



BUILDING PROJECTS ARCHITECTURAL DESIGN AND PLANNING

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Article history:	Abstract:
<p>Received: September 28th 2021 Accepted: October 11th 2021 Published: December 13th 2021</p>	<p>As you know, preparing structural maps and reading the building is one of the most important steps that we need to have accurate and complete information about and dominate it. In fact, the first step is to design structures, prepare maps and model.</p> <p>However, due to the lack of training and understanding of the maps, in this E book we will have detailed discussions for a variety of building maps including architectural maps, structures, mechanical installations maps and electrical installations. The map of niches and structures of common guards is also one of the things that will be examined in this E book.</p>
<p>Keywords: Structural Design, Types of maps, Architectural Map Details, Architectural Drawings, Structural Drawings</p>	



PHASE ZERO STRUCTURAL DESIGN

In these maps, the generalities are discussed and the feasibility of implementing the project in these maps is investigated. Simple, detail less plans such as crocs, which are used only to locate different spaces and draw the overall schism of the project, fall into this category. Also in this phase, recognition of the region's climate, architectural conditions of the region, terms and conditions, frameworks and standards, etc. The project is considered in terms of technical and economic justification as well as cultural.

PHASE 1 STRUCTURAL DESIGN

After finalizing the design in phase zero, they draw the building maps accurately with the appropriate scale. These maps show the architectural characteristics of the building, such as the establishment, the relationships of spaces and the specifications of the building's facades, and are the basis for evaluating and deciding employers and users and investors. In order to explain the design to others, drawing, presenting the design accurately and beautifully, and even making replicas or architectural animations, is of great importance. These maps remain incomplete and do not contain many details. In general, phase 1 maps in the building include "building position map", "floor plan map", "building cutting map" and "building façade map".

PHASE 2 STRUCTURAL DESIGN

After eliminating the possible defects of the design and maps in phase 1 by the employer, the design phase 2 maps are carried out with all the executive data, dimensions and measurements, determining the type of materials and other items. These maps include items such as foundations, column dimensions, pipe paths, materials of walls, materials and details of doors and windows, flooring materials, lamps, location, etc. is.

It is important to note that before designing the architectural phase 2, all structural, mechanical and electrical installations designed in phase 1 should be reviewed and any possible forms and contradictions between them should be resolved. One of the contradictory issues related to structural, installation and architectural maps is the location of the ducts of facilities that even the wrong concrete and concrete destruction have been experienced in the executive works.

TYPES OF MAPS

Construction maps are divided into four categories: architectural, structural, mechanical and electrical maps:

Architectural Drawings:

These maps are designed by the architect, who determines the full specifications of the materials and the executive details of the different parts of the building. These maps are also identified by the abbreviation "A".

Structural Drawings:

These maps are designed by Engineer accountant and introduce the specifications of foundations, columns, beams and roof coverings. These maps are also identified by the abbreviation "S".

Mechanical drawings:

These maps are designed by the mechanical engineer and introduce the water supply system, sewage disposal, heating and cooling. These maps are also defined by the abbreviation "M".

Electrical Drawings:

These maps are designed by the electrical engineer and introduce the lighting system, key and socket and the building phone.

Plans, facades and cuts

To specify a point in space, we need three coordinate components. Objects are composed of joining points. Therefore, the location of objects and their sides can be identified using maps. For this purpose, we need cutting maps and plans to determine the spatial and sides characteristics of the map components. In general, in maps to display each part, we use three maps of "Plan", "Nama" and "Cut".

We can see how to draw these maps in the figure below.



How to draw "A" plan, "B" cutting from a certain juncture, "C" different facades of the building

Architectural Drawings

Architectural maps include site plan, all facades of the building, basement plan, floor plan and floor type map, furniture plan, roof slope plan and cuts from different parts of the structure.

Architectural Design Stages

In order to accomplish the architectural design path, steps must be taken to achieve the desired goal, each step must be taken efficiently. All projects for architectural design consist of three main parts:

- 1) Phase Zero Architectural Design
- 2) Phase 1 Architectural Design
- 3) Phase 2 Architectural Design

General Architectural Drawings

Architectural drawings are named after the letter A indexing, the engineering system of each city provides general requirements related to the project, usually the general requirements of the project along with the list of maps in the sheet A-00 are provided in each sheet in the corner of the map or on the side of the map, the general information of the building and the specifications of the site and the owner are provided in each sheet. And an example of the list of architectural maps can be seen in the figure below.

Drawing Name	Scale	Paper Size
000-DrawingIndex	1/2" per foot	36"x24"
Artistic		
B-080_Art-FullNorth	1/4" per foot	36"x24"
B-083_Art-FullEast	1/4" per foot	36"x24"
B-082_Art-FullWest	1/4" per foot	36"x24"
B-081_Art-FullSouth	1/4" per foot	36"x24"

Drawing Name	Scale	Paper Size
Architectural Drawings		
A-080_Arch-UnfinishedBasement	1/4" per foot	36"x24"
A-090_Arch-FloorPlanMain	1/4" per foot	36"x24"
A-091_Arch-FloorPlanBedroom	1/4" per foot	36"x24"
A-092_Arch-PlanRoof	1/4" per foot	36"x24"
A-095_Arch-WallFoundationDesignFull	1/2" per foot	36"x24"
A-005_Arch-InternalWallFoundationFull	1/2" per foot	36"x24"
A-010_Arch-FoundationWithDeckingTop	1/4" per foot	36"x24"
A-015_Arch-FoundationWithDeckingBottom	1/4" per foot	36"x24"
A-123_Arch-NorthElevFull	1/4" per foot	36"x24"
A-122_Arch-EastElevFull	1/4" per foot	36"x24"
A-121_Arch-WestElevFull	1/4" per foot	36"x24"
A-120_Arch-SouthElevFull	1/4" per foot	36"x24"

Drawing Name	Scale	Paper Size
Plumbing Drawings		
P-011_Plumbing-Plan-UnfinishedBasement	1/4" per foot	36"x24"
Plot		
L-000_PlotFull	1" = 50 feet	36"x24"
L-001_PlotBuildingSiteTop	1/4" per foot	36"x24"
L-002_PlotBuildingSiteMiddle	1/4" per foot	36"x24"
L-003_PlotBuildingSiteBottom	1/4" per foot	36"x24"
L-004_PlotBuildingSiteWest	1/4" per foot	36"x24"
L-070_PlotFullNoBorder	1" = 200 feet	11"x8.5"
L-071_PlotBuildingSiteNoBorder	1" = 40 feet	11"x8.5"

Drawing Name	Scale	Paper Size
Drainage Drawings		
D-010_Drainage-Implementation	1/2" per foot	36"x24"
Fire Dept Drawings		
F-060_Fire-SprinklersBasement	1/4" per foot	36"x24"
F-070_Fire-SprinklersMainLevel	1/4" per foot	36"x24"
F-080_Fire-SprinklersBedroomLevel	1/4" per foot	36"x24"
F-090_Fire-SprinklersRoof	1/4" per foot	36"x24"

Drawing Name	Scale	Paper Size
Structural Drawings		
S-000-DrawingIndex	1/2" per foot	36"x24"
S-010_Struct-StructuralNotes	1/2" per foot	36"x24"
S-025_Struct-WallFoundation	1/2" per foot	36"x24"
S-026_Struct-InternalWallFoundation	1/2" per foot	36"x24"
S-030_Struct-BackfilledWall	1/2" per foot	36"x24"
S-050_StructureFlooring	1/2" per foot	36"x24"
S-052_StructureDetailsE102	1/2" per foot	36"x24"
S-053_StructureDetailsE130	1/2" per foot	36"x24"
S-054_StructureDetailsE116	1/2" per foot	36"x24"
S-057_StructureMiscDetails	1/2" per foot	36"x24"
S-058_SouthShearWallBasement	1/2" per foot	36"x24"
S-059_Arch-ShearWalls	1/2" per foot	36"x24"
S-060_StructureColumnDetails	1/2" per foot	36"x24"
S-202_StructPlotBuildingSiteTop	1/4" per foot	36"x24"
S-203_StructPlotBuildingSiteBottom	1/4" per foot	36"x24"
S-210_StructFoundationDeckingTop	1/4" per foot	36"x24"
S-211_StructFoundationDeckingBottom	1/4" per foot	36"x24"
S-220_StructFloorPlanBasementTop	1/4" per foot	36"x24"
S-221_StructFloorPlanBasementBottom	1/4" per foot	36"x24"
S-222_StructFloorPlanMainTop	1/4" per foot	36"x24"
S-223_StructFloorPlanMainBottom	1/4" per foot	36"x24"
S-226_StructFloorPlanBedroom	1/4" per foot	36"x24"
S-228_StructPlanAttic	1/4" per foot	36"x24"
S-240_StructCeilingBeamsBasementTop	1/4" per foot	36"x24"
S-241_StructCeilingBeamsBasementBottom	1/4" per foot	36"x24"
S-244_StructCeilingBeamsMainLevel	1/4" per foot	36"x24"
S-245_StructCeilingBeamsBedroomLevel	1/4" per foot	36"x24"
S-300_StructElev-EastDeckEdge	1/4" per foot	36"x24"
S-305_StructElev-EastMainWall	1/4" per foot	36"x24"
S-310_StructElev-HalfwayInsideEast	1/4" per foot	36"x24"
S-315_StructElev-EastInternalWall	1/4" per foot	36"x24"
S-320_StructElev-BuildingCenterNorthSouth	1/4" per foot	36"x24"
S-325_StructElev-WestInternalWall	1/4" per foot	36"x24"
S-330_StructElev-HalfwayInsideWest	1/4" per foot	36"x24"
S-335_StructElev-WestMainWall	1/4" per foot	36"x24"
S-340_StructElev-WestDeckEdge	1/4" per foot	36"x24"
S-400_StructElev-BottomGardenStairs	1/4" per foot	36"x24"
S-405_StructElev-HalfwayGardenStairs	1/4" per foot	36"x24"
S-410_StructElev-TopGardenStairs	1/4" per foot	36"x24"
S-415_StructElev-SouthWallSouthPortico	1/4" per foot	36"x24"
S-420_StructElev-HalfwaySouthPortico	1/4" per foot	36"x24"
S-425_StructElev-SouthMainWall	1/4" per foot	36"x24"
S-430_StructElev-HalfwayInsideSouth	1/4" per foot	36"x24"
S-435_StructElev-GarageSupports	1/4" per foot	36"x24"
S-440_StructElev-BuildingCenterEastWest	1/4" per foot	36"x24"
S-445_StructElev-HalfwayInsideNorth	1/4" per foot	36"x24"
S-450_StructElev-NorthMainWall	1/4" per foot	36"x24"
S-455_StructElev-HalfwayNorthPortico	1/4" per foot	36"x24"
S-460_StructElev-NorthWallNorthPortico	1/4" per foot	36"x24"
S-465_StructElev-NorthWallDrivewaySupport	1/4" per foot	36"x24"
S-500_StructElev-RoofFramingWest	1/4" per foot	36"x24"
S-501_StructElev-RoofFramingSouth	1/4" per foot	36"x24"
S-510_StructPlan-RoofFraming	1/4" per foot	36"x24"



General Architectural Drawings

Architectural Map Details

Architectural maps are usually drawn on a scale of 1/200. In order to have sufficient mastery of architectural maps and sufficient familiarity with the project's situations and dimensions, we need to be aware of the signs in the maps. In the following, we will state some important signs of architectural maps and special executive data.

Signs on architectural maps

<p>Earth or ground</p> <p>Architectural and topographical installation symbols</p> <p>Lamp, general symbol</p> <p>Laminar, fluorescent lamp</p> <p>Switch, general symbol</p> <p>Switch with pilot light</p> <p>Pull-coed switch, single pole</p> <p>Two-way switch, single pole</p> <p>Socket outlet (power), general symbol</p> <p>Socket outlet (power) with single-pole switch</p> <p>Socket outlet with isolating transformer, eg shower socket</p> <p>Distribution centre, shown with five conduits</p> <p>Fan, shown with wiring</p> <p>Water heater shown with wiring</p>	<p>Information devices</p> <p><i>Datums, levels, orientation</i></p> <p>1.101 bench mark</p> <p><i>Steps and gradients</i></p> <p>1.801 direction of RISE, ramp/stairsteps</p> <p>1.802 direction of FALL, slope</p> <p><i>Applications</i></p> <p>Straight stairsteps 1.801</p> <p>Ramp 1.104 1.801</p> <p>Materials in section</p> <p>Wood</p> <p>2.101 any type, sawn</p> <p>2.105 softwood, machined all round</p> <p>2.106 hardwood, machined all round</p>	<p>Manufactured materials</p> <p>2.201 board/layer, etc. any type; small scale*</p> <p>2.202 sheet, any type; large scale</p> <p>2.203 board, any type; large scale</p> <p>2.205 plywood sheet</p> <p>2.206 glass sheet</p> <p>2.207 metal sheet</p> <p>2.208 blockboard</p> <p>2.209 insulation board</p> <p>Masonry</p> <p>2.301 blockwork</p> <p>2.302 brickwork</p>	<p>2.303 stonework</p> <p>Site formed materials</p> <p>2.403 asphalt/macadam</p> <p>2.404 plaster/render/screed</p> <p>2.405 concrete</p> <p>2.406 granular fill</p> <p>2.407 hard fill</p> <p>2.408 subsoil</p> <p>Landscape</p> <p>Existing trees</p> <p>4.202 existing tree</p> <p>4.203 existing tree to be removed</p> <p>Proposed trees</p> <p>4.303 proposed tree, any type</p>	<p>Building components</p> <p><i>Windows in horizontal/vertical section/cut</i></p> <p>6.101 any type</p> <p>6.102 with sill/jamb/threshold</p> <p><i>Windows in elevation</i></p> <p>6.201 any type</p> <p>6.202 fixed</p> <p>6.203 hinged at side</p> <p>6.204 hinged at top</p> <p>6.205 hinged at bottom</p> <p>6.206 pivoted, horizontal axis</p> <p>6.213 sliding horizontally</p> <p><i>Doors and doorsets on plans</i></p> <p>6.301 hinged leaf</p>	<p>6.307 two hinged leaves, any type</p> <p>Piped and ducted services</p> <p><i>Pipes, ducts, drains and sewers</i></p> <p>7.101 any type</p> <p><i>Pipe fittings</i></p> <p>7.211 draw off point (tap)</p> <p>7.212 spray outlet</p> <p>Valves</p> <p>7.301 straight two port</p> <p>7.309 ballcock</p> <p><i>Sanitary fittings (simplified representations on plan)</i></p> <p>7.4R1 sink, any type</p> <p>7.4R4 sinktop, R31 bowl</p> <p>7.4R7 wash basin</p> <p>7.4R9 bath</p>	<p>7.4R10 shower tray</p> <p>7.4R11 bidet</p> <p>7.4R12 wc with close coupled cistern</p> <p>Pipework components</p> <p>7.601 radiator</p> <p>7.602 heated towel rail</p> <p>Electrical services</p> <p>Communications sockets</p> <p>8.507 socket, telephone</p>
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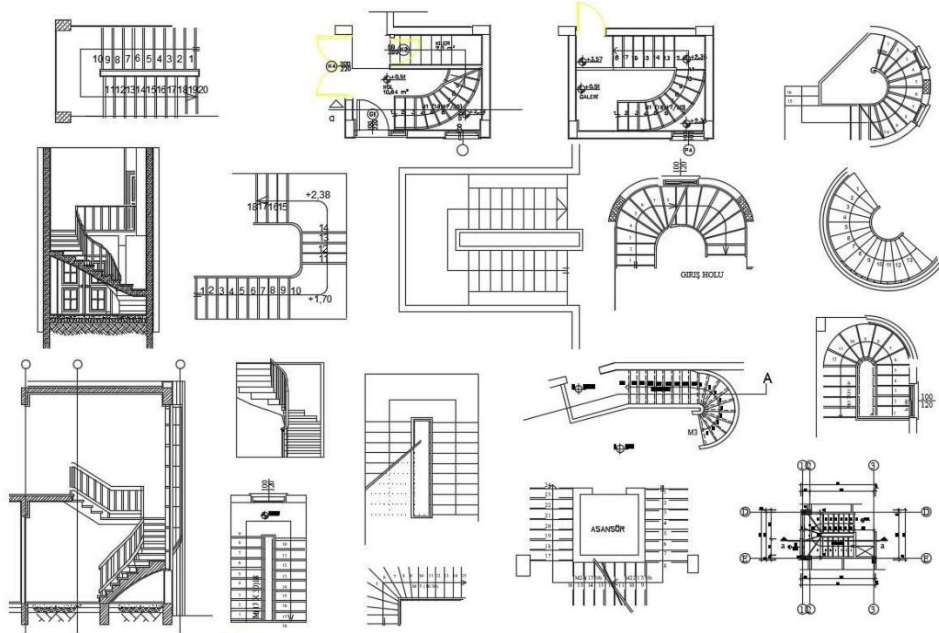


Signs on architectural maps

Executive Data in Architectural Maps

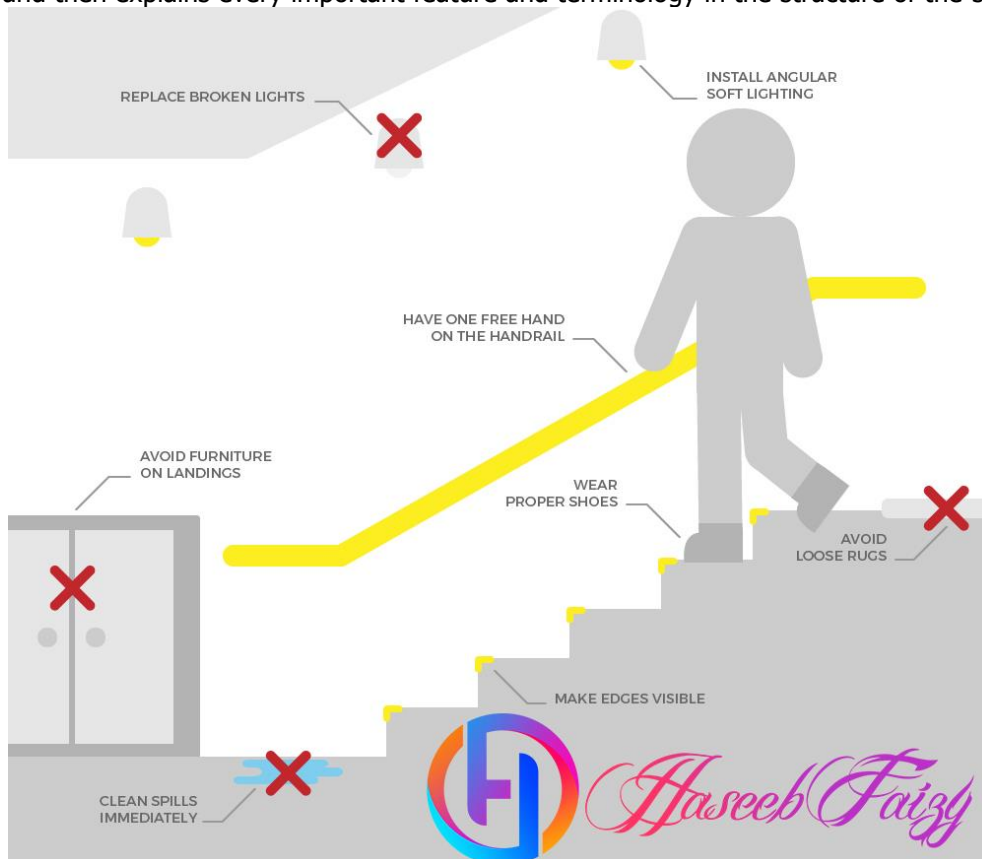
In the following, we will examine the general data of buildings. Note that what is stated in this section is conventional data in architectural drawings and may be needed in a particular data structure for a component.

Staircase Executive Data



Staircase or staircase is one of the most important components of the building that we should pay special attention to during the implementation. To avoid mistakes, zooming in on maps is a very ideal solution. In the executive details of the staircase, the appropriate and standard dimensions of the staircase box, the number, height and width of the stairs and ... to be considered.

Arrows are used to display the path along the stairs and reach the top floor. Each step has the specifications shown in the figure below and then explains every important feature and terminology in the structure of the stairs.



Specifications of each step of the stairs

- A. Stair floor: The upper surface of the stairs on which the foot is placed is called "stair floor".
- B. Height of one step: The vertical distance of two consecutive stair floors is called "stair height".
- C. Stair forehead: The vertical piece that sits between the two floors of the stairs is called the "stair forehead".
- D. Stair species: The surfaces on the sides of the stairs are called "cheeks".
- E. Stair width: The distance between the cheeks of each step is called "the width of the stairs".
- F. Stair floor groove: On each floor of the stairs there are usually one or two grooves along the width of the stairs, these grooves are created with the aim of preventing slippage.
- G. Stair cape: The forehead of the stair floor from the forehead of the stairs is called "stair cape".



Figure 12- Row of stairs and footpaths

Step row: A set of consecutive stairs between two level differences is called "row of stairs".

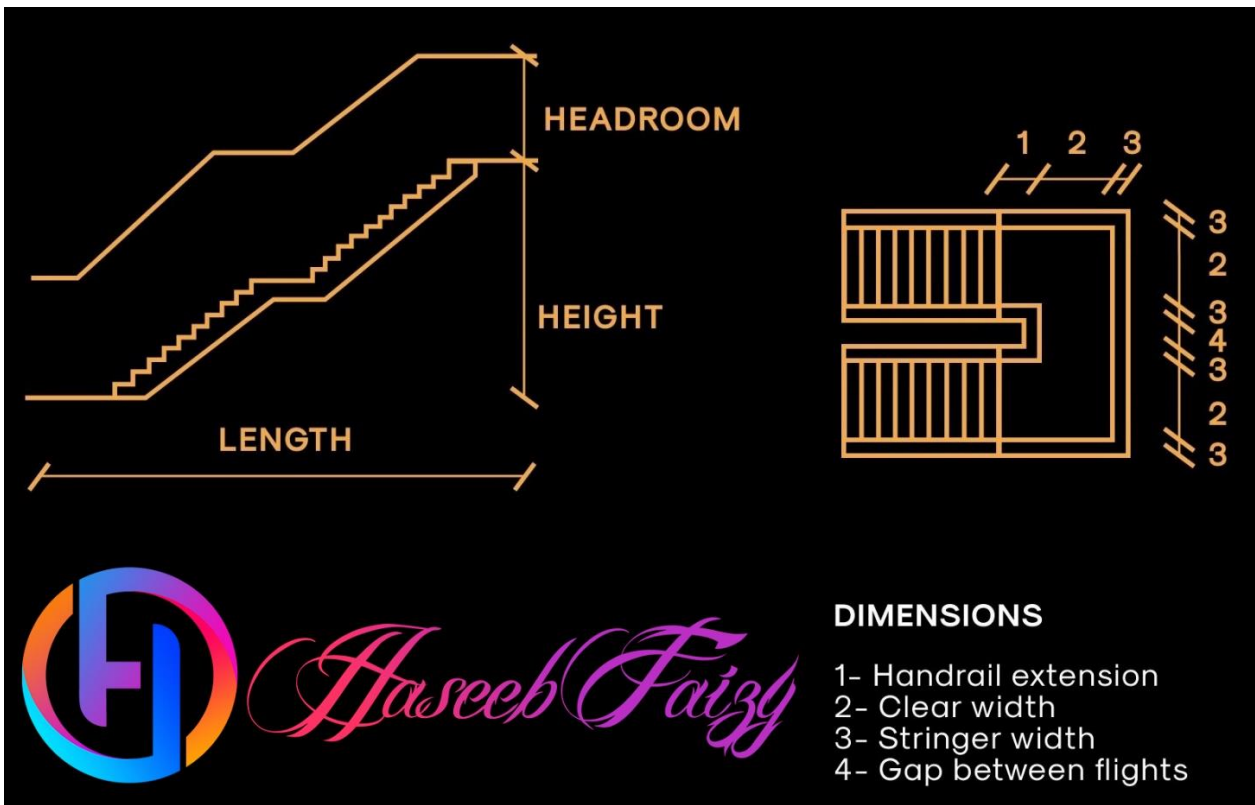
Staircase: The level on which a person steps after traversing a row of stairs, is used with the aim of resting or changing the direction of the stairs, the maximum number of consecutive stairs is 12, and if the number of stairs is more than this amount, there is a need for the footman to rest.

Step Eye: The distance between several rows of stairs in the form of a round-up is called "stair eye", in the figure below is a sample of the step eye.



Stair Eye

Fences: Turrets and shields to prevent people from falling, which according to the necessary standards, the necessary executive data are provided for them, fences can be made of wood, metal, masonry materials, among other uses of fences on balconies that have different executive data according to the conditions.



Staircase plan and its details

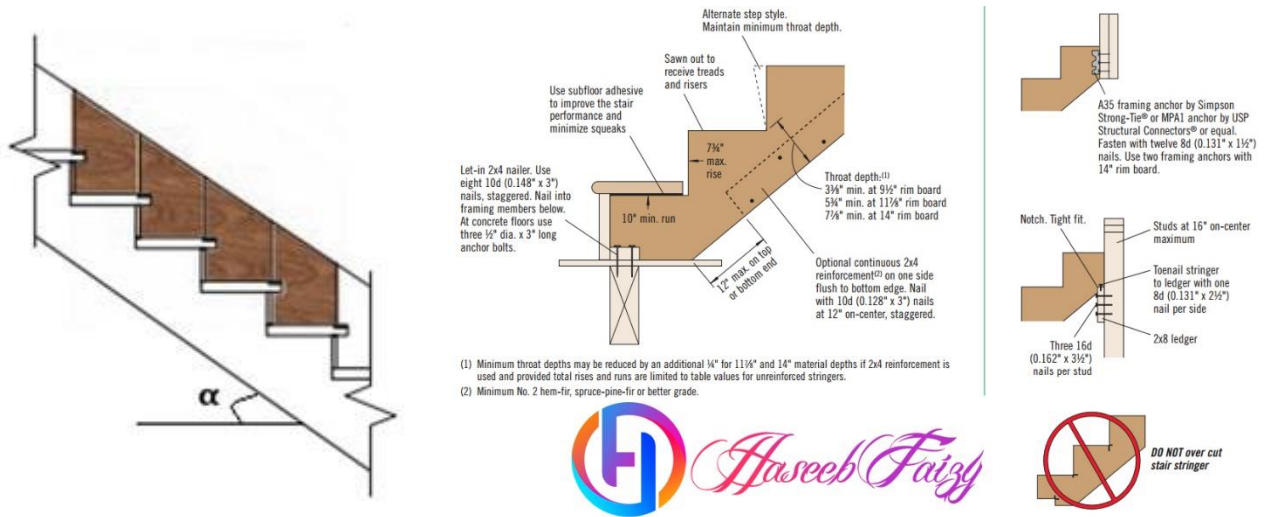
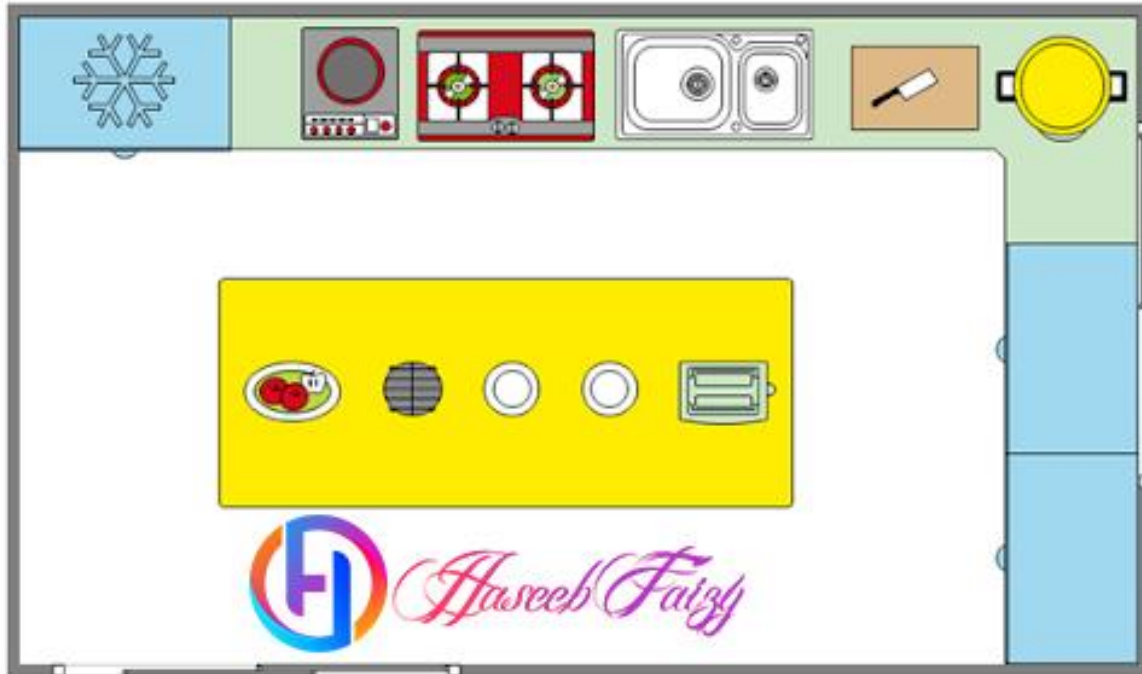


Figure 13- Stair cornice and its slope angle Executive details of stairs

Note: In general, stairs are divided into different types of use, staircases, duplex stairs and emergency stairs are used for specific purposes in buildings, in any case, displaying each of them in architectural maps is mandatory.

Layout or Zoom Maps

Usually, in the architectural phase 2 maps, The executive details of some spaces (such as staircases, bathrooms, kitchens and bathrooms) are displayed separately, this is much more pronounced in large projects, the number of such details varies according to the importance of the project and the spaces and their complexity in these maps, such as the layout of the elements in the desired space, how to execute the thinning, slope and the location of the floor installation. Passions and... Displayed. In the figure below, we will see examples of layout maps.



Layout map of kitchen and staircase

Study of plans, facades and architectural cutting

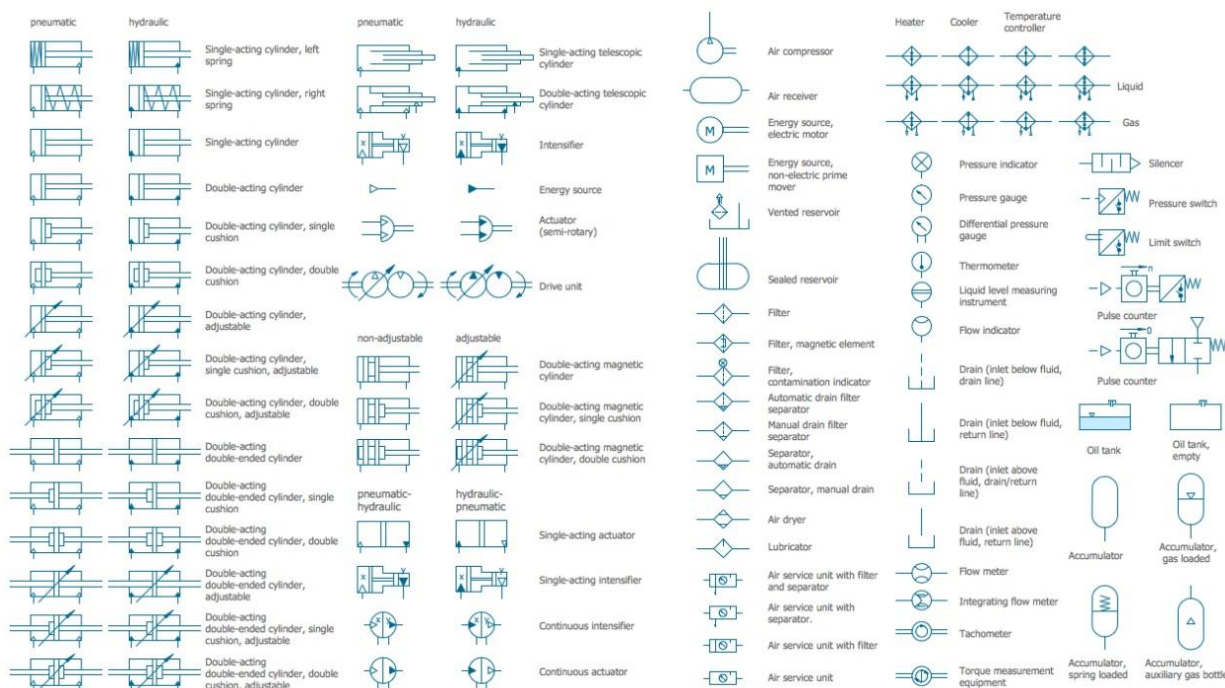
In the main text of the E book, we will thoroughly examine the plan, cutting and façade of a 4-storey building. To view the full text of this E book, download the PDF file.

STRUCTURAL DRAWINGS

Structural drawings include material specifications, construction details and installation of guard structures and structural elements including foundations, main and minor beams, columns, retaining and shear walls, braces and fittings in these maps all details of the implementation of ceilings, staircases, between frames and wall posts, etc. delivered. Any defects in the presentation of maps may cause confusion and even postpone the project's delivery date. Also, structural maps are the continuity point of architectural maps, mechanical and electrical installations. Because if there is a contradiction in the maps, unsupervised implementation such as shaving, cutting, piercing or destroying structural elements will result. The purpose of the mentioned destructions is mainly to pass the pipes of the facilities, installing signs, chimneys and implementing ducts.

ABBREVIATIONS OF STRUCTURAL MAPS

To introduce different elements in maps, a series of standard signs are usually used, the most important and most widely used of which are presented in the figure below.



Abbreviations in structural maps

A look at the maps of the Guardian structure

Each project needs 4 groups of construction maps. These four groups include architectural, structural, electrical and mechanical installations. However, due to the progress of the construction industry, another group of these maps should be added to the construction maps group. In fact, due to underground constructions due to economic problems, we need to sustain and excavate operations. This operation requires executive maps that due to their proximity to structural maps, we will examine it in this book.

Among the structures of conventional guards in the construction industry are the following:

- 1) Guard structure by truss method
- 2) Guard structure by nailing method
- 3) Guard structure by anchorage method (sewing back)
- 4) Guard structure by mutual harness method

Drawing of concrete building

Studying the maps of concrete structures due to their popularity is one of the necessities of the discussion of building map reading, in this book we will examine the maps of several concrete buildings with different characteristics as follows:

Landscape of concrete structure maps survey

- Details of rebars
- Foundation
- Column
- Beam
- Concrete Shear Wall
- Structural Ceiling System
- Stairs
- Wall Post

Rebar Details

Length, bending radius of main armatures, hooks along with inhibitory length and longitudinal armature patches are among the things that should be controlled and properly executed in maps. Any defects in the presentation of data and the implementation of these items will call into question the seismic performance of the structure. The items mentioned in the maps can be presented in different ways, including in tables.

Values expressed for inhibitory length, hooks, patches, etc. Changes may be made in accordance with the time and change of the bylaws. In the following figure, in three parts, the details of the bend, patch and overlapping length of the armatures are mentioned.

Map reading of steel building

The map of steel structures has more details than the map of concrete structures, in this section we will examine the steel structures from foundation to roof and we will provide everything that is needed for full understanding of the map, we will see a view of the process that we will take to check the steel structure maps in this E book:

Prospects for reviewing steel structure maps

- Foundation
- Column
- Beam
- Bracing
- Concrete Shear Wall
- Steel Shear Wall
- Fittings
- Structural Ceiling System
- Stairs
- Wall Post

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