concept is determined taking into account the factors that influence the choice of historical or modern style of a small garden.

Of great importance in the formation of a small garden for individual yard are the favorable location of the site and the level of its comfort, on which depends the nature of the formation of its architectural and landscape environment (Table 2.1).

The zoning of the small garden, which meets modern requirements, should be clear. Clear functional zoning of a small garden with the allocation of a large number of different zones can meet the needs of any person. A small garden, located in places of permanent residence, creates a certain comfortable psychological atmosphere.

Table 2.1 – Formation criteria and zoning of the territory of residential buildings



The formation of the planning structure of a small garden is due to the functional zoning of the territory and the definition of planning elements in the zones. The main tasks of forming a small garden are isolation from the surrounding

buildings, organization of approaches and entrances to the main building, placement of recreation areas, creation of pedestrian routes, tracing of main and secondary alleys, etc.

Examples of two variants of spatial planning solutions of small garden are shown in Figures 2.6, 2.7, 2.8, 2.9.

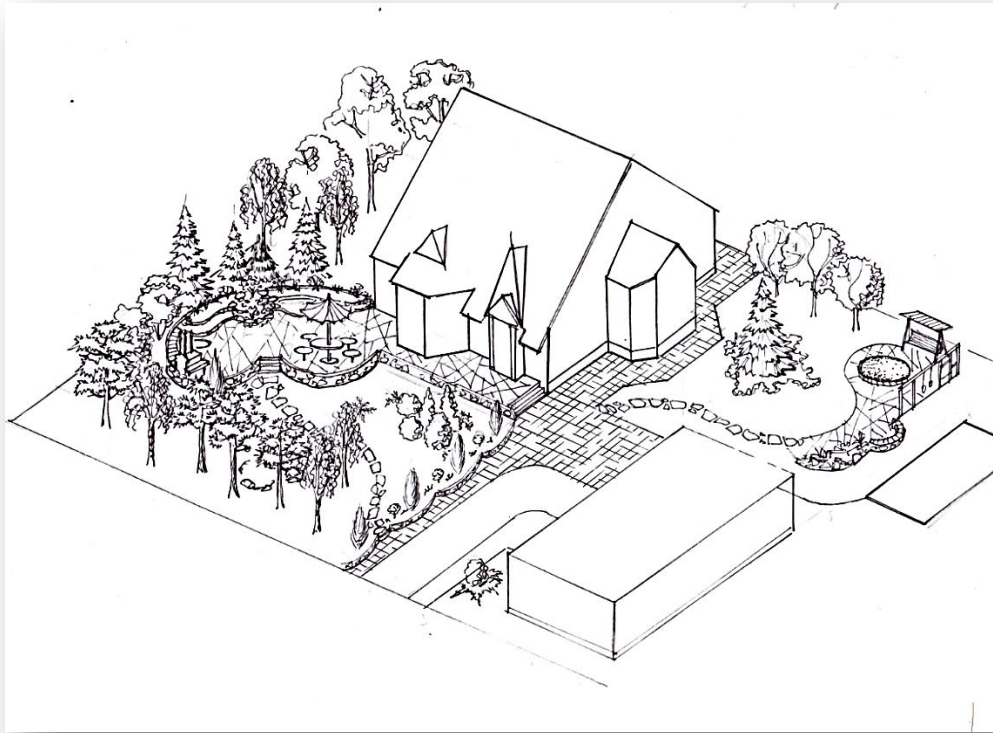


Figure 2.6 – View of a small garden

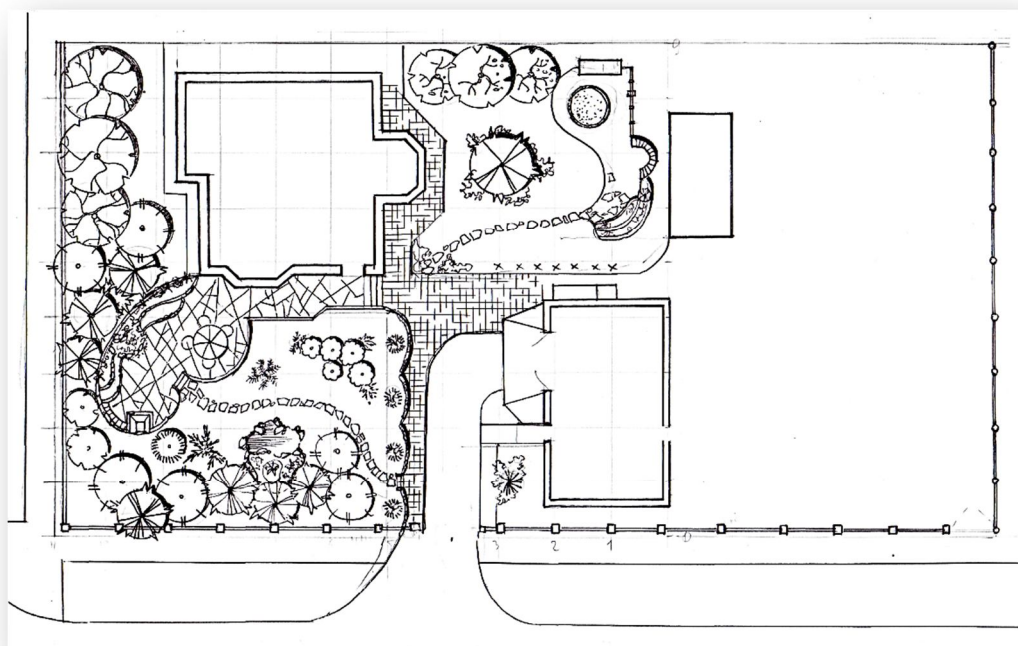


Figure 2.7 – Planning solution 1 of the small garden

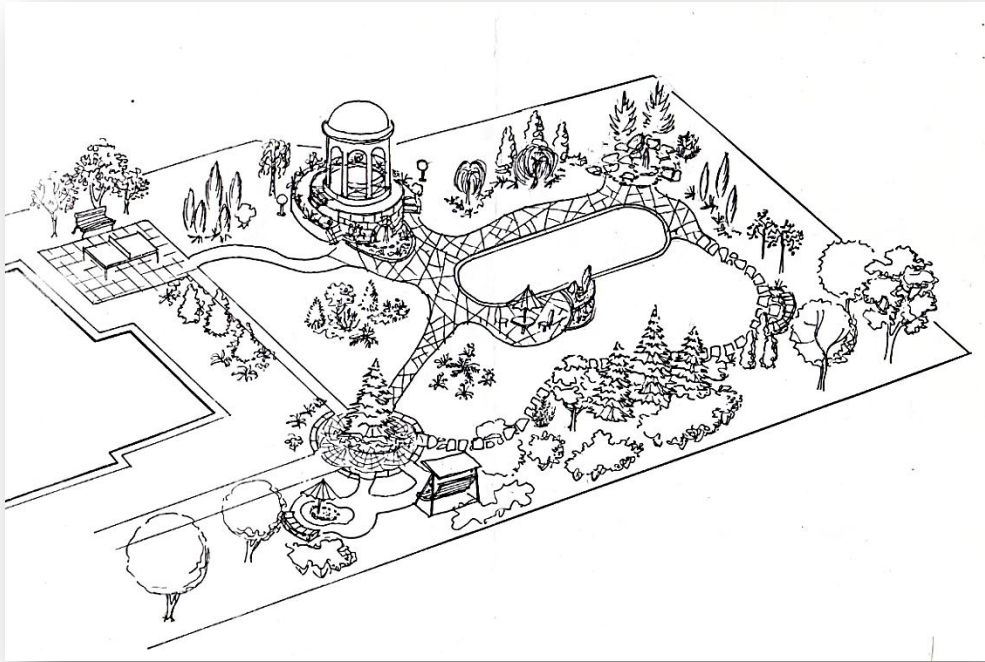


Figure 2.8 – View of a small garden

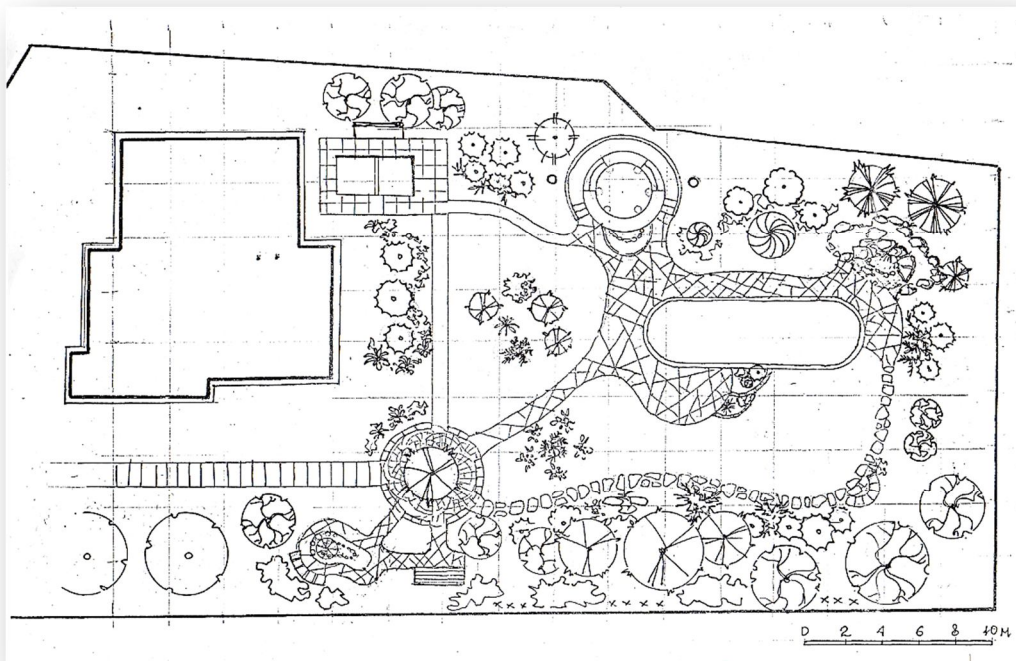


Figure 2.9 – Planning solution 2 of the small garden

When designing a planning solution for a small garden, all these basic issues must be solved. The most difficult task is to identify the artistic image of a small garden. A variety of combinations of relief, water and vegetation create the basis for the formation of numerous landscape compositions with high emotional impact. In

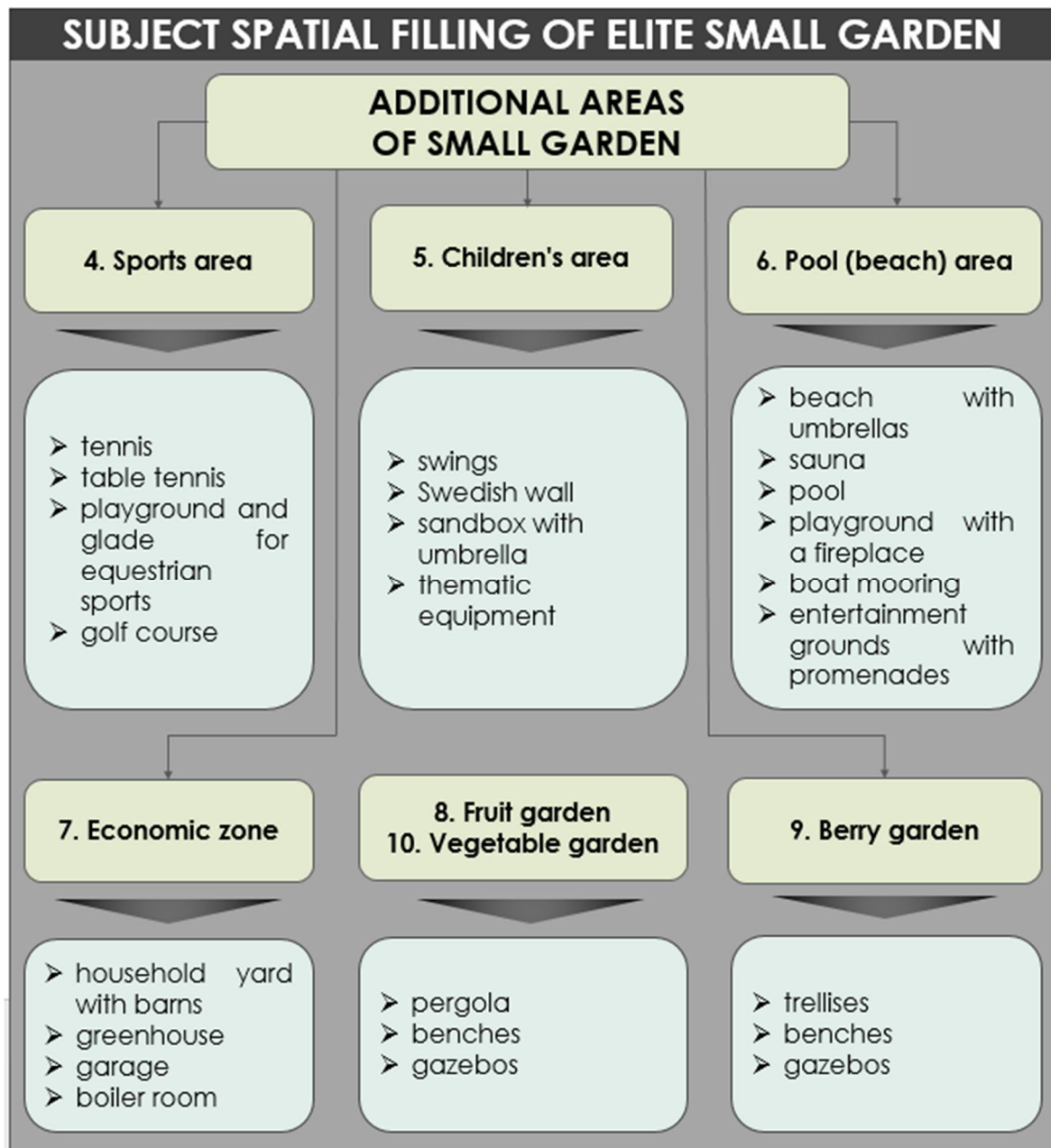
each case, one of the elements of the landscape acts as a leader. Rich historical experience can be used to reveal the artistic image of a small garden.

An elite small garden should have a clear functional zoning, which determines its subject-spatial content. The artistic image of the garden can be solved using historical and modern stylistics. The planning task is to arrange the rooms and premises of the house into a single spatial organism to create a living environment of increased comfort (Table 2.2, 2.3).

Table 2.2 – Main zones of small garden



Table 2.3 – Additional zones of small garden



The basis of the planning decision, which influences the formation of the artistic image of a small garden, are the natural landscape components are relief, water and vegetation, the competent use of which allows to give the site an individual look. Creating the most convenient and comfortable conditions for recreation, an organic combination of outdoor and indoor spaces, the use of new building materials and modern technologies are the main tasks in the design of a small garden.

The master plan is a refinement or modification of the preliminary design that is drawn more precisely and with greater detail. For example, plant materials are usually drawn as generalized masses on the preliminary plan, whereas they are shown

as individual plants within masses on the master plan. Planning solution of individual residential yard is shown in Figure 2.10.

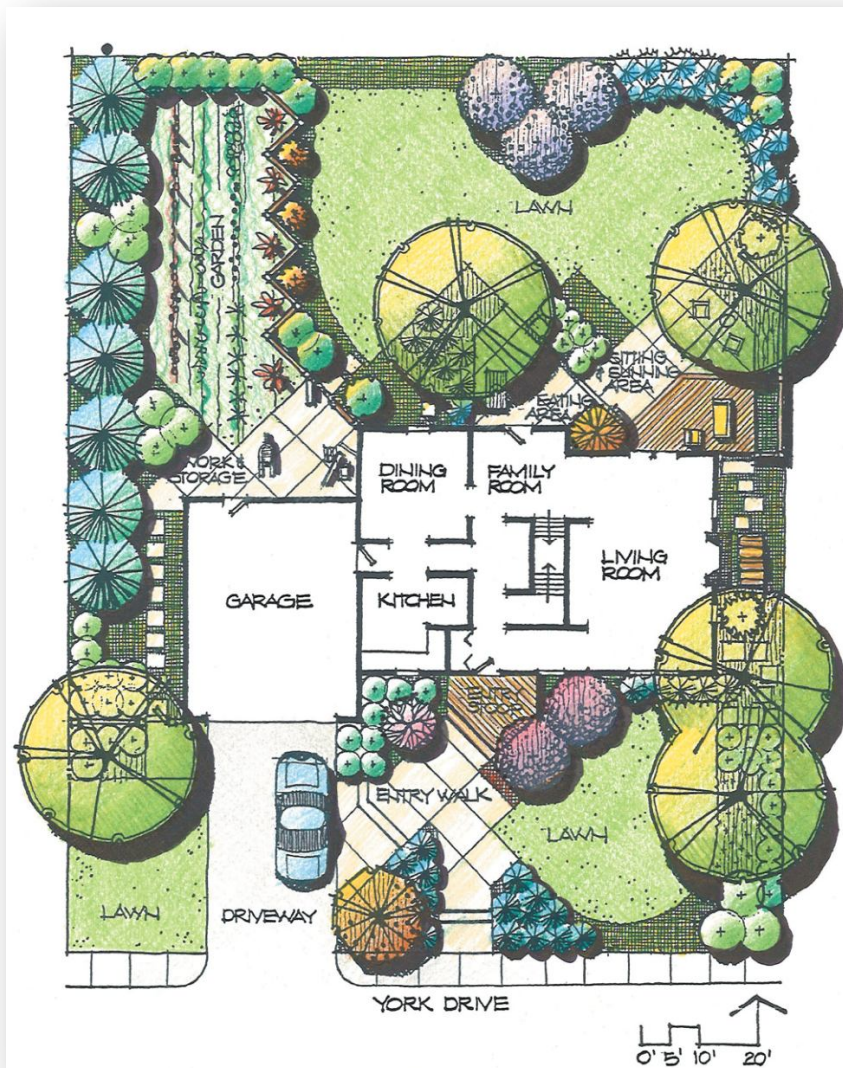


Figure 2.10 – Planning solution of individual residential yard

Also, the exact species of plant materials are likely to be specified on the master plan, whereas only general terms identify plants on the preliminary design. In addition, the form and outline of structural elements such as pavement areas, walls, and steps are apt to be drawn with more exactness in the master plan.

The initial idea of the master plan is developed in the form of a sketch. It will show the contour of the building and the location of functional areas around the house. Interrelations between zones are developed and the direction of the basic movement between zones and communication with premises of the house is specified (Fig. 2.11, 2.12). For master plan understanding on drawing usually use conditional symbols (Table 2.1).



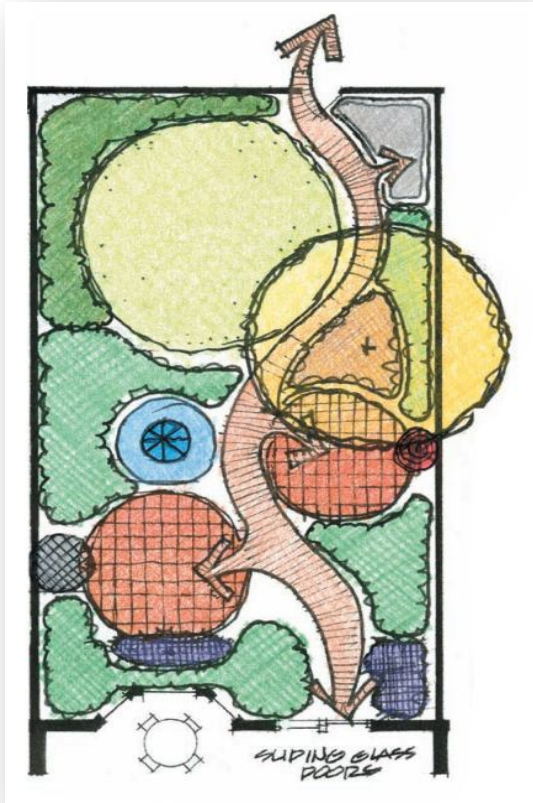


Figure 2.11 – Initial planning solution functional diagram

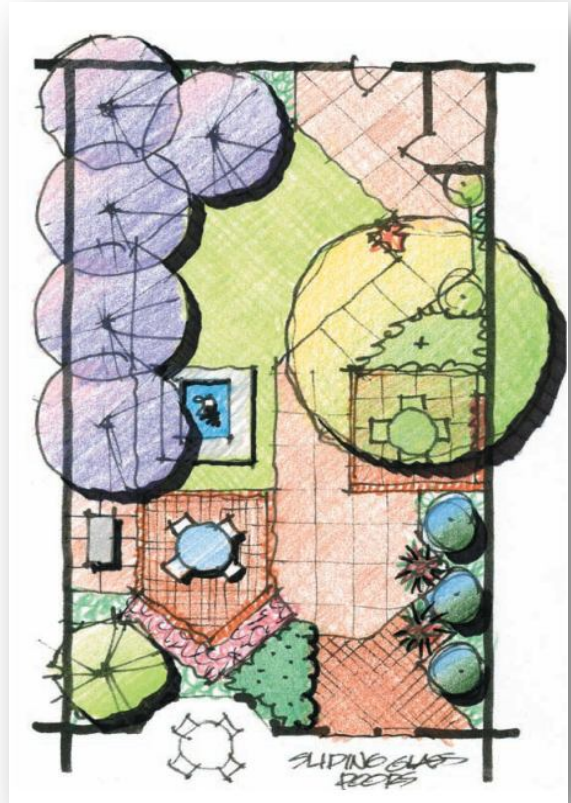


Figure 2.12 – Final planning solution

Landscape design examples of patio area near of building on master plan drawing are shown in Figure 2.13, 2.14.

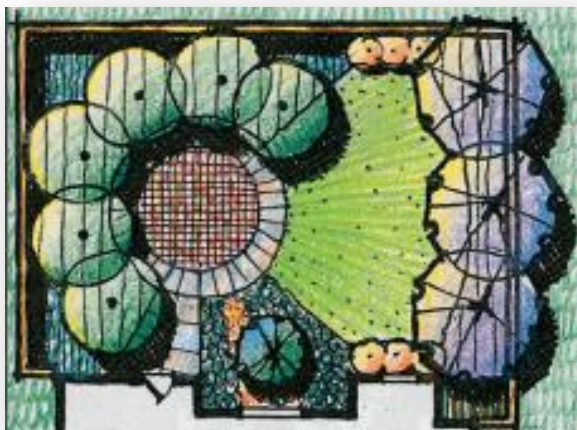


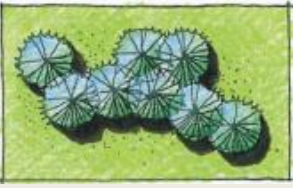
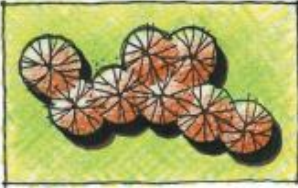












Figure 2.13 – Landscape design (site 1)

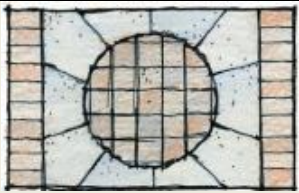
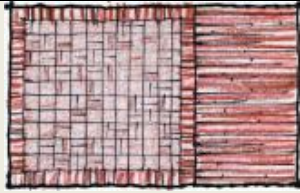
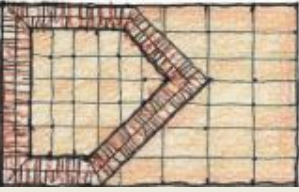
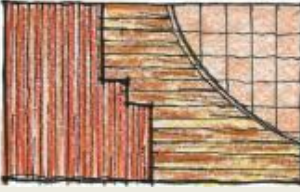
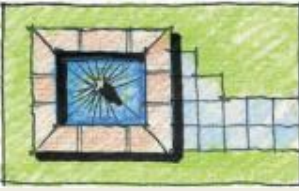
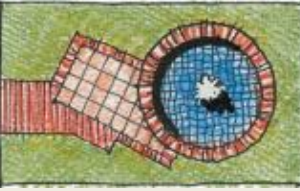
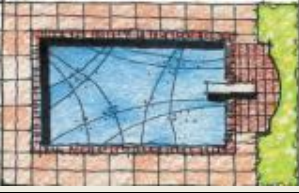

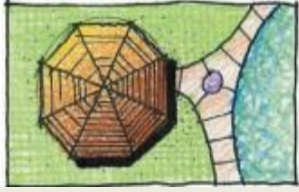
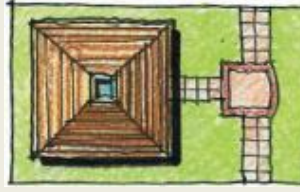
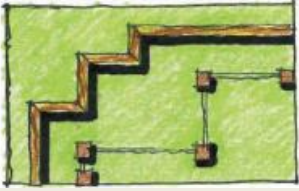



Figure 2.14 – Landscape design (site 2)

Table 2.1 – Conditional symbols for master plan drawing

Symbol	Explanation	Symbol	Explanation
1	2	3	4
<b>Trees symbols</b>			
	Small group of trees		Group of different size trees and shrubs
	Group of trees (green on light blue colored plants)		Group of trees (white tint on red/orange colored plants)
<b>Shrubs symbols</b>			
	Shrubs near trees (green shrubs and red/orange colored trees)		Hedge (fence) of shrubs around the paved area
<b>Flowers symbols</b>			
	Mixborder		Flowering plants in tubs
<b>Paving materials</b>			
	Brick running-bond pattern		Lawn (easy fade out color technique)
	Stone (grays and blues of different values)		Portion of a patio
	Tile patio		Edge of ground cover with tile paving

Ending of Table 2.1.

1	2	3	4
<b>Combined paving materials</b>			
	Different shades of colored concrete		Red brick pattern
	Mottled concrete		Several adjacent materials
<b>Water equipment</b>			
	Fountain square shape		Fountain circle shape
	Pool		Waterfall
<b>Pavilions symbols</b>			
	Pavilion with an octagonal pitched roof		Pavilion with a quadrangular pitched roof
<b>Fences and benches</b>			
	Wood fences and posts		Benches

**Color pencil techniques.** Color pencils can be used in two primary ways to represent landscape design drawings.

First, just as black-and-white drawings can be developed using a variety of line types, these same drawings can be developed using the same line types, but with the use of color pencils. The following are common examples:

- a gray pencil can be used to draw a series of varied sizes of polygons to represent a stone patio;
- a blue pencil can be used to draw a pattern of cross-hatched waves to represent a body of water;
- a green pencil can be used to draw accordion lines to represent small evergreens;
- a pink and a purple pencil can be used to fill an area with jitter lines to represent a bed of annual color.

Second, color pencils can be used with a series of techniques that can add character and contrast to landscape design drawings [3]. Figure 2.15 gives examples of individual tree symbols and contrasting ground covers.

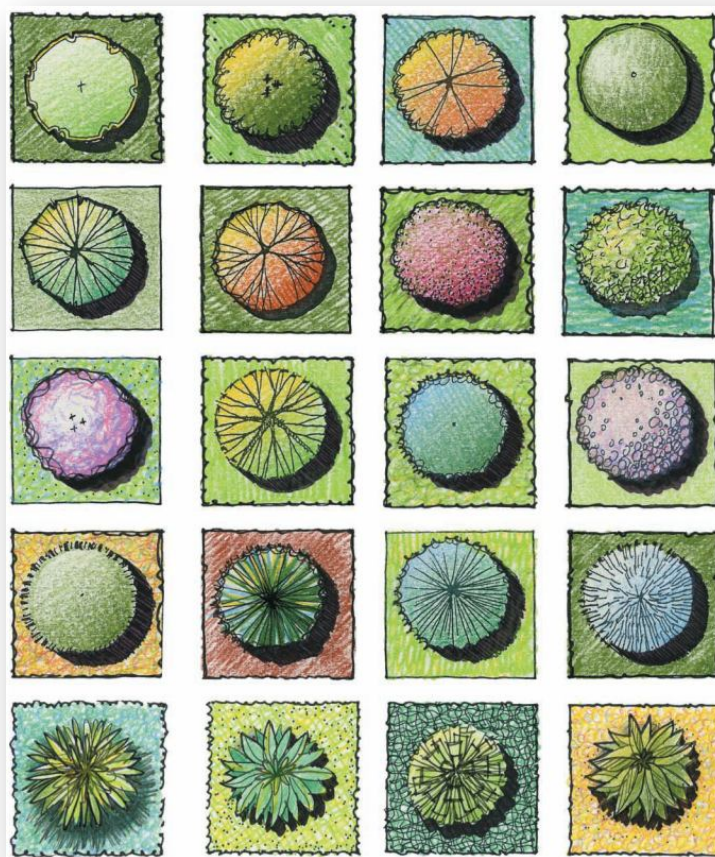


Figure 2.15 – Individual tree symbols

### 2.3 Implementation of the master plan drawing

Assignment «Master plan of the individual residential building» should be performed on the A3 format in scale 1:200. To perform of drawing it is necessary:

1. Draw the selected area on a scale of 1:200.
2. In accordance with the location of the streets, define the main and secondary entrances to the territory.

3. Place a residential building on the territory. Run a blind area around the house.
4. Place the garage with driveways to it.
5. Perform the zoning of the territory according to your desire. On the site you can place a swimming pool with equipment for it, a playground with equipment, sports grounds, a barbecue area, an orchard, a vegetable garden, a recreation area and more.
6. Connect separate zones with footpaths.
7. Cover each area.
8. Make landscaping of your territory.
9. On the drawing, make the appropriate labels: street names; title at the top; below is your name and group.
10. On the plan, number the objects and write the explication on the free space of the sheet.
11. Draw out the required symbols.
12. Show the direction of the north.

Example of functional diagram for master plan and master plan example are shown on Figure 2.16, 2.17.

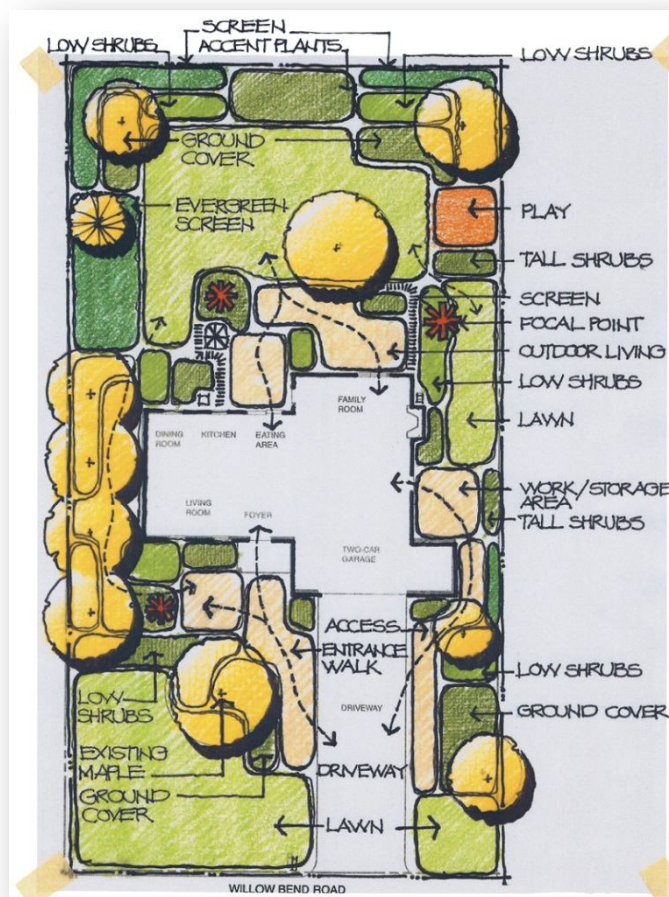


Figure 2.16 – Functional diagram of planning structure site territory

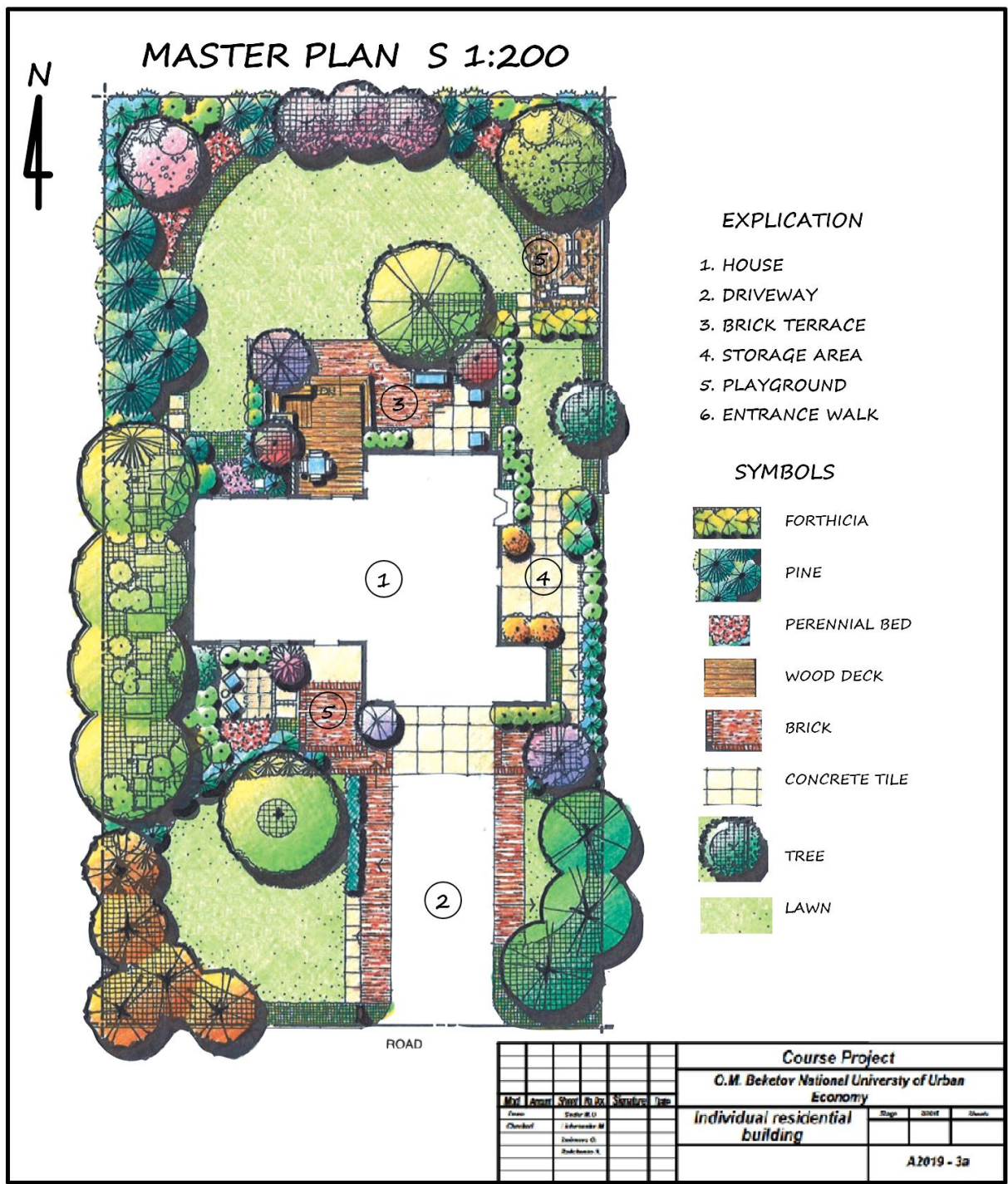


Figure 2.17 – Example of master plan drawing

### **3 SPATIAL AND PLANNING ORGANIZATION OF RESIDENTIAL BUILDINGS**

#### **3.1 Spatial solution of individual residential buildings**

#### **3.2 Constructive solutions of individual residential buildings**

#### **3.3 Implementation of plans, elevations and section drawings**

#### **3.1 Spatial solution of individual residential buildings**

The division of living space into zones in which such domestic processes take place has existed in all traditional houses since ancient times. This technique is called functional zoning. The relationship between the functional purpose of the building and its compositional solution has always been determined by the creative concept of the architect.

The main method of planning a residential building is zoning. This method involves a clear planning selection of groups of rooms that have homogeneous functions and internal connections of the house. Houses are zoned by function, thermal regime, lighting and orientation.

Functional zoning is used to arrange the connections between the premises. Functional zoning is an effective way of planning the organization of residential buildings. Zoning promotes the formation of the shortest connections and the independence of the functioning of the zones at the same time.

Two types of functional zoning are used in housing construction: horizontal and vertical.

Horizontal zoning is used in single-storey buildings, it involves the placement of all functional areas in the horizontal plane and the organization of the division (association) mainly by horizontal communications such as corridors and galleries.

Vertical zoning is typical for houses with several levels, it requires the placement of internal spaces on the levels and their connection with each other by vertical communications such as stairs. Vertical zoning saves building space: compared to horizontal, and in some cases is a more efficient form of functional organization of large residential buildings, as well as limited building space.

Along with vertical and horizontal zoning, currently used three-part zoning, which involves the division of the space of the house into three zones on the principle of homogeneity of domestic processes. Basically in one-storey single-family houses allocate the following zones.

**1. Family (public) area** in individual houses of comfort and country mansions, includes the entrance (hall, hallway), living room (main space), kitchen and dining room, sometimes a separate dining room, guest bathroom, pantry (Fig. 3.1).

As the size of the house increases, all kinds of rooms are added to them, the set of which is determined by the individual recommendations of the owner: library, office, fireplace, winter garden, etc.

In foreign practice, there is often an additional separation of this area into rooms directly for the family (family rooms, including a special room for breakfast) and living room, as well as dining rooms for guests. The public area is the most open space of the house, which usually implements the architectural concept of the architect.

**2. Individual area** includes bedrooms, bathrooms, wardrobes for storing clothes, etc. things (Fig. 3.1).

Bedrooms need the greatest insulation, optimal orientation and microclimate. The best orientation for bedrooms is the east side, the least favorable west side. The most stringent sanitary and hygienic requirements are imposed on dormitories.

The interconnection of functional zones is carried out by means of communication spaces and internal stairs. The communication center of the house is the hall. From the hall, traffic should be organized to three directions: the main direction is a living room, then it is a sleeping area and, finally, it is an economic zone.

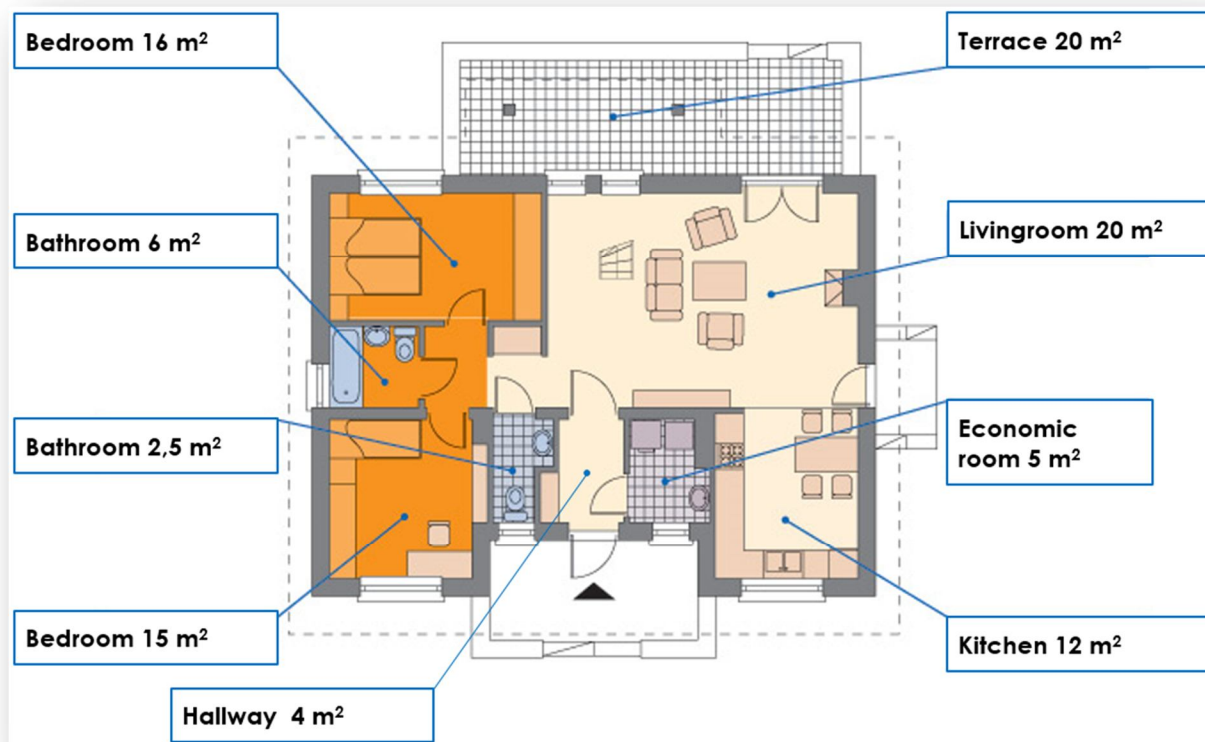


Figure 3.1 – Premises of a house



It is desirable to connect the living room with the dining room. An independent passage must be provided in the sleeping area. In the structure of the house different zones can be located on one plane (horizontal zoning). With the difference in levels in the house, vertical zoning is applied. The method of placement of functional areas and spatial planning solution of a residential building are usually closely interrelated.

*Entrance part.* In climatic zones with low temperatures, the entrance to the house is organized through the vestibule with the door opening to the outside. The minimum size of the vestibule (120 cm × 120 cm). The entrance part consists of a hall and a hallway. The hallway should be equipped with built-in wardrobes for clothes, shoes and bags.

The hall, as the main communication space, can become dominant in the spatial composition of the house. It is desirable to have close to the square proportions of 10–15 m<sup>2</sup>. The vertical space of the hall can be illuminated by an overhead light. The idea of a two-world central space with an open staircase and a gallery above refers to English traditional homes. The hall is always a passage space and the visitor must be clearly oriented in it. The main direction (to the living room) should be identified by architectural means (location on the central axis, large holes, glass).

*Living room.* In most cases, this is the main space of the house, which can unite all other public spaces. In the living room space should be a place to place a formal dining table at the reception (in the absence of a separate dining room), a place to relax, talk, music corner is all that is dictated by the individual tastes of the hosts. The living room is usually designed large landscaped and decorated terraces, loggias, which allow you to visually further increase this space. In houses with several levels, the main space can be two-light and even three-light. More modest options to increase the height of the main space is possible even in small houses with attics and pitched roofs.

*Kitchen* is the most equipped room of the house, requiring good ventilation and natural light, as cooking affects the microclimate (odors, rising temperatures). The order of placement of equipment (technological front) is determined by the convenience of work, providing a chain: stove, work table, sink, dishwasher and refrigerator. Placement of this equipment can be one-sided, two-sided, angular, island. In the practice of design, different types of kitchens are used.

*Bedrooms.* There are several types of bedrooms: a bedroom for a couple (at least 20 m<sup>2</sup>), for two people (same-sex children, 16–20 m<sup>2</sup>), a bedroom for one person (10–12 m<sup>2</sup>). In any house, the bedroom square should not be less than 10 m<sup>2</sup>.

All bedrooms are designed impassable. Adjacent isolated planning is allowed for the parents' bedroom and one of the children's rooms. In each bedroom it is necessary to allocate a place for employment, to place the built-in cases for clothes.

They can be replaced by a dressing room, which is more hygienic. In all bedrooms the island arrangement of a berth is recommended, therefore the width of the room should be not less than 3 m. In areas of a cold climate the berth should not be located along an external wall.

*Sanitary facilities* require insulation of each room, organization of ventilation or natural ventilation. The doors of all bathrooms open to the outside. Currently, several main types of bathrooms are used: combined bathroom (bath, sink, and toilet), separate bathroom (toilet, sink, bidet in one room, bath and sink in another one), guest bathroom (toilet, sink, shower). In a private house, a guest bathroom is designed in a public area (near the entrance or kitchen) and combined or separate in the bedroom (depending on the number of bedrooms). In some houses (even the middle level), the number of bathrooms is usually equal to the number of bedrooms (Fig. 3.2).

Ukrainian building codes (DBN B.2.2–15–2005 “Residential buildings”) set the minimum size of the area of bathrooms. However, the optimal size for such premises is better to discuss when designing a private house with an architect, who, taking into account the priorities, will help to properly manage and organize the area of the house.

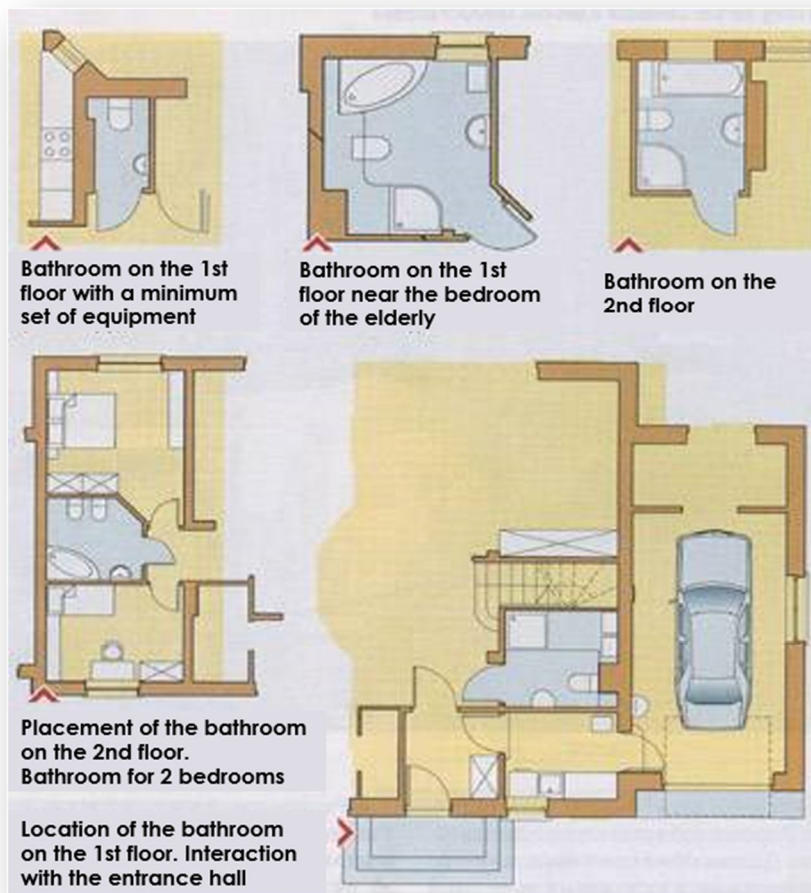


Figure 3.2 – Some types of bathrooms

Apart from the basic fixtures, bathrooms also have furniture, like:

- cabinets and drawers for towels;
- cabinets for laundry;
- mirrors;
- shelves, drawers and cabinets for personal care products;
- radiator;
- other accessories.

Typical bathroom layouts.

*Half bathrooms.* Half bathroom is a small bathroom with a small vanity or sink, mirror and toilet and is designed to accommodate guests as well as family members. This type requires the minimum space for the essentials, though is suitable for restaurants, cafeterias, shopping malls, etc. In many homes, the closet or space under the stairway is drafted as a powder room so visitors don't have to go upstairs to visit the main bathroom (Fig. 3.3).

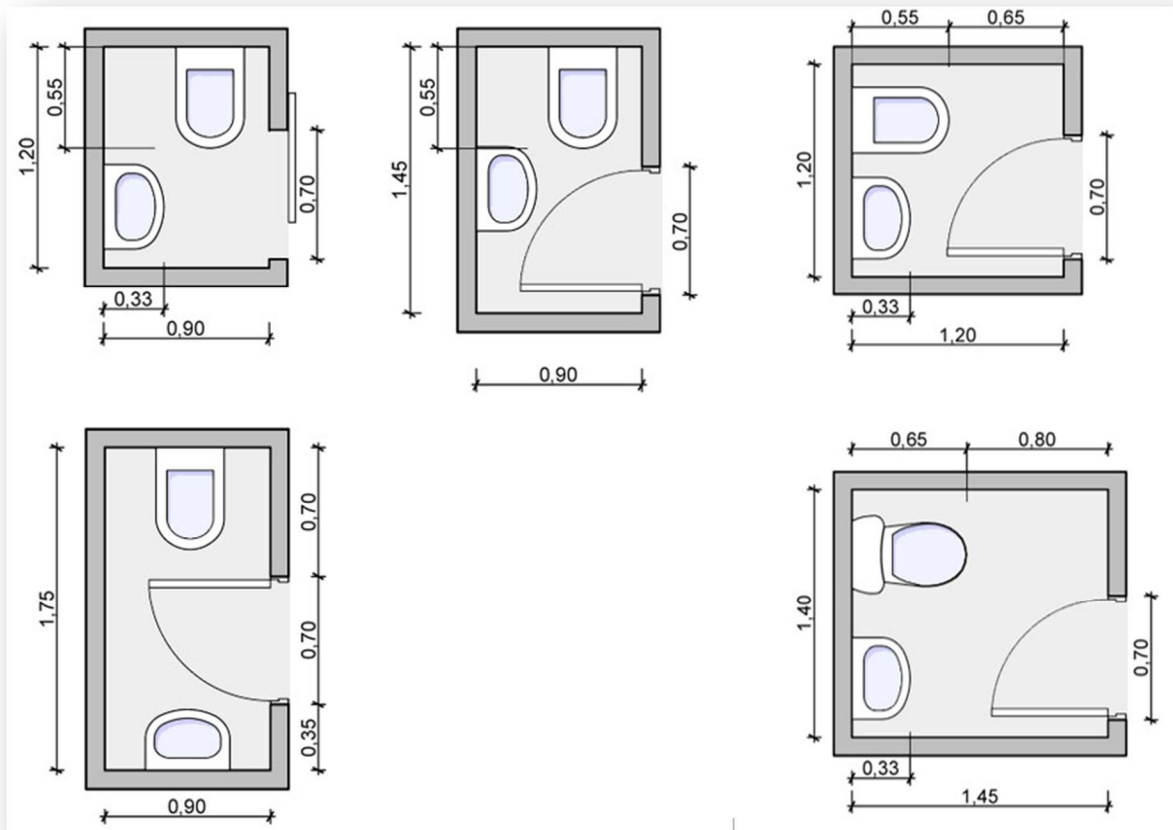


Figure 3.3 – Half bathrooms

*Separate room for the shower.* A completely separate room just for the shower, ensures that the bathroom remains free while the shower is busy. The room can also have a small sink (Fig. 3.4).

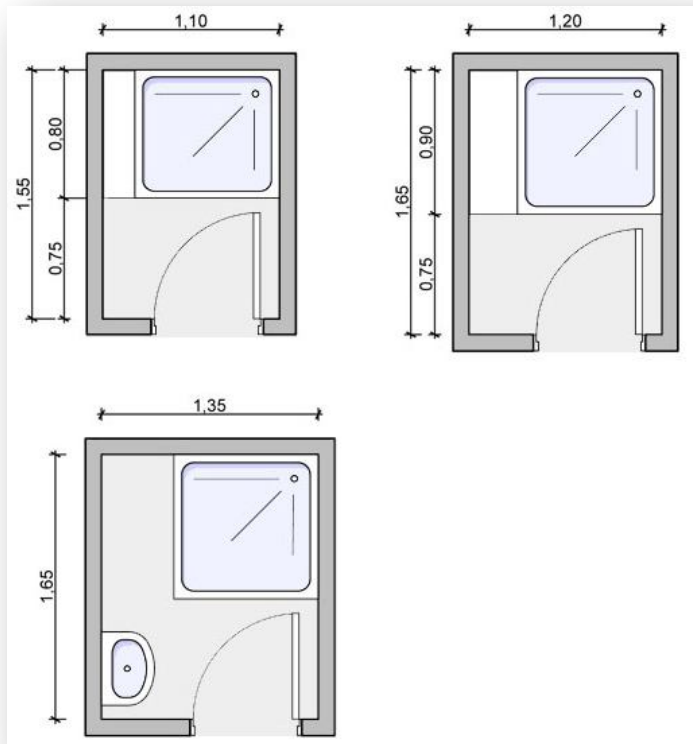


Figure 3.4 – Separate room for the shower

*Three quarter bathroom.* A three quarter bath is usually small, but large enough to include a shower, a vanity or a sink, a toilet and probably storage shelves (Fig. 3.5).

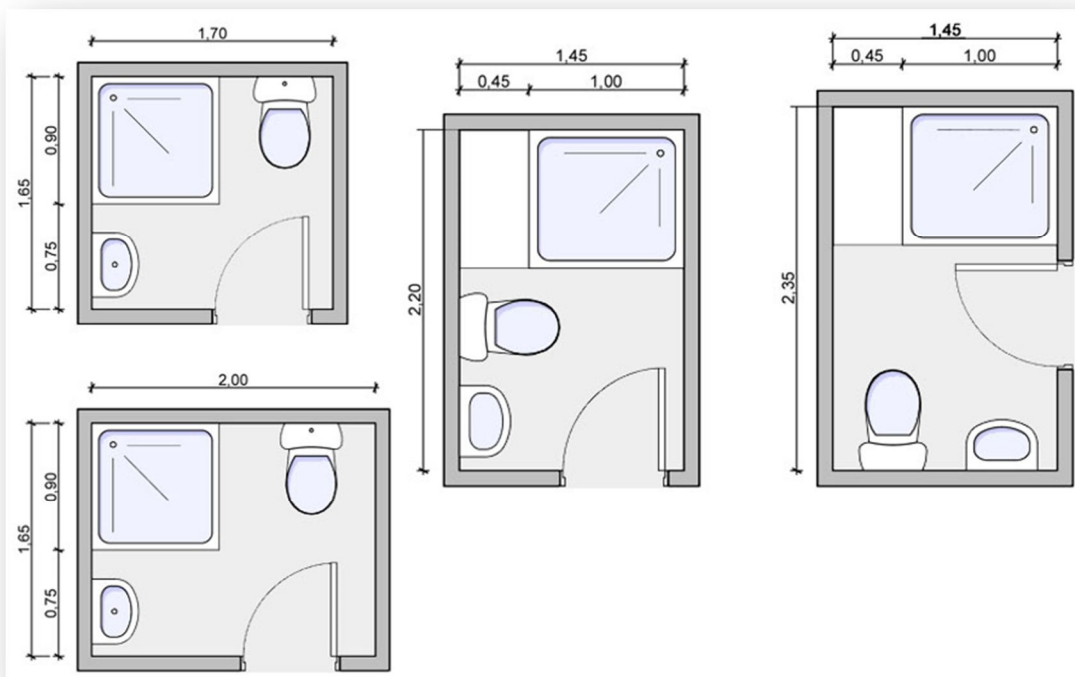


Figure 3.5 – Three quarter bathroom

*Master bathroom.* The master bathroom is one of the most private and relaxing spaces. A master bathroom might include double vanities with sinks and mirror, toilet in a semiprivate compartment, sauna or steam shower, soaking or whirlpool tub, storage for linens and many more amenities (Fig. 3.6).

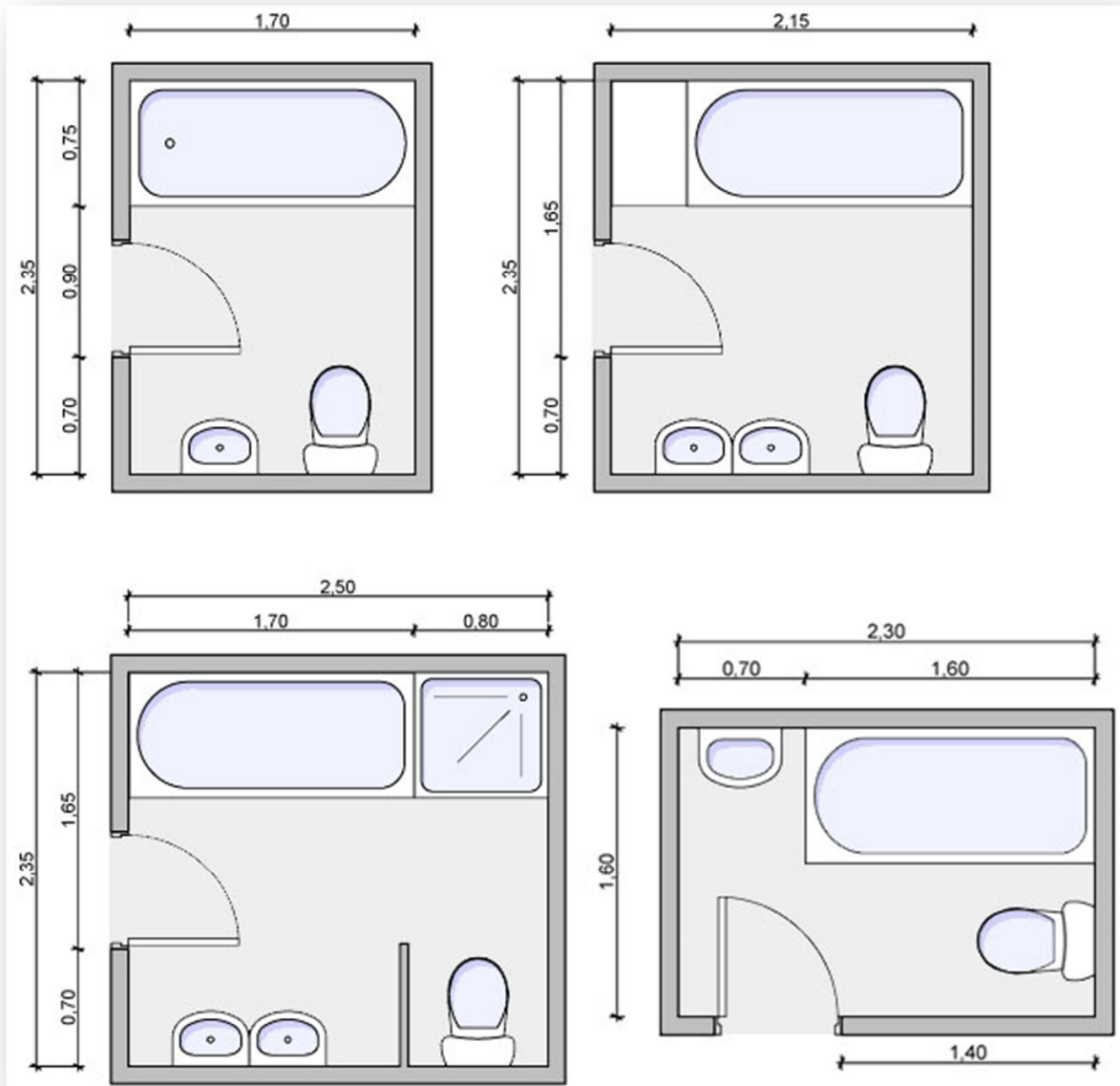


Figure 3.6 – Master bathroom

*Adjoining bathroom.* This type of two-room bath is ideal for big families where the bathroom might be occupied most of the time (Fig. 3.7).

*Bathroom with laundry facilities.* In many European countries where many apartments are small, it not rare to install the washing machine into the bathroom (Fig. 3.8).

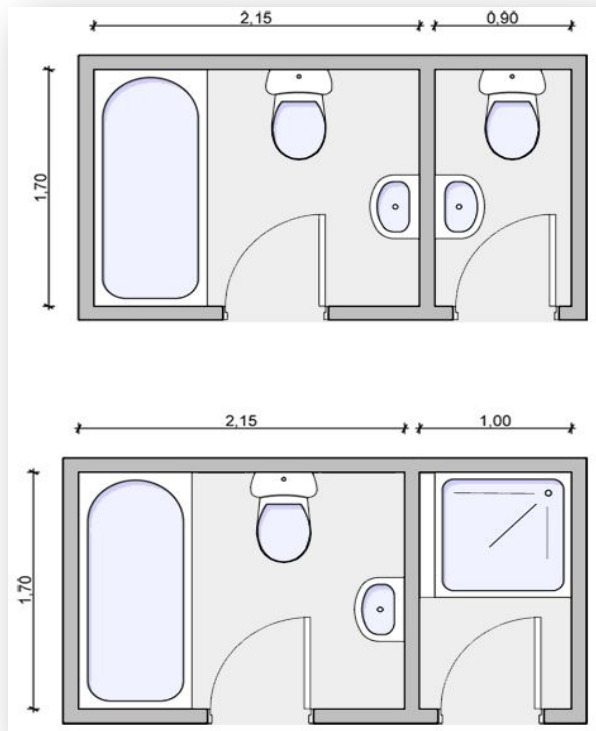


Figure 3.7 – Adjoining bathroom

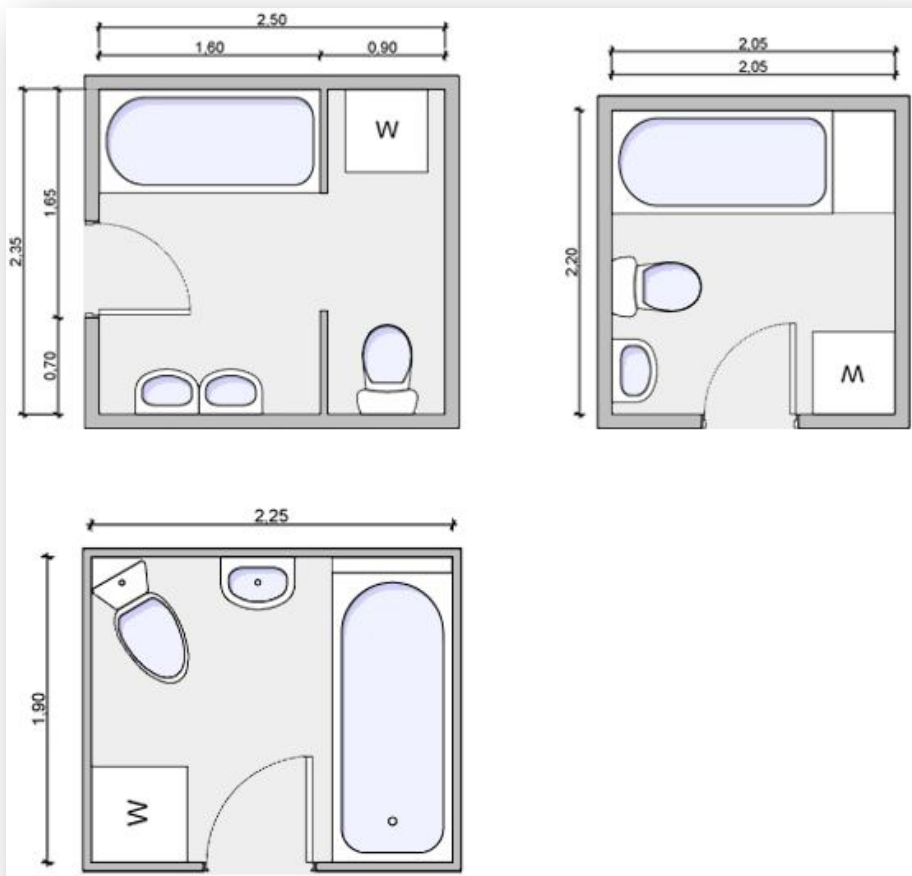


Figure 3.8 – Bathroom with laundry facilities

Sanitary facilities should not be located above the living rooms. It is most rational to block them to one riser, both vertically and horizontally. The overall dimensions of the equipment and their convenient location play an important role in the design of bathrooms.

**3. Household (economic and domestic) area** includes a variety of utility rooms. Their composition depends not only on the household needs of the family, but also on the forms of organization of engineering systems. In which house should there be pantries for household items and equipment, for food, laundry, etc. Some of them can be located in the basement or basement. The lack of special rooms in the house for storage of equipment, things, products, items for cleaning the apartment dramatically reduces its comfort and convenience of living. Requirements for premises for engineering devices in the house are set by specialists of the relevant profile. Therefore, at the organization of autonomous heating the room for the heating unit with a separate entrance (the most expedient in a ground floor) is required, at local water supply – the expansion tank at the level of the top floor, etc. is required. n. It should be remembered that a residential building of this type should be designed not only by an architect, but by a group of specialists, which includes a designer, engineers for water supply, heating and sewerage, electricity and low-current devices, as well as a landscape designer.

### 3.2 Constructive solutions for individual residential buildings

The concept of *structural design of a building* includes a set of structural elements and their relationship with each other. One of the requirements for buildings is its strength and durability. This requirement is provided by the choice of the optimal design solution, which is developed on the basis of the accepted spatial planning scheme. Structural elements are parts of the building that have certain purposes, which perform their functions and meet the requirements that ensure the strength of the building as a whole.

By purpose, all structural elements are divided into load-bearing (foundations, supports, walls, floors) and fencing (interior walls, floors, floors, partitions, doors), and some of them perform both functions. All loads that occur in the building, take on load-bearing elements, and fencing separates the room from the outside space.

The main structural elements are foundations, walls, floors, partitions, stairs, roofs, windows, doors, floors.

**Walls** are vertical, structural element. When building a house, you need to clearly imagine what requirements you need to make to the walls of your future home.

Stone walls or wooden must perform the following main functions:

– function is to carry and transfer to the foundation on-loading of walls, floors, roof, furniture, etc.

Walls are divided into external and internal, which in turn are divided into load-bearing internal walls or partitions and simply self-supporting partitions. For example, the walls between the bathroom and the bathroom can be only half a brick thick.

Today among a huge variety of modern materials for the device of walls the brick remains a priority and the most widespread (Fig. 3.9).

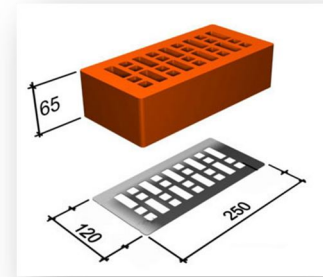


Figure 3.9 – Brick sizes

**Foundation.** The main supporting part of any house, designed to withstand the weight of the whole structure, is called the foundation. The strength of the whole house depends on the strength of the foundation. The foundation reliably protects the structure from distortion and subsidence, as well as from cracks. When calculating and designing the foundation should take into account the terrain, soil character and climate.

In general, all foundations are divided into two categories – shallow and deep foundations. The terms shallow and deep foundation refer to the depth of the soil at which it is placed. Generally, if the width of the foundation is greater than the depth, it is labeled as the shallow foundation. If the width is smaller than the depth of the foundation it is called as deep foundation. Structure of some foundation types are shown in Figure 3.10.

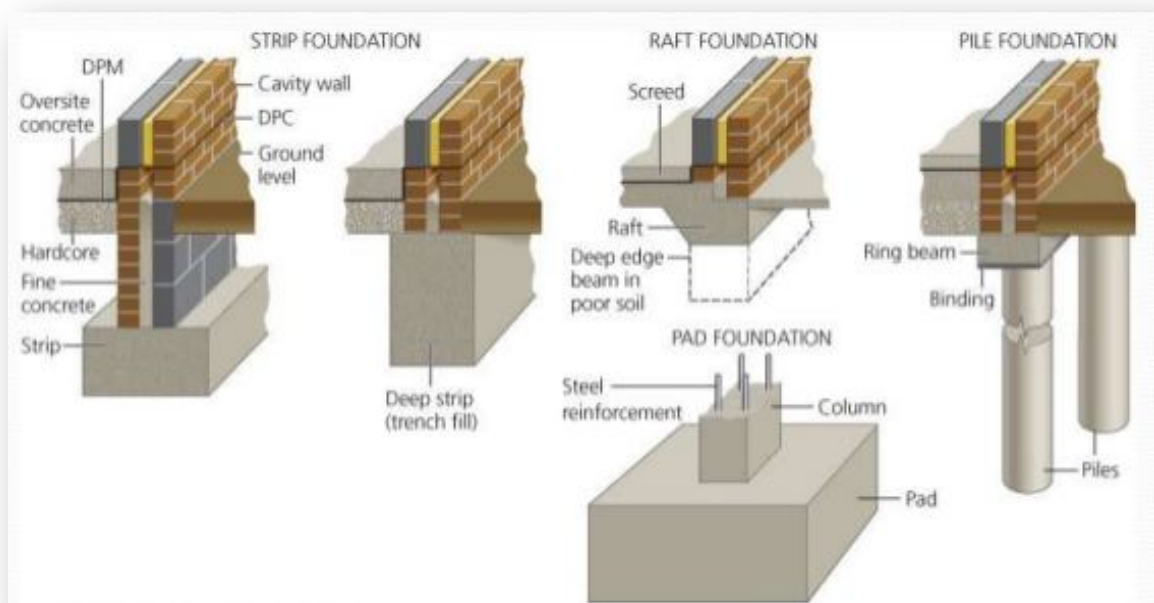


Figure 3.10 – Structure of foundation types



**Isolated spread foundation.** This is the most widely recognized and most straightforward shallow foundation type, as this is the most economical type. They are typically utilized for shallow establishments to convey and spread concentrated burdens caused, for instance, by pillars or columns (Fig. 3.11). They are generally used for ordinary buildings (typically up to five stories).

**Wall footing or strip foundation.** Wall footing is also known as continuous footing. This type is used to distribute loads of structural or non-structural load-bearing walls to the ground in such a way that the load-bearing limit of the soil is not outperformed. It runs along the direction of the wall. The width of the wall foundation is usually 2–3 times the width of the wall.

**Combined foundation** is very similar to the isolated footing. When the columns of the structure are carefully placed, or the bearing capacity of the soil is low and their footing overlap each other, combined footing is provided. It is fundamentally a blend of different footings, which uses the properties of various balances in a single footing dependent on the necessity of the structure.

The foundations which are made common to more than one column are called combined footings. There are different types of combined footing, including slab type, slab and beam type, rectangular, raft, and strap beam type. They may be square, tee-shaped, or trapezoidal. The main objective is the uniform distribution of loads under the entire area of footing, for this is necessary to coincide with the center of gravity of the footing area with the center of gravity of the total loads.

**Cantilever foundation.** Strap footings are similar to combined footings. Reasons for considering or choosing strip footing are identical to the combined one.

In strap footing, the foundation under the columns is built individually and connected by a strap beam. Generally, when the edge of the footing cannot be extended beyond the property line, the exterior footing is connected by a strap beam with interior footing (Fig. 3.12).

**Raft or pad foundation** are used where other shallow or pile foundations are not suitable. It is also recommended in situations where the bearing capacity of the soil is inadequate, the load of the structure is to be distributed over a large area or structure is subjected continuously to shocks or jerks.

Raft foundation consists of a reinforced concrete slab or T-beam slab placed over the entire area of the structure. In this type, the whole basement floor slab acts as the foundation. The total load of the structure is spread evenly over the entire area of the structure. This is called raft because, in this case, the building seems like a vessel that floats on a sea of soil (Fig. 3.13).

Foundation should fulfill the following objectives: distribute the weight of the structure over a large area of soil; avoid unequal settlement; prevent the lateral movement of the structure; increase structural stability (Fig. 3.14) [4].



Figure 3.11 – Isolated shallow foundation



Figure 3.12 – Cantilever or strip foundation



Figure 3.13 – Raft or pad foundations

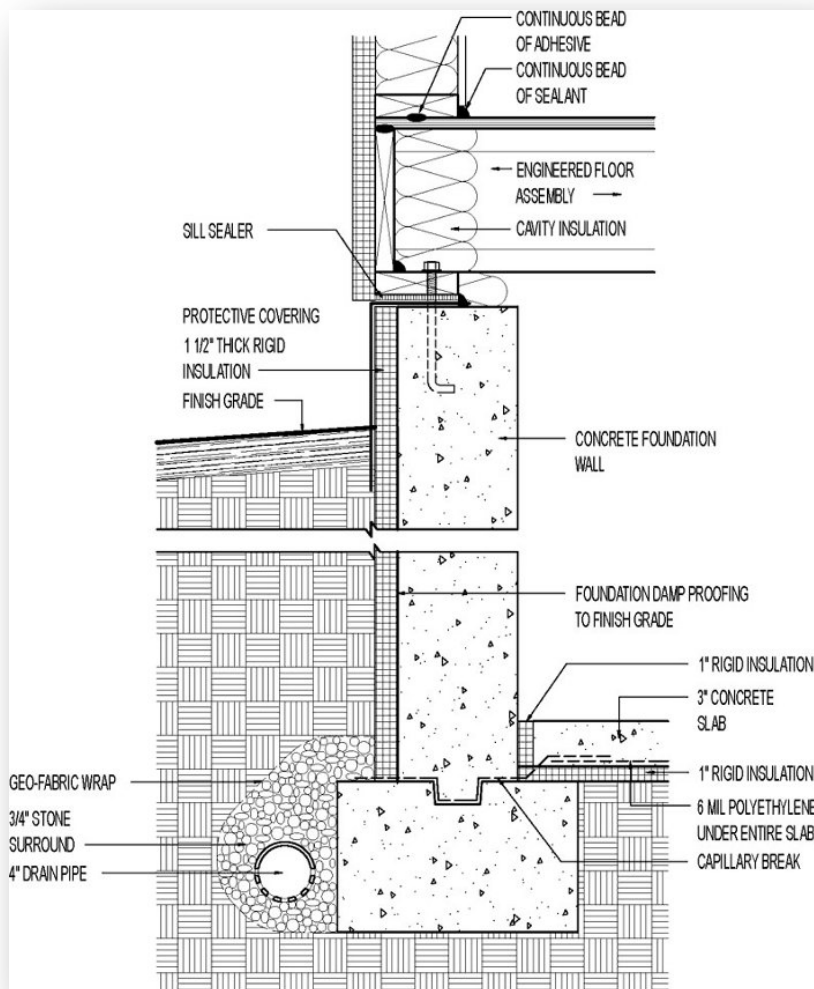


Figure 3.14 – Structure of foundation

**Wall foundation** is an above-ground part of the foundation of the house. Basements are made of high-grade solid brick (frost-resistant) with solid masonry or concrete foundation blocks. Two waterproofing are placed on the plinth, each of which consists of two layers of roofing material on bituminous mastic. The purpose of waterproofing is to cut off the migration of moisture into the walls from the soil and to moisten the walls from melting snow and rain spray (Fig. 3.14). The surface of the plinths is decorated with brick, natural stone or ceramic tiles.

**Ramps** as the main means of lifting are extremely rarely used in a low-rise building. Most often, ramps are used at low altitudes to organize entry or entrance, with a difference in levels inside the house, when it is necessary to ensure continuity of movement. The slope of the ramp inside the room should be 1:6, outside – 1:8.

**Lifts and elevators** should be used only in very expensive multi-level buildings, or in specialized types of housing (for example, for the disabled). Rem Koolhaas in a villa, the owner of which is disabled, placed a lifting platform-library in the center of the house. A person moving in a wheelchair can get from it to anywhere in the house. Small local lifts for lifting food have long been used to connect the kitchen and dining room in palaces. Now the range of types of lifts and small elevators is so wide that it is possible to choose any of the required dimensions. In houses of the developed structure there is an independent economic zone including the garage, premises of service personnel, for engineering devices, pantries, saunas, etc.

**Stairs** is a set of steps that lead from one level of a building to another. The *stairwell* is a staircase enclosed by capital (bearing) walls. *Stair march* is an inclined element of a ladder with steps (no more than 18 steps). The *stair landing* is a horizontal element of the staircase between the marches. The main one is at the floor level, the intermediate one is for the transition from one march to another. Stair consist from follows elements.

*Tread.* The part of the stairway that is stepped on. It is constructed to the same specifications (thickness) as any other flooring. The tread depth is measured from the outer edge of the step to the vertical riser between steps. The width is measured from one side to the other.

*Riser.* The vertical portion between each tread on the stair. This may be missing for an open stair effect (open rise).

*Nosing.* An edge part of the tread that protrudes over the riser beneath. If it is present, this means that, measured horizontally, the total run length of the stairs is not simply the sum of the tread lengths, as the treads actually overlap each other slightly.

*D-tread.* Where stairs are open on one or both sides, the first step above the lower floor may be wider than the other steps and rounded. The balusters typically

form a semicircle around the circumference of the rounded portion and the handrail has a horizontal spiral called a volute that supports the top of the balusters. Besides the cosmetic appeal, D-treads allow the balusters to form a wider, more stable base for the end of the handrail. Handrails that simply end at a post at the foot of the stairs can be less sturdy, even with a thick post.

*Stringer.* The structural member that supports the treads and risers. There are typically two stringers, one on either side of the stairs; though the treads may be supported many other ways. The stringers are sometimes notched so that the risers and treads fit into them. Stringers on open-sided stairs are often open themselves so that the treads are visible from the side. Such stringers are called cut stringers. Stringers on a closed side of the stairs are closed, with the support for the treads routed into the stringer.

*Winders.* Winders are steps that are narrower on one side than the other. They are used to change the direction of the stairs without landings. A series of winders form a circular or spiral stairway. When three steps are used to turn a 90° corner, the middle step is called a kite winder as a kite-shaped quadrilateral.

*Balustrade.* The balustrade is the system of railings and balusters that prevents people from falling over the edge.

*Handrail.* The angled member for hand holding, as distinguished from the vertical balusters which hold it up for stairs that are open on one side; there is often a railing on both sides, sometimes only on one side or not at all, on wide staircases there is sometimes also one in the middle, or even more. The term banister is sometimes used to mean just the handrail, or sometimes the handrail and the balusters or sometimes just the balusters.

*Baluster.* A term for the vertical posts that hold up the handrail. Sometimes simply called guards or spindles. Treads often require two balusters. The second baluster is closer to the riser and is taller than the first. The extra height in the second baluster is typically in the middle between decorative elements on the baluster. That way the bottom decorative elements are aligned with the tread and the top elements are aligned with the railing angle.

*Newel.* A large baluster or post used to anchor the handrail. Since it is a structural element, it extends below the floor and subfloor to the bottom of the floor joists and is bolted right to the floor joist. A half-newel may be used where a railing ends in the wall. Visually, it looks like half the newel is embedded in the wall. For open landings, a newel may extend below the landing for a decorative newel drop.

*Shoe rail.* A capping on top of the stringer for balustrades to be inserted. To be used for flight balustrade.

*Flight.* A flight is an uninterrupted series of steps.

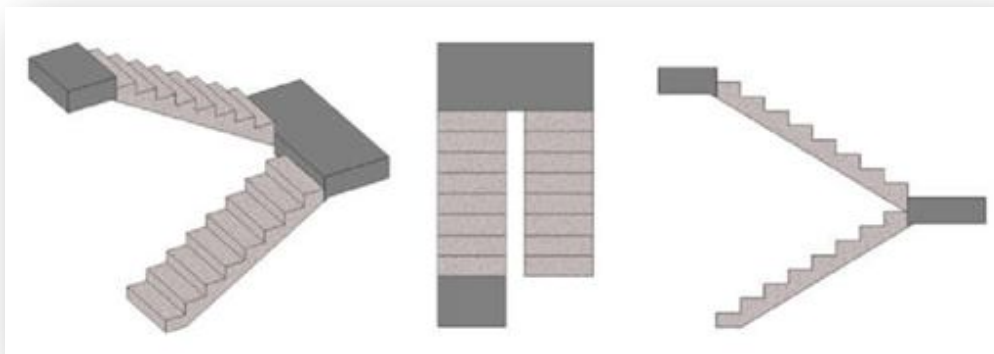
*Landing.* A landing is a small platform that is built as part of the stair and is typically used to allow stairs to change directions, or to allow the user a rest. A half landing is where a 180° change in direction is made, and a quarter landing is where a 90° change in direction is made.

*Base rail.* Similar to a shoe rail, the base rail is for balustrades to be inserted into, but is used for gallery balustrade. The base rail is usually the same width as the newel posts (Fig. 3.15).

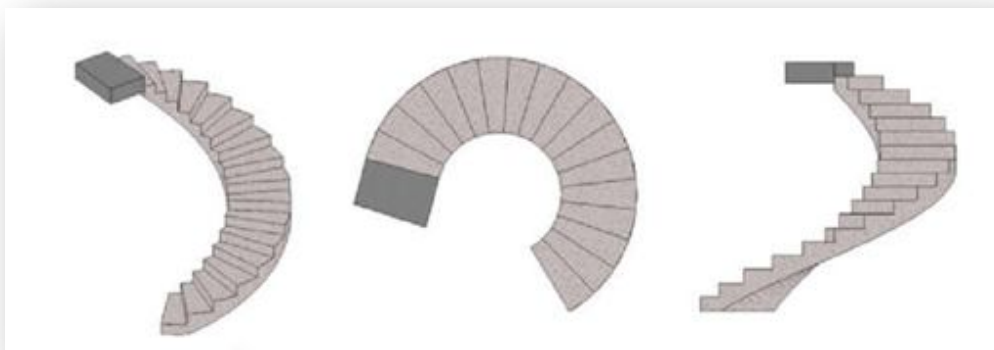


Figure 3.15 – Structure of stairs

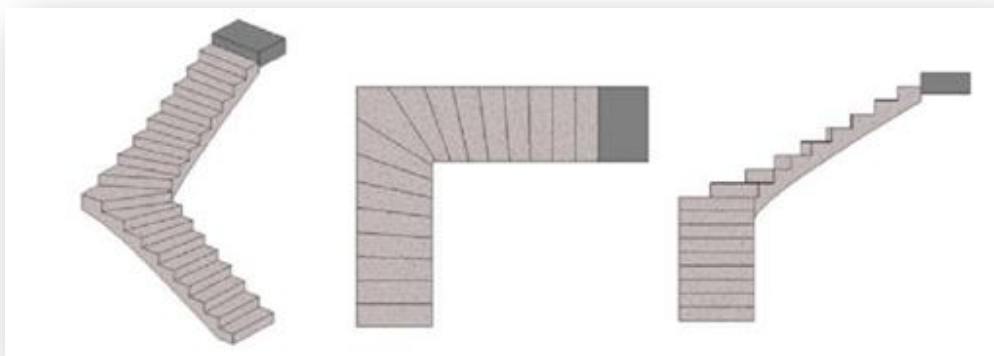
Four types of stairs (3D view, plan and front view) are shown in Figure 3.16. Different types of stairs in plan are shown in Figure 3.17.



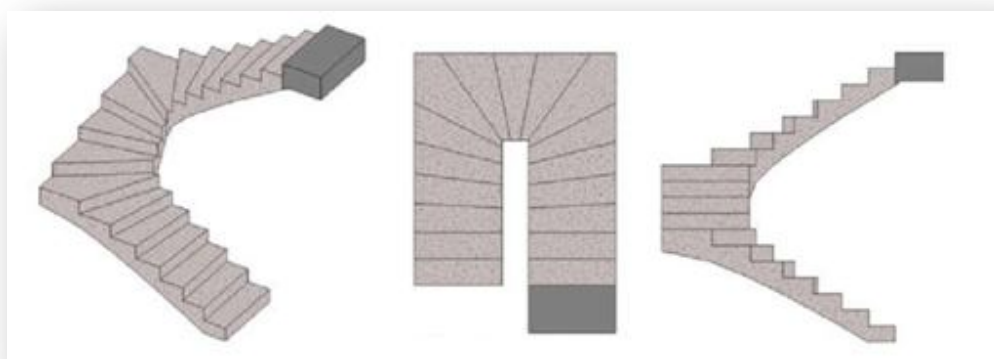
a



b



c



d

Figure 3.16 – Four types of stairs (3D view, plan and front view):  
 a – straight; b – spiral; c – L-shaped winder; d – U-shaped winder

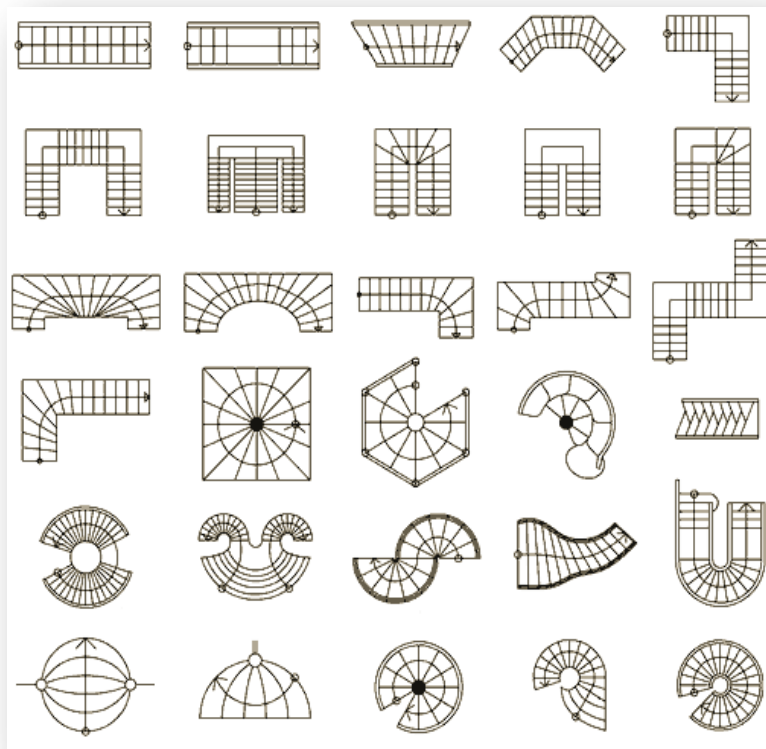


Figure 3.17 – Stairs plans

Advantages of straight stairs:

- straight stairs tend to be the easiest to go up and down, or, ascend/descend, as we say in the industry;
- they are typically the easiest to build, however, this depends a lot on the level of detail in the design;
- straight stairs only need to be connected at the top and the bottom (no intermediate supporting structure is required);
- they work well with minimalist designed homes due to their inherent simplicity;
- by selecting thinner treads, open risers, and thin metal stringers, straight stairs can be made more transparent than other types of stairs, allowing less obstruction to the view beyond;
- no landing is required if the number of risers is kept under 16 or the overall vertical height is less than 3,5 meters;
- it's relatively easy to build railings and handrails for straight stairs;
- measuring for railings for straight stairs is simpler than for other stair designs.

Disadvantages of straight stairs:

- straight stairs use up a fair amount of linear space, which has to be planned for in your design;

- some of the other stair types create a privacy barrier between the floors of your home. Straight stairs do not offer this privacy;
- a stair 3,5 meters high requires a landing to break up the span. The addition of a landing will use up a lot more space and therefore these types of stairs are seldom used in residential construction. You will see these more frequently in large commercial buildings.

Advantages of curved stairs:

- curved staircases are often very elegant and traditional but this type of design can equally be adapted to contemporary architecture;
- they are relatively easy to walk up if the radius is large.
- disadvantages of curved stairs:
  - curved stairs are by far the most difficult to build of the various types of stairs. In fact, building curved stairs represents a pinnacle of achievement for any stair builder or fabricator. For this reason, they are the most costly to build.

### **3.3 Implementation of floor plans, elevations and section drawings**

Many different types of drawing can be used during the process of designing and constructing buildings. Some of the more commonly-used types of drawing are listed below. Scale drawing is a generic term used to describe any drawing that illustrates items at less than (or more than) their actual size. This is generally necessary where the items is so large or small that it is not useful or convenient to draw it at its actual size.

**Floor plans** are a form of orthographic projection that can be used to show the layout of rooms within buildings, as seen from above. They may be prepared as part of the design process, or to provide instructions for construction, often associated with other drawings, schedules, and specifications.

Floor plans may include key dimensions and levels, and may also use, hatching, symbols and other standard annotations and abbreviations to indicate materials, fittings and appliances, and so on.

Depending on the size of the building, floor plans are typically drawn at scales of between 1:200 and 1:20. Different line types, colours and weights can be used to differentiate between the types of drawn information they include.

Floor plans can be drawn for whole buildings, a single floor of a building, or just a single room. The more detailed the floor plan is in terms of layout, fittings and so on, the more useful and instructive it will be for the project. However, if spaces are complex, it is normal for separate drawings to be prepared for different trades, such as electrical and lighting drawings, plumbing drawings, and so on.



The lower-right-hand corner of the sheet is typically reserved for a title block. This provides a space to record the name of the project, the name of the drawing, the scale, the originators name, the date, revision history, and so on.

The floor plan view should be roughly centered on the sheet, with the front of the building typically drawn along the lower side of the sheet. A north point may be included to show the orientation of the floor plan.

Typically, the outside walls are drawn first, to lay the plan out on the sheet, then the internal walls, then windows, doors, stairs, lifts, ramps, and so on, are added. An arrow is used to indicate the upward direction of stairs and ramps. It is usual for a faint dotted line to be drawn around stairs (or other openings) where they are open at ceiling level.

Rooms should be clearly labeled, with block lettering in the center of each room. The correct symbols should be added for elements such as; appliances, fixed furniture, fittings, building services, and so on. Stages of building plan drawing are shown in Figure 3.18.

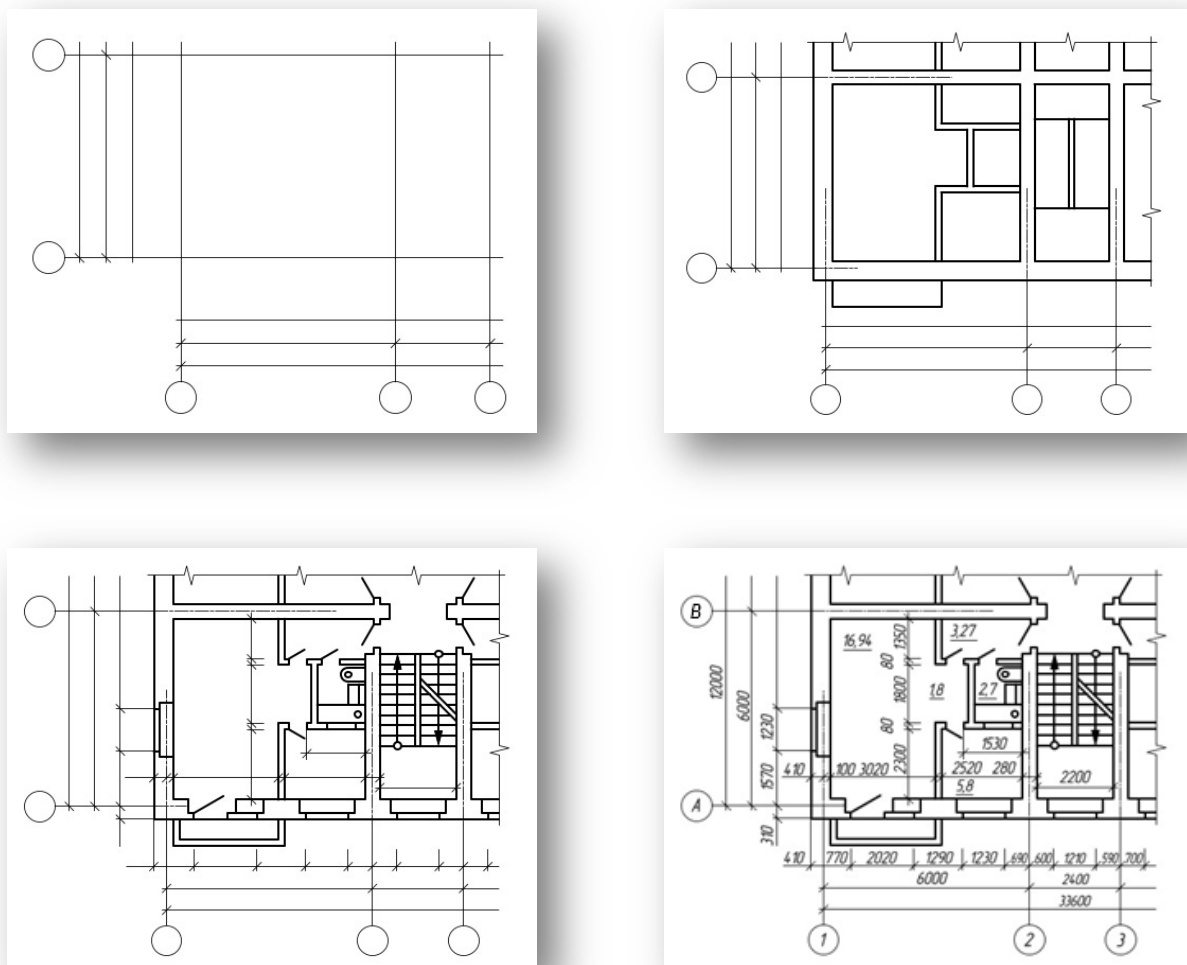


Figure 3.18 – Drawing stages of floor plan

**Elevation** refers to an orthographic projection of the exterior (or sometimes the interior) faces of a building, that is a two-dimensional drawing of the building's façades. As buildings are rarely simple rectangular shapes in plan, an elevation drawing is a first angle projection that shows all parts of the building as seen from a particular direction with the perspective flattened. Generally, elevations are produced for four directional views, for example, north, south, east, west.

Simple elevation drawings might show:

- the outline of a building;
- openings such as doors and windows;
- roofing;
- projections such as eaves and pipes;
- level datums such as finished ground level and floor positions;
- key dimensions such as lengths between first and last axes and heights level marks;
- exterior features such as decks, porches and steps;
- any portion of the foundation that may be visible;
- exterior wall and roof finishes.

Elevations are usually performed in scale 1:100 or 1:200. The elevation drawings are shown in Figure 3.19.

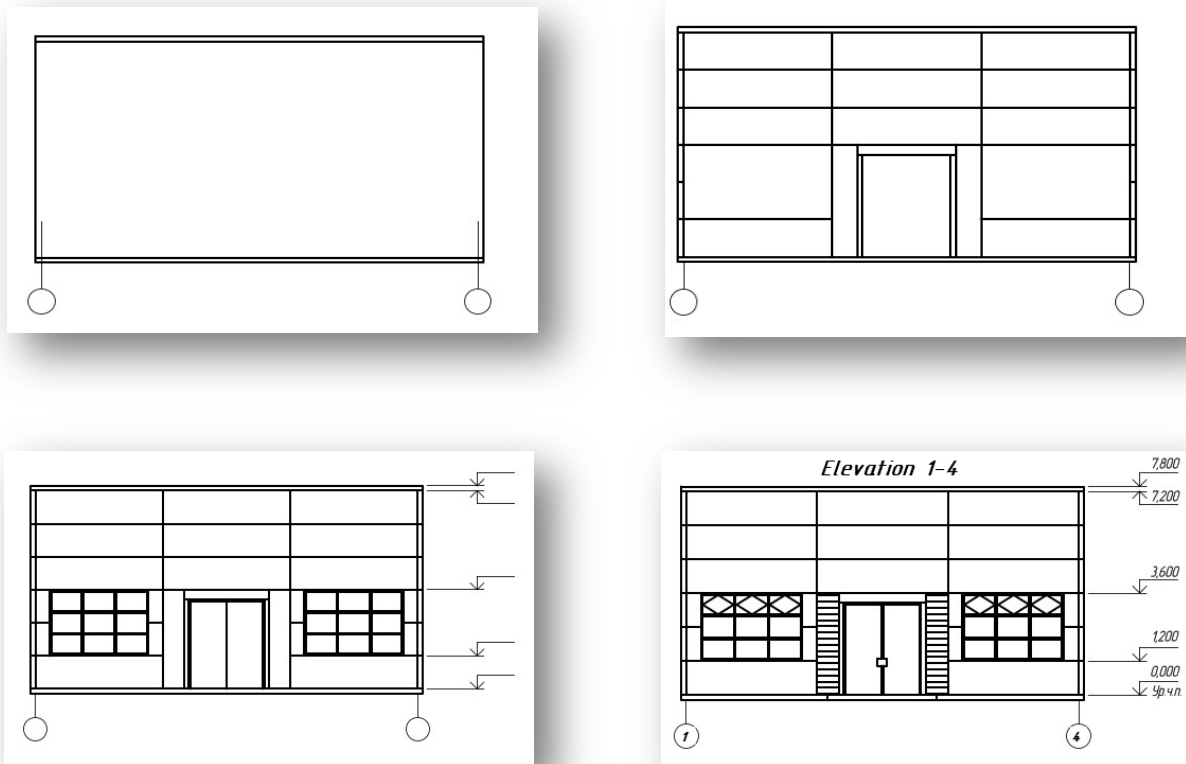


Figure 3.19 – Drawing stages of elevation

**Section drawing** shows a view of a structure as though it had been sliced in half or cut along another imaginary plane. This can be useful as it gives a view through the spaces and surrounding structures (typically across a vertical plane) that can reveal the relationships between the different parts of the buildings that might not be apparent on plan drawings.

For buildings, this can be useful as it gives a view through the spaces and surrounding structures (typically across a vertical plane) that can reveal the relationships between the different parts of the buildings that might not be apparent on plan drawings. Plan drawings are in fact a type of section, but they cut through the building on a horizontal rather than vertical plane.

The direction of the plane through which the section is cut is often represented on plan drawings and elevations by a line of long and short dashes, called a section plane. If there are a number of sections, the line may have letters at each end indicating the name of the section drawing and an arrow showing the direction that the view takes.

The section drawings are shown in Figure 3.20.

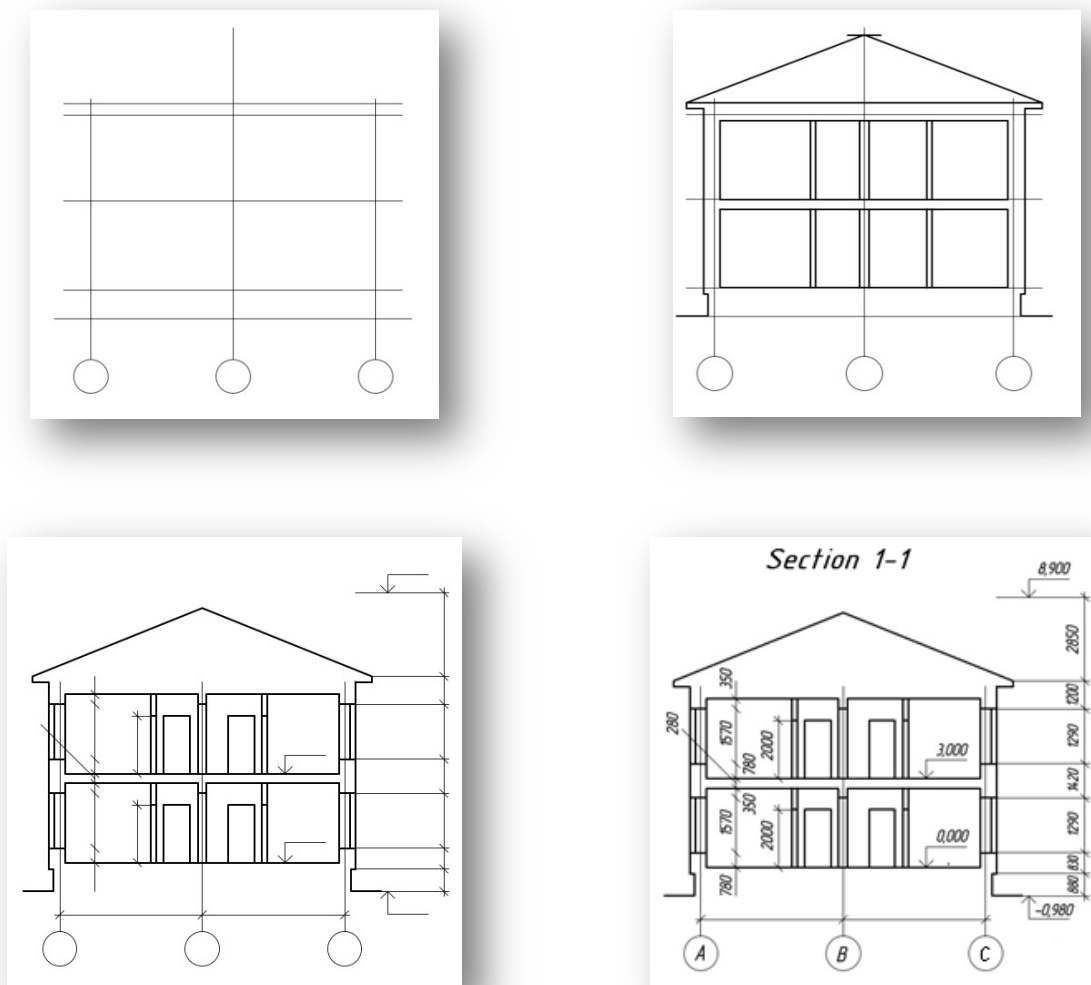


Figure 3.20 – Drawing stages of section

The section line can take an indirect route through a building if this helps show the most important features or junctions in the building, as illustrated on the drawing below.

Shading, cross hatching or other fill styles and/or thicker lines can be used to indicate parts of the structure that have been cut through, such as walls, roofs and floors.

The scale of a section drawing will depend on the size of the building being drawn and the level of detail that needs to be shown. Sections may show the entire building, or may focus on a particular component, junction or assembly. In this case they can be similar to assembly drawings but differ in that they do not usually include details of the actually assembly process.

Different types of cross hatching can be used to differentiate between different types of component on detailed sectional drawings. Standards exist for hatching that should be used on some common materials, for example, double diagonal lines indicate brickwork, a wave indicates insulation and so on [5].

Example of floor plans of individual residential building drawings is shown in Figure 3.21. Example of elevations of individual residential building drawings is shown in Figure 3.22. Example of section of individual residential building drawings is shown in Figure 3.23.

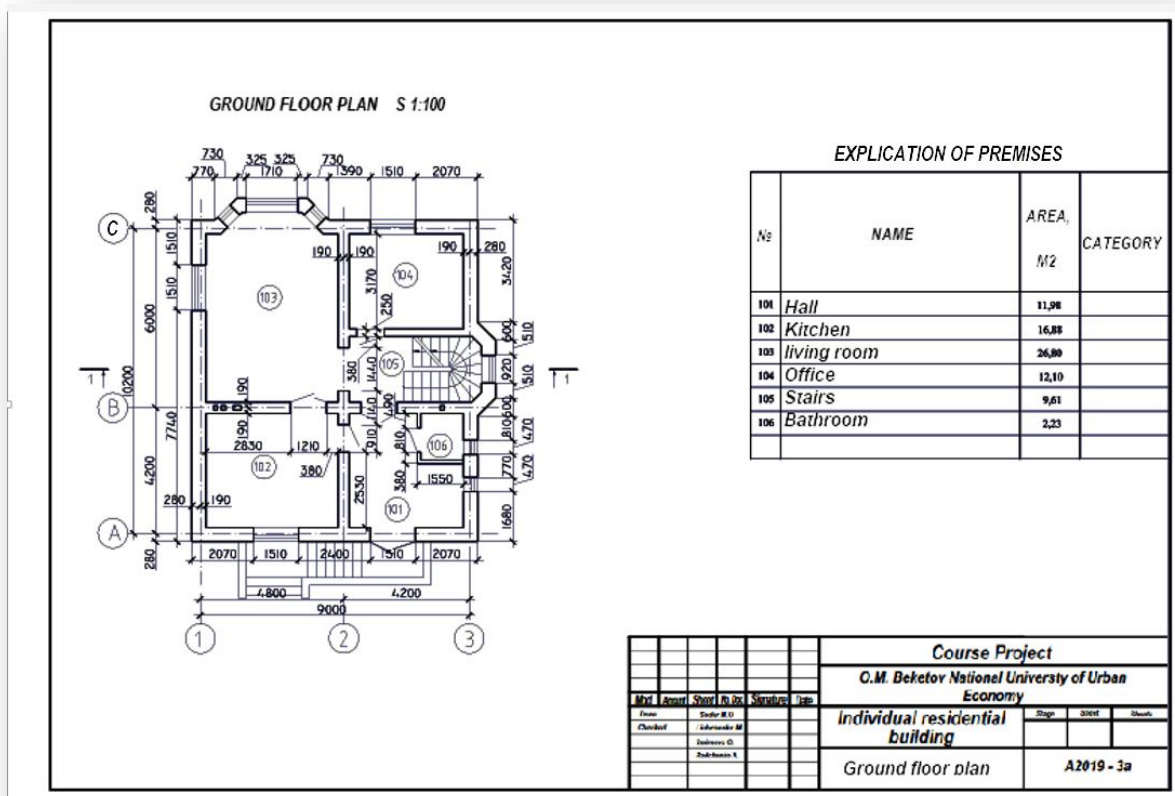


Figure 3.21 – Example of drawing of Ground floor plan

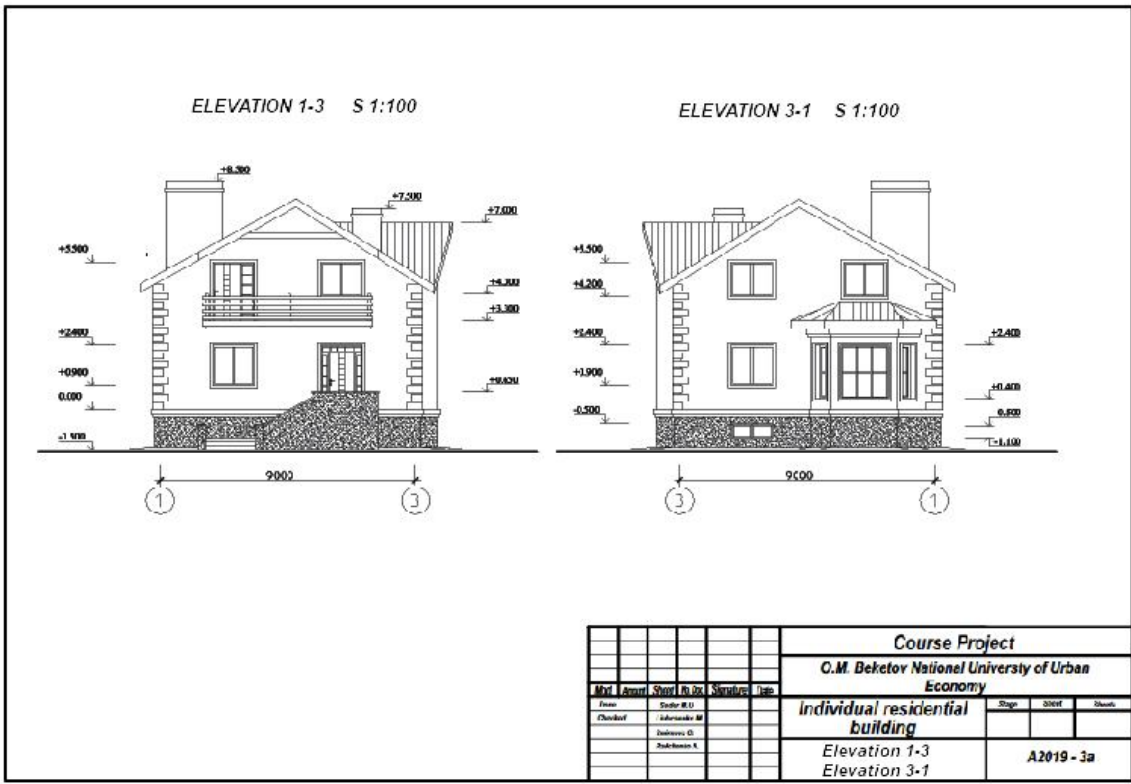


Figure 3.22 – Example of drawing of Elevation 1–3 and Elevation 3–1

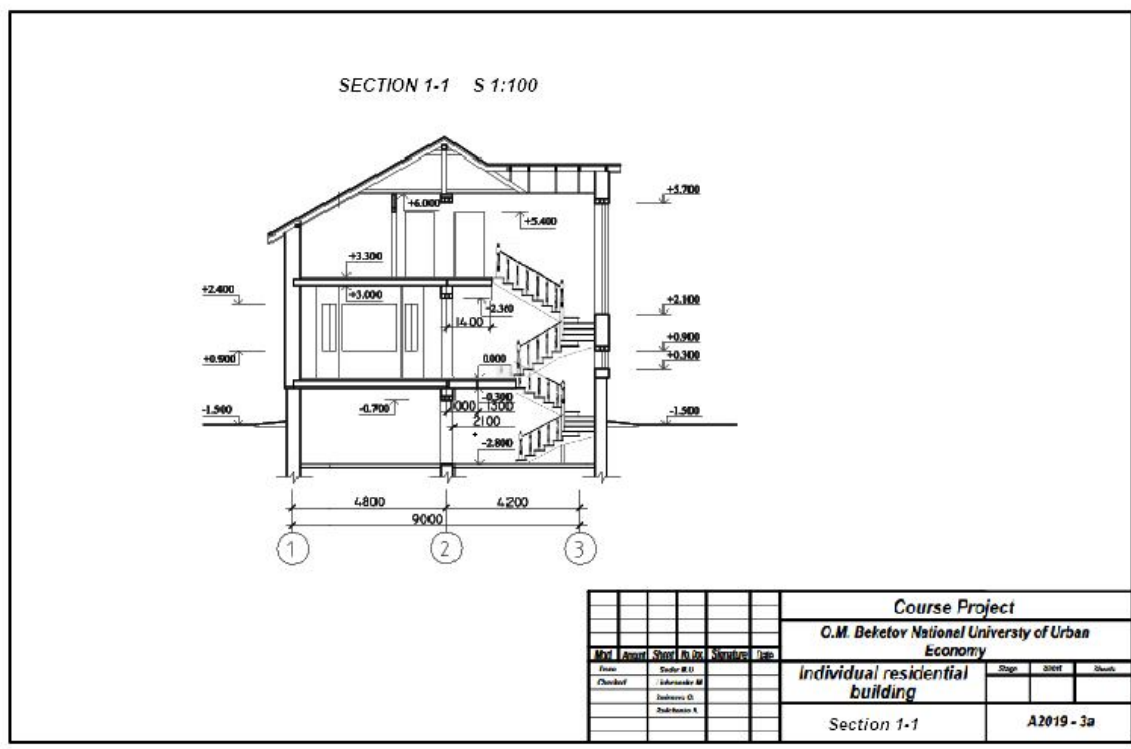


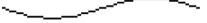
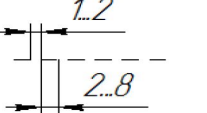
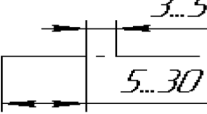
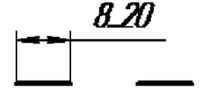



Figure 3.23 – Example of drawing of Elevation 1–3 and Elevation 3–1

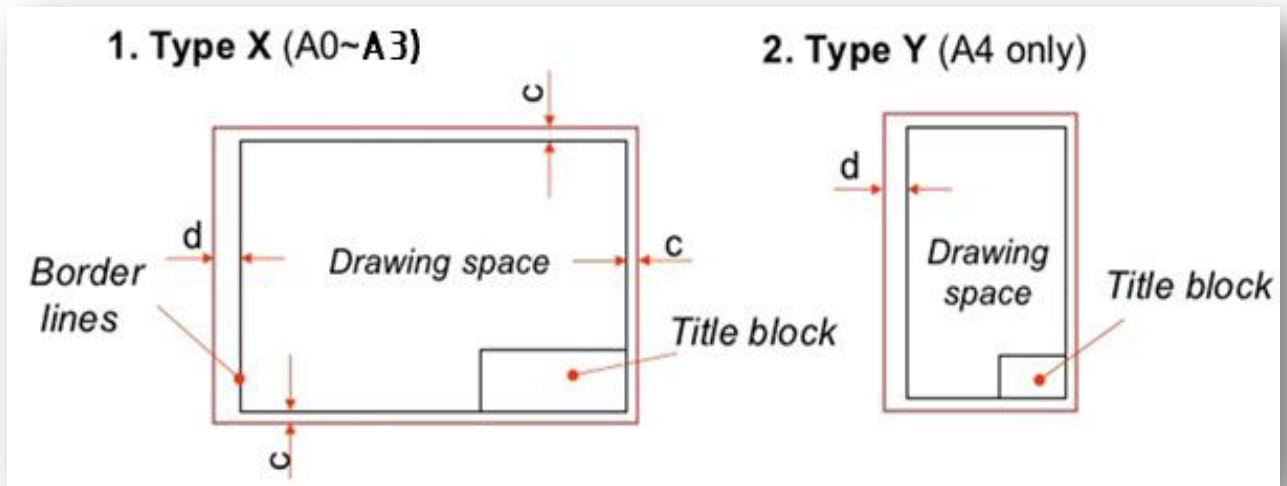
Lines types used in architectural and construction drawing are used for different purposes to provide specific information about building (Table 3.1).

Table 3.1 – The line types

Line	Illustration	Thickness	Application
Continuous thick (object)		$S = 0,5-1,4$ mm Thick	Outlines, visible edges, surface boundaries of objects
Continuous thin		$S/3 - S/2$ Thin	Dimensions, leader, extensional
Shot break (Continuous thin free hand)		$S/3 - S/2$ Thin	Limits of partial views or sections when the line is not an axis, interrupted views and sections
Hidden		$S/3 - S/2$ Thin	Hidden outlines and edges
Center		$S/3 - S/2$ Thin	Centerlines, lines of symmetry
Chain		$S - 1,5 S$ Extra thick	Cutting planes
Long break with zig-zag		$S/3 - S/2$ Thin	Indicate of long break

Drawing lines are used for different purposes to provide specific information for designers, manufacturers, etc. The person who will read drawings have to learn what they mean. Line types are also a language type to communicate between architect and technical people.

There are 2 types of sheet schema location: horizontal (type X) and frontal (type Y) orientations (Fig. 3.24).



Sheet size (format)	c, mm	d, mm
A4, A3, A2, A1, A0	5	20

Figure 3.24 – Types of sheets location

The title block is placed in bottom right corner of the drawing sheet (Fig. 3.25). Fill in of title block example is shown in Figure 3.26.

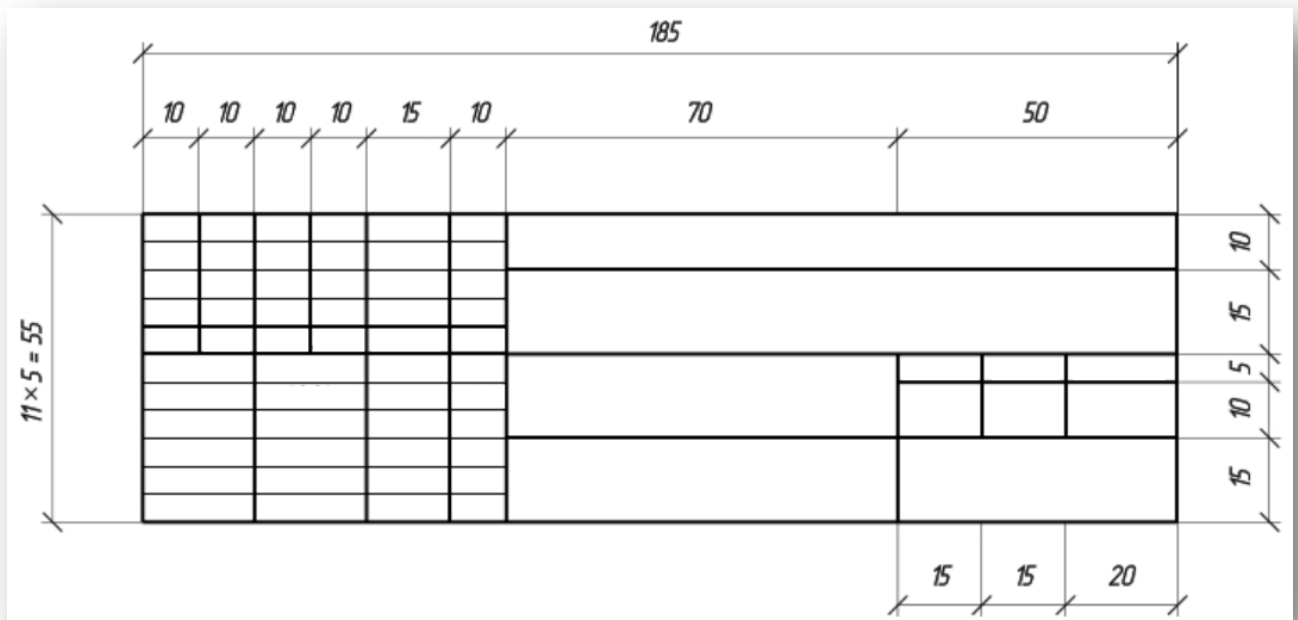


Figure 3.25 – Title block dimensions for construction drawings

						<i>Course project</i>			
						<i>O.M. Beketov National University of Urban Economy</i>			
<i>Mod.</i>	<i>Amount</i>	<i>Sheet</i>	<i>No. doc.</i>	<i>Signature</i>	<i>Date</i>				
<i>Done</i>						<i>Individual residential building</i>	<i>Stage</i>	<i>Sheet</i>	<i>Sheets</i>
<i>Checked</i>	<i>Liubchenko M.</i>								
	<i>Smirnova O.</i>								
	<i>Radchenko A.</i>					<i>1st floor plan</i>	<i>A2019-3a</i>		

Figure 3.26 – Fill in title block of floor plan drawing

Drawings must accurately convey the shape and dimensions of the building and its structures, be understandable, clear, and designed according to standards. When performing construction drawings, they rely on the rules established by state standards for a unified system for design documentation and standards for a system of design documentation for construction, which establish uniform rules for the implementation, execution and circulation of design documentation. Compliance with these rules ensures the unification of the composition and design of project documentation.



## **4 INTERIOR AND EXTERIOR DESIGN OF INDIVIDUAL RESIDENTIAL BUILDING**

### **4.1 Conceptual solution of the interior of individual residential buildings**

### **4.2 Implementation of plan drawing and visualization of interior**

### **4.3 Implementation of individual residential building project**

#### **4.1 Sketch conceptual solution of the interior of individual residential building**

One of the factors solving the problem is the introduction of the criterion of comfort for living, related to the size of the area, volume, equipment, hygienic conditions, etc. Comfort of living consists of spatial parameters of the room, physical conditions, microclimate and necessary equipment. Favorable microclimate is created by architectural and planning means (lighting, insolation, ventilation, internal volume, noise protection, etc.). Room is the simplest structural unit of a residential area. Dimensions (width width) are determined on the basis of functional processes. The height is determined empirically from 2,5 m to 3 m. The size of the area associated with the distance of the necessary equipment, taking into account the psychological factor of the feeling of space in the room.

Furniture occupies an average of 30–40% of the area of the apartment and 40–50 % of the room. Workplaces in groups: for sleep, rest, individual work, food, cooking, personal hygiene. For rational operation of the premises used normative recommendations (normal). For residential premises is characterized by a combination of several operations in the water room. For example, rest is in the bedroom; cooking food is in kitchen-dining room. The less heterogeneous operations performed in a separate room, the higher the degree of comfort.

The main functions of housing. The stability of living processes is characterized by the environment, according to the composition of the equipment, its location and the parameters of the zone.

*Functional of sleep.* The primary function of housing – a full sleep – a form of rest and a means of maintaining health. Zone requires complete visual, acoustic and psychological isolation. Ideally – from a non-sleeping local room.

*Function of rest.* The position of the person sitting in a free pose is considered. Basic furniture: chair, armchair, sofa, deck chair, furniture for rest, often mobile. Additionally can be shelves, bar, lamp, TV. etc. There are certain dimensions of passages.

*Function of individual work.* The process of preparation of educational tasks, self-education, creativity, professional activity and. n., the requirement – the absence

of noise, quality lighting. Workplace, desk (computer, easel, musical instrument), chair.

*Function of cooking.* The process may be accompanied by deterioration of the microclimate – gassiness, humidity, rising temperatures. Necessary ventilation, lighting, finishing. Modern kitchen equipment.

*Food function.* To save time and energy spent on servicing the process of eating, an important factor is the close mutual location of areas for eating and cooking. Dining room furniture: dining table and seating area.

*Function sanitary hygiene.* Has an individual character – isolation, special sanitary equipment. Standard equipment – bath, shower, sink, toilet, bidet. Premises of bathrooms of two types: separate and combined.

*Function of domestic work.* Care for clothes, linen, things, cleaning. Desired separate premises.

*Storage function.* Furniture cabinets, shelves, mezzanines, separate rooms. Hallway is a kind of living space with a hanger, mirror, cabinets, and shelves.

Also for the organization of an interior of the room it is necessary to consider the following elements of the organization of internal space.

**Space.** The most important element of interior design would be a functional space. Functional space acts as the base of the entire interior design. Therefore, it is essential that the user and designer both are well aware of the space availability and purpose of each individual space. A functional space would contain two type of space. A space that is filled with furniture or fixture (e.g. sofa, dining set, and etc.) and a space that is empty (e.g. hallway, space between dining set and sofa). Both spaces are determined by the user's needs as every person will require different space for variant purposes. Most importantly, both spaces should be well-balanced maintained as you do not want to be overcrowding or emptiable (Fig. 4.1).

**Color.** After functionality of the space, next thing to take note would be colors. Colors represent an aesthetic connection between the living and non-living object. Choice of colors can also be psychological affection to individual mindset attached to the functionality of the space. Each color has three distinctive aspects of Hue, Value, and Intensity. A good interior designer must be well aware of these three aspects to perform all kind of pairing alterations or combinations of the colors. For example, light earth tones (e.g. beige, light brown, light warm grey, and etc) would be an excellent choice for bedroom as it is the color of the harmonious blend as a neutral base evocative of stability which is great for making any room into an oasis of peace with a warm and inviting environment (Fig. 4.2).



Figure 4.1 – Well-balanced space



Figure 4.2 – Combination of the colors

**Style.** Each interior design project is personalized for the owner, beyond just catering to their aesthetic taste and style preferences. Regardless of the project residential design, hospitality design, office design or retail design, you would like the building design to represent a brand or preferred taste of the owner. Therefore, understanding the different design style would greatly help you to proceed to the next stage to finalize the overall design style. For example, minimalist would prefer design style that is minimal and with the balance of both positive and negative space whereas classicalist would be highly favored into the classical edges detailing of each piece of the fixture in the interior design from ceiling to flooring design to establish a very classical grandeur interior presentation (Fig. 4.3).

**Light.** Light is one of the most critical elements of interior design. Either artificial lighting or natural lighting, no elements would be identified simply without the light. Light sets in the mood and ambiance into space together light will also highlight some of the other design elements with the prior to proper planning. Therefore, you may refer to the three major types of lights (Fig. 4.4).

*Mood lighting* also referred as ambient light which generally set the mood of the general space and illuminate the overall space that set the mood. Mood lighting commonly refers to cove lighting on the ceiling, floor lighting or wall lighting that illuminate the overall space of the dedicated mood.

*Accent lighting* also referred to focus light which generally set to highlight a particular element or object. For example, painting artworks, design structures, sculptures and etc. You may found ceiling spotlight, track light or integrated lighting design would be a great way to function as accent lighting.

*Task lighting* as the name implies, includes light sources like table lamps and bedside lamps which serve a defined purpose or dedicated to a specific task. For example, table lamps for better reading or writing purposes for the work desk and bedside lamp would be great for soft lighting without opening the general lighting that might annoy another party in the room.

Last but not least, *natural lighting* would be the best of all as it will not cost you and eco-friendly that serve the same purpose of the artificial lighting. If the owner or designer could integrate the natural lighting source design into the building then it would be the best design by using the natural resources.



Figure 4.3 – Personalized design

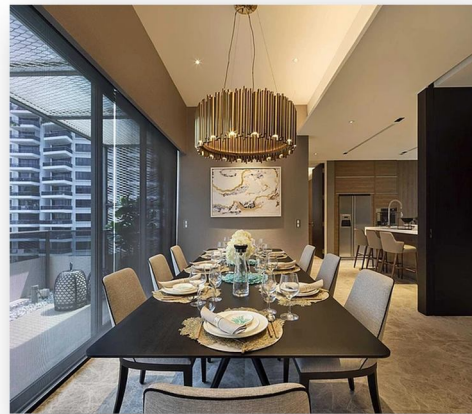


Figure 4.4 – Interior lighting solution

**Texture and pattern.** A different material would have different texture or pattern that would bring interesting feels to interior design along with the element of colors. Different texture or pattern would add depth to a space together it will define the feel or appearance. Texture or pattern could easily found in all aspect of design especially interior design with the designated flooring material, wall finishing, choice of cushion, bedding material or furniture's material. Most importantly, always strike a balance with the overall composition of the space without being too much or too less (Fig. 4.5) [6].



Figure 4.5 – Different texture of interior elements

## 4.2 Implementation of plan drawing and visualization of interior

In Assignment “Interior of the individual residential building” it is necessary to complete the interior design of one of the premises of an individual residential building.

Floor plan made at 1:50 scale. On the drawing, show the placement of furniture (Fig. 4.6), work out the details, taking into account the selected style (Fig. 4.7).

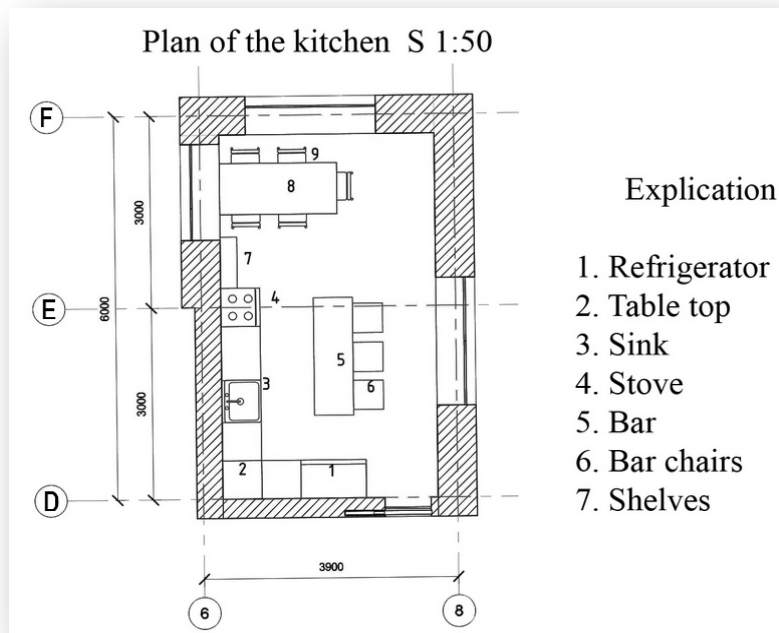


Figure 4.6 – Plan of kitchen interior



Figure 4.7 – Interior design of kitchen

Some example of living room interior: plan, top perspective view and visualization (Fig. 4.8.)



Figure 4.8 – Interior design of living room

### 4.3 Implementation of individual residential building project

Assignment “Project of an individual residential building” is carried out on the A0 format, is made out by a frame and the main inscription.

The design of the project on one sheet is of great importance for its presentation to the customer and is therefore an important part of the task. The design style can be arbitrary at the request of the architect. You can experiment with color, background, font.

The following elements must be placed on the format:

1. Situational diagram with a dedicated plot for construction. at a scale of 1:2 000, located at the top left of the format.

2. General plan of the homestead plot in the scale of 1:200, located in the left part of the format. Place symbols to the general plan next to the image.
3. Four facades of an individual house in a scale of 1: 100. Located at the top of the format.
4. Floor plans of an individual house in a scale of 1:100. Located in the central part of the format. Next to the plans to place an explication of the premises of each floor.
5. Architectural section on the stairs at a scale of 1:100.
6. Two, three visualizations of an individual house with the environment. Are located in any free place of a format
7. The plan of one of rooms of a cottage with arrangement of furniture and details of an interior in scale 1:50. Place symbols next to the plan.
8. One, two visualizations of an interior of the chosen room.
9. Above each image write the name of the image and the scale in which it is made.
10. At the top of the format write the name of the project.
11. In the upper left corner of the format show the north direction (Fig. 4.9, 4.10) [7, 8].

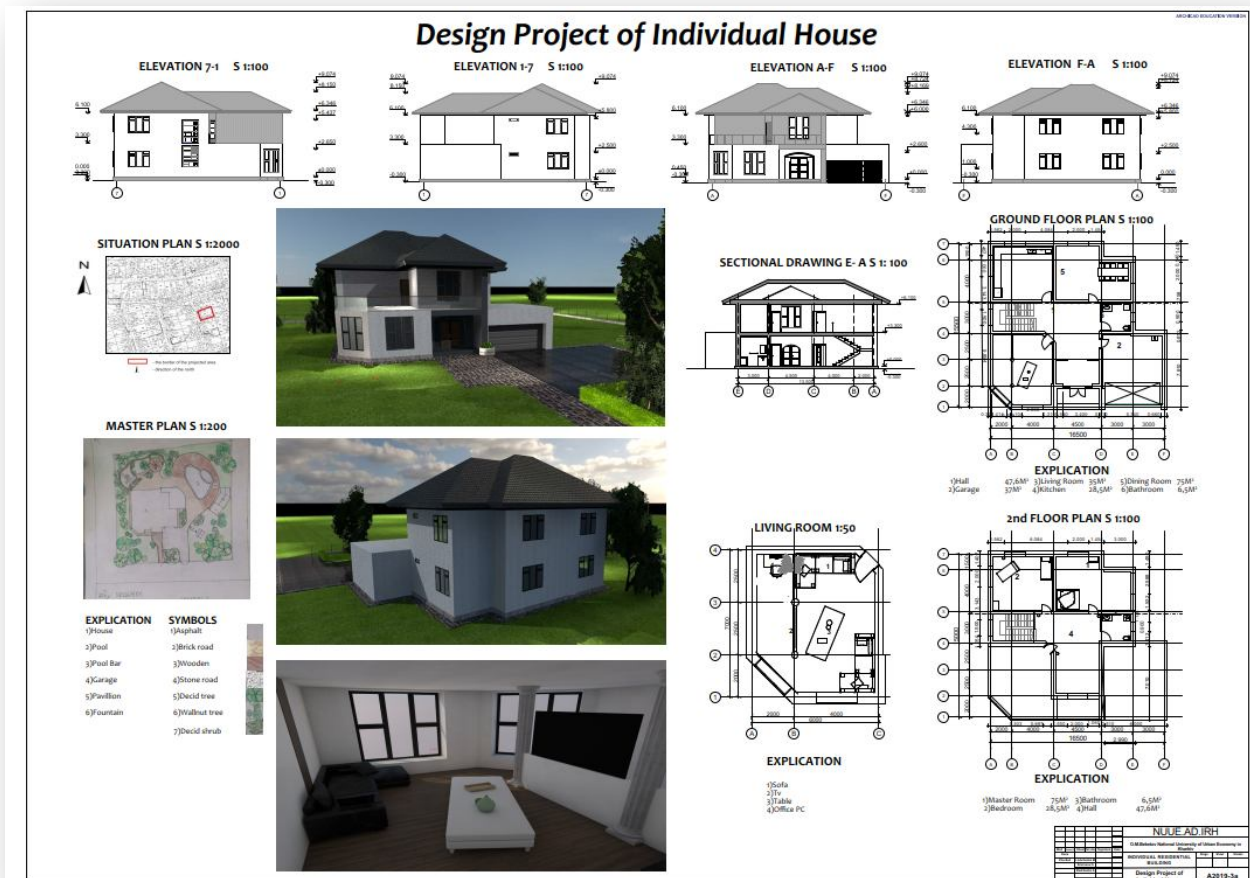


Figure 4.9 – Example of student project (Alhan E. gr. A 2019-3a)

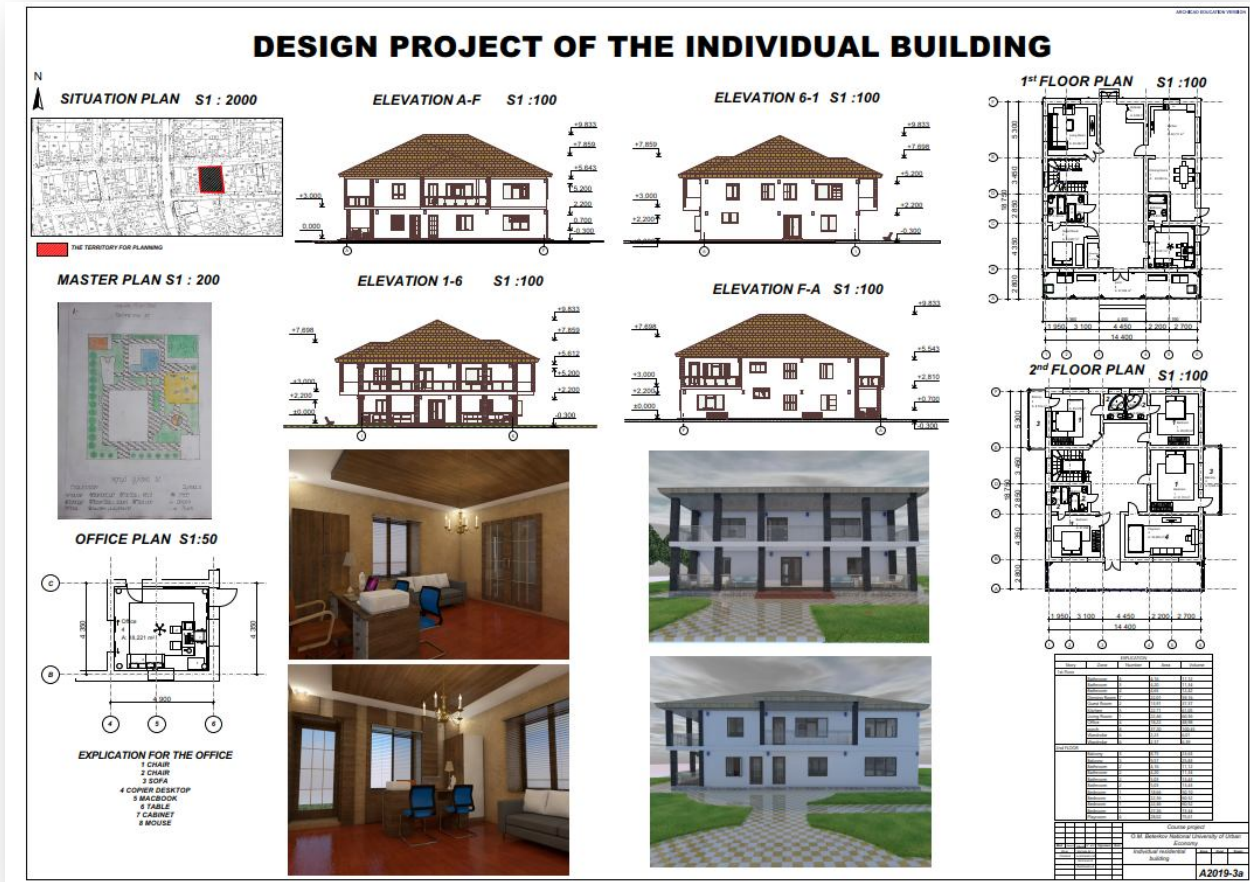


Figure 4.10 – Example of student project (Samake M. gr. A 2019-3a)

After arranging all parts of the project on one sheet, it is necessary to compose separate drawings into an album (Fig. 4.11).

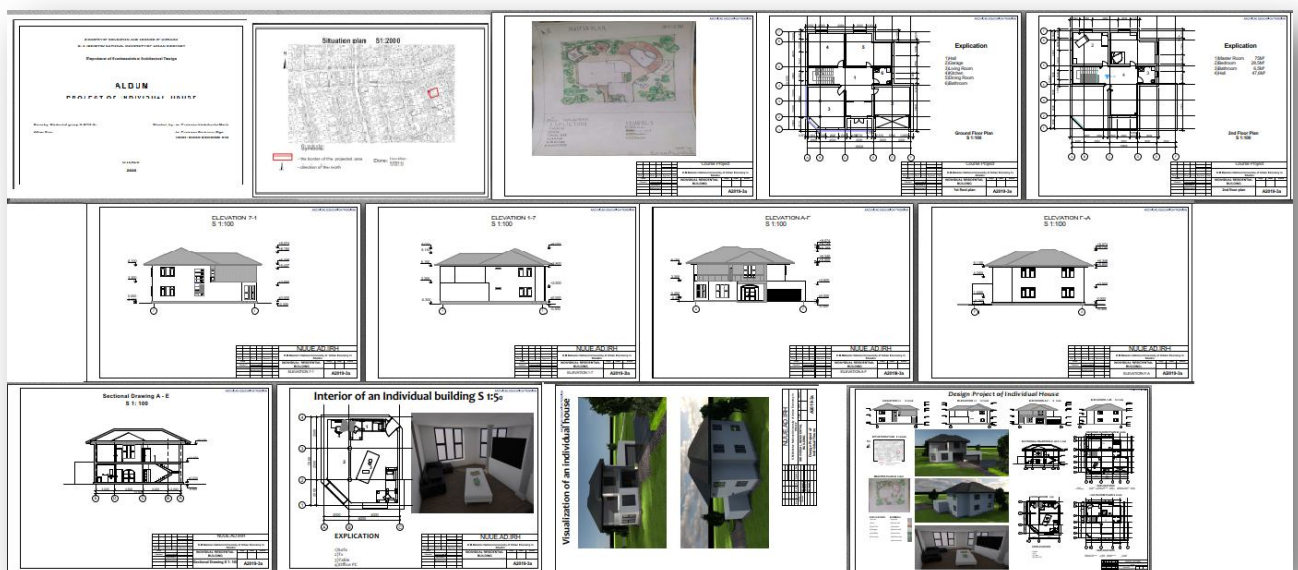


Figure 4.11 – Album of project drawings



The album consists of A3 sheets and a title page, each format, except the title page, must have a frame and a main inscription. The album contains drawings in the following sequence:

1. Situational scheme.
2. General plan.
3. Plans of all floors.
4. Incision.
5. Facades.
6. Room plan.
7. Visualizations of the selected room.
8. Visualizations of the cottage.
9. A reduced copy of the entire project.

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*Виробничо-практичне видання*

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до практичних занять та самостійної роботи  
з дисципліни

**«АРХІТЕКТУРНЕ ПРОЄКТУВАННЯ:  
ІНДИВІДУАЛЬНИЙ ЖИТЛОВИЙ БУДИНОК»**

*(для іноземних студентів другого курсу денної форми навчання  
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