DADABHOY INSTITUTE OF HIGHER EDUCATION
DIHE

Engineering Drawing-01

Final Examination

Spring Semester- 2021

Instructor Name: Muhammad Mudasir Ijaz

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Faculty of: Computer Science

Exam Date: 31th Aug. 2021
Time: 6:00 PM

Assignment Due Date: 31th Aug. 2021 @ 6:00 PM
Max Marks: 40

Instruction: Please follow the step wise instructions mentioned below:

1. After completion of the assignment, please save your file as a PDF file
2. Submit your assignment on LMS, in the respective course page
3. When submitting a pop-up User agreement will appear on your screen. Tick "I Agree" at the bottom of this pop-up sign.
4. Continue with submission process as always
5. Submission of assignment will not be accepted after 24 hours
6. Minimum 1000 to maximum 1500 words
7. All assignments will be passed through TURNITIN to check plagiarism. Max 10 Marks will be deducted if found guilty of copy / paste

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Registration No	**: BSTech(M)/3-17/M05016**
Student Name	**: Muhammad Shahzaib Soomro**
Title of Assignment	**: Final Exam**
Title of Course	**: Engineering Drawing-01**
Name of Faculty	**: Muhammad Mudasir Ijaz**
Submission Date	**: 31-08-2021**

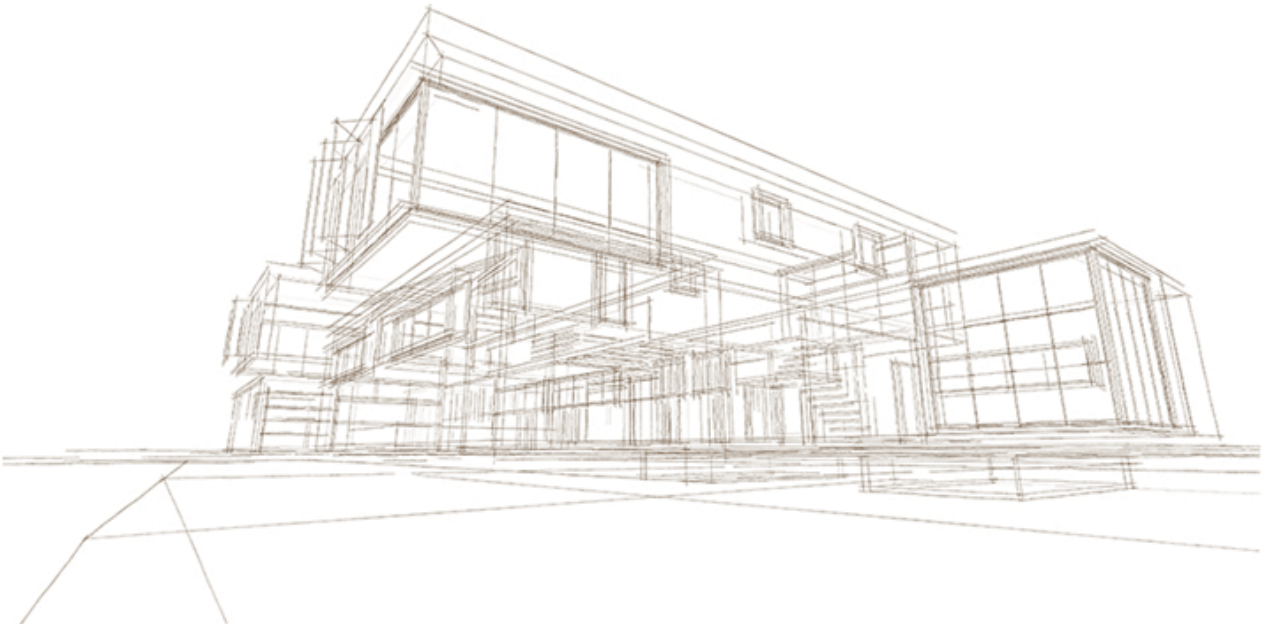
Assignment Questions:

Question No1: What are the basic components of Civil Drawing? Write in detail the components of civil structures with their drawings. (10)

Answer: Types of Civil Drawings: A construction drawing or plan illustrates what you will build and what the finished product will look like when you complete it, but there are different types of construction drawings used. The types of drawings, such as blueprints, plans, working drawings, and are quite confusing. As with any complex document, the different types of commercial construction drawings require specialty skills to decipher.

In this article, I cover the range of construction drawings used in commercial construction, including examples and why your specialty contracting firm, if it hasn't already, move to connect its **design department with the construction operations** team (office and field) for improved document management and project delivery. This meeting of the minds (e.g., departments) within your construction firm using easily integrated best of in-class technologies will substantially hit its key business drivers – increasing productivity, profit margins and lowering operational costs and risks of lawsuits.

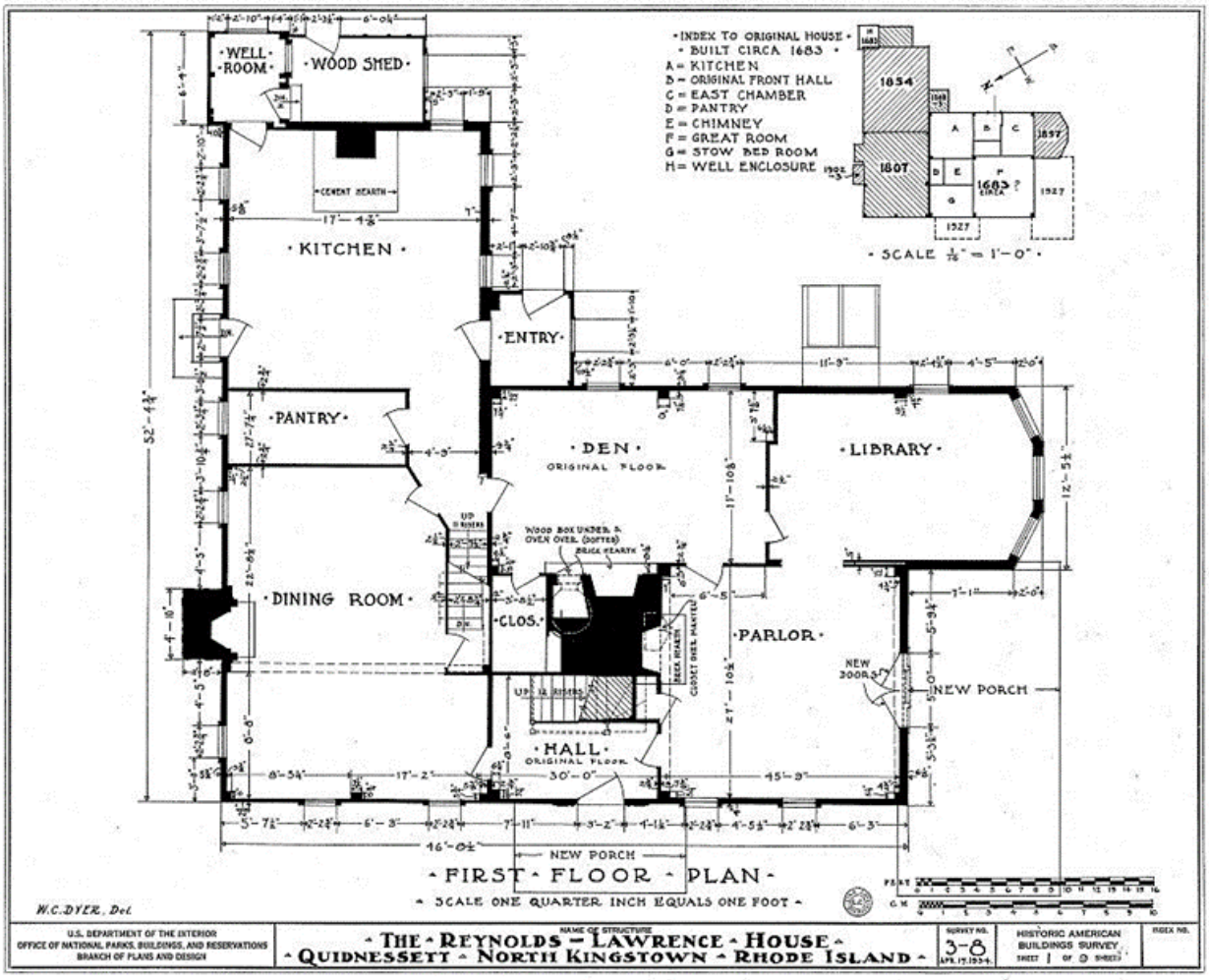
Below are the different types of construction drawings.



1 Architectural Drawings:

This is one of the types of construction drawings. It provides a complete view of a building. There several design programs out there but nothing like 3-D and 2-D Modeling can give architects and designers a more accurate example to articulate the end-product needed for the subcontractors to build.

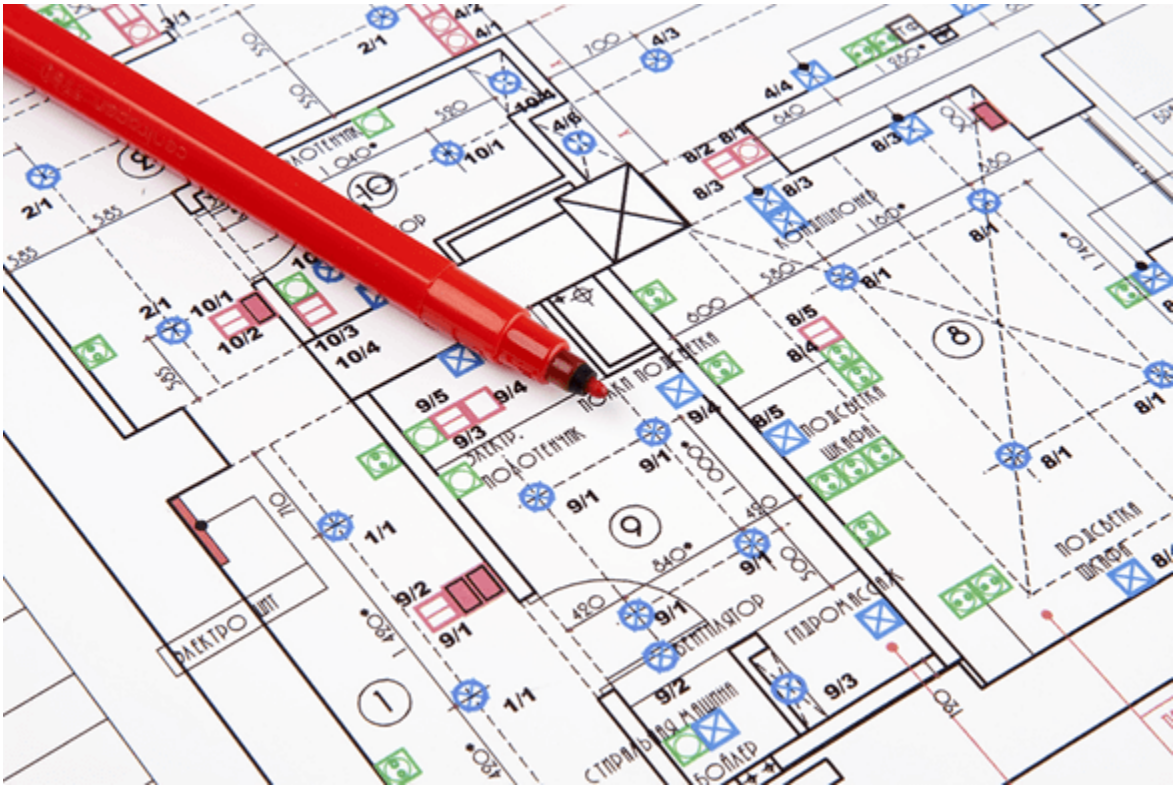
An architectural drawing is a technical rendition of a building (or building project) that falls within the classification of architecture. Historically, architectural drawings were made in ink on paper or similar material, and copies require an expensive printer that needs to be expensively hand delivered. If you're still operating with a tremendous amount of paper, imagine the **construction savings by shifting to a digital ecosystem**.



2. Structural Drawings:

This type of construction drawing provides a complete view of the structure or structures involved in the building project. Structural drawings are typically prepared by licensed structural engineers relying on input from architectural drawings. Structural drawings emphasize load-carrying members (e.g., steel beams, joists, framing materials, and so forth) of the structure.

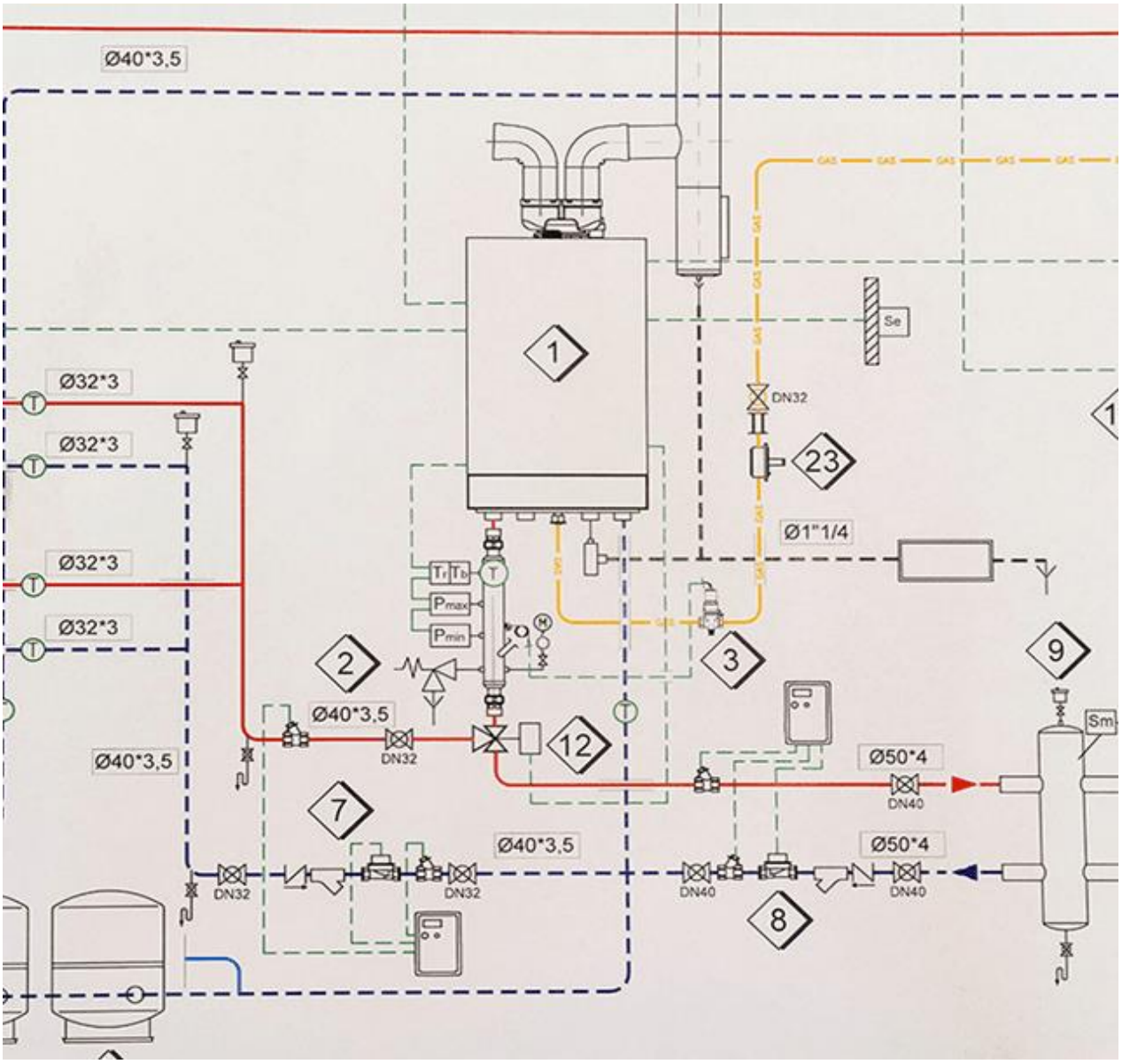
Structural construction drawings are unique to other drawings because they do not address partition walls, plumbing, and mechanical systems, or other details like surface finishes.



3. Electrical Drawings:

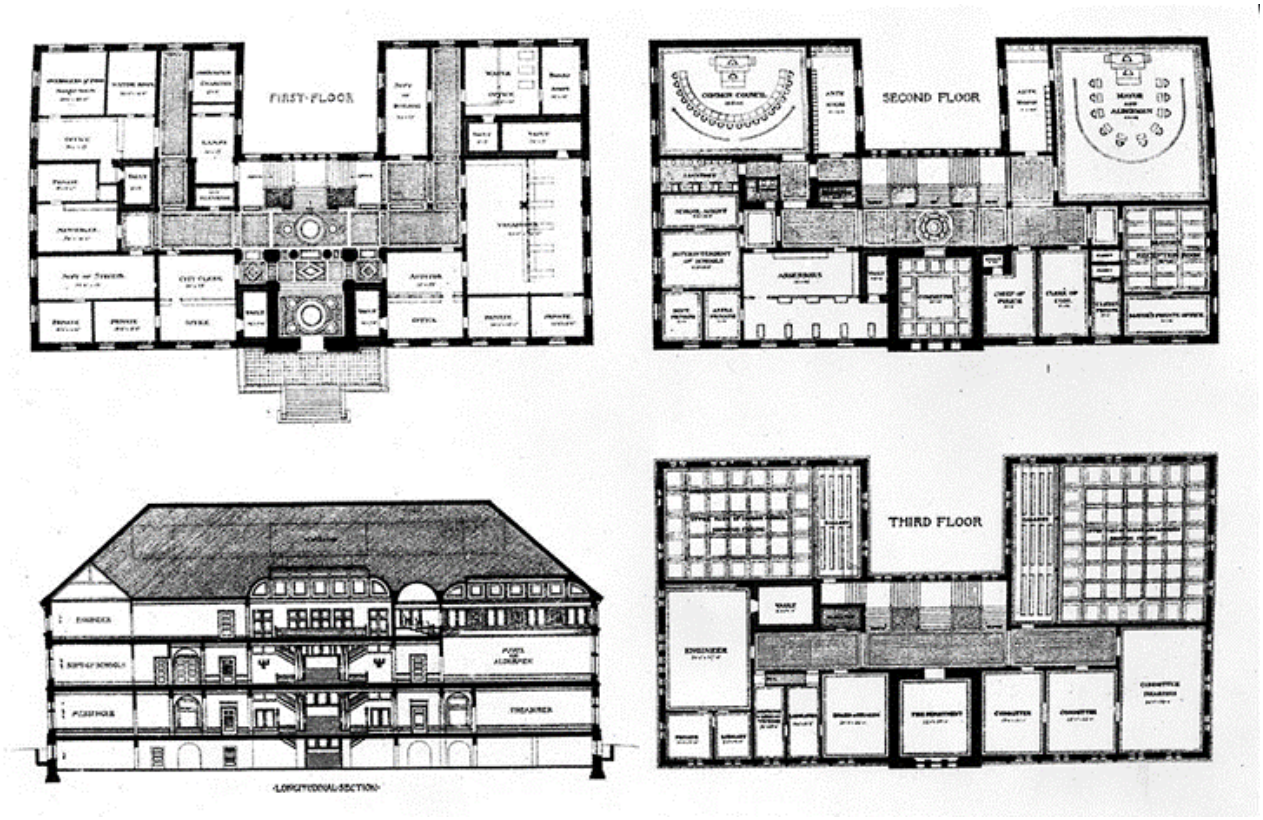
This type of technical drawing illustrates information about lighting, wiring, power, and circuits for communication within the commercial construction project. Electrical construction drawings are meant to illustrate the physical layout of the wires and components they connect inside the building as well as the outside power grid. Standard schema symbols in electrical drawings represent circuit breakers, transformers, capacitors, bus bars, conductors, and many other details on drawings.

Electrical contractors spend years mastering their craft and deserve **software** to make their jobs easier.



4. Plumbing and Sanitary Drawings:

This type of technical drawing illustrates the system for pumping water in and out of the building. Equipment, pipes, pumps, and drains, the nature and size of sinks to the location of gas are carefully illustrated in a drawing. Plumbing construction drawings also indicate the position of sanitary, piping for water supply system, fixtures, and the process to connect every accessory. Read this article on how to save thousands of dollars a year with **digital blueprints**.



5. Finishing Drawing:

This drawing illustrates the finishing details and appearance of the building. Construction Finishing drawings include every type of components of the building, such as painting colors, flooring pattern, plastering texture, elevation design, and false ceiling shapes.

Conclusion

There is no standard rule of construction drawings required for a commercial construction project, but these are the most common. Depending upon the type of building and business need, construction drawings are developed on a fit the need basis. However, contractors depend on a steady stream of data to adapt their project plans, mobile resources, and target budget and timeline goals. A commercial construction project becomes a highly fluid effort – labor, time, materials, and costs, once the project begins and beyond the finish line. The best solution for achieving profitability is leveraging best in class software programs and automated workflows that tie “the office” to “the field” and vice-a-versa.

The massive production of documented paper (construction drawings included) and a lack of communication and labor productivity have been an infinite **drag on the commercial construction industry** contributing to high costs and deterring progress on the environmental improvement. The move also helps digitize drawings and solves the problem of **removing data silos**. You need to make a strategic business decision for making business progress happen.

Question 02: write in detail about the principles of building planning. Support your answer with respective drawings. (10)

Answer: Principles of Building Planning:
Building Planning is the arrangement of various components or units of a building in a systematic manner so as to form a meaningful and homogeneous structure to meet its functional purpose. The arrangement of the various rooms in the building is known as Planning of Building.
Building planning is a graphical representation of what a building will look like after construction. It is used by builders and contractors to construct buildings of all kinds. Building planning is also useful when it is essential to estimate how much a project will cost and for preparing project budgets building planning is also useful.
The basic objective of planning the building is to arrange all the units of the building on all floors at a given level according to their functional requirements. By doing this, one can make the best use of space available for building.
In building planning, privacy can be obtained by judicious planning of the building with respect to grouping, the position of doors and windows, mode of the hanging of doors, location of entrance and pathways, drives, etc. sometimes, provision of lobbies, corridors, screens, etc.

Factors Affecting to Building Planning
Followings are the factors affecting the planning of the building,
Function of building e.g. residential, industrial, public, commercial etc.
Shape and size of the plot
Topography
Climatic condition
Building by-Laws etc.

Principles of Building Planning:
These principles are not as rigid as laws of nature, certain deviations from these principles are necessary and inadequacies in them are to be met with by an individual.

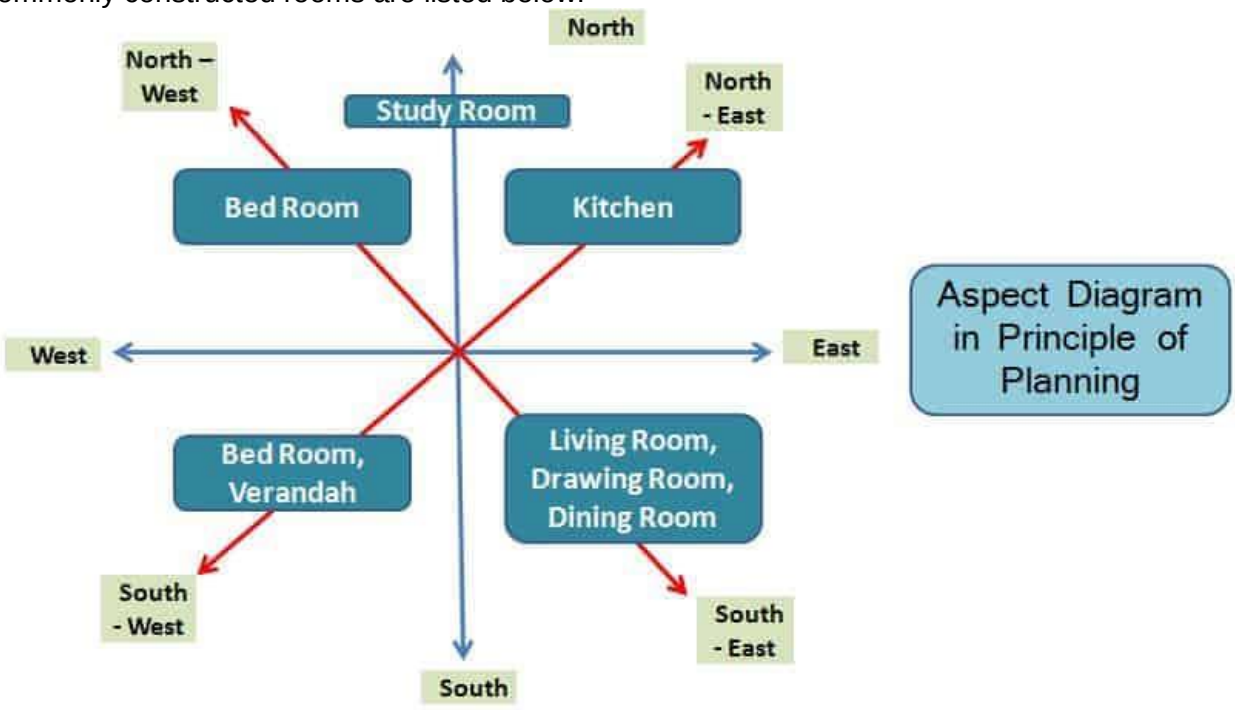
Basic principles of building planning

1. Aspect
2. Prospect
3. Furniture Requirements
4. Roominess
5. Grouping
6. Circulation
7. Sanitation
8. Elegance
9. Privacy
10. Flexibility
11. Economy
12. Practical Consideration

1. Aspect

Aspect is the positioning of rooms in buildings with respect to 4 directions in such a way that the occupants of buildings would enjoy the natural comforts like sunshine, breeze, scenery, etc. to the maximum possible extent.

A room receiving light and air from any particular direction is said to have the aspect of that direction. All the rooms of a dwelling need a particular aspect. Some necessary aspects of commonly constructed rooms are listed below:



- Living Room: It should have a southern or south-east aspect. The sun is towards the south during winter and north during summer which will provide sunshine during winter and cooler during summertime.
- Bedroom: It should have a west or south-west aspect, as the breeze required particularly in summer would prevail from this side.
- Kitchen: It should have an eastern aspect so as to admit morning sun refresh and purify the air.
- Gallery or Verandah: It should be north or north-east aspect.
- Classroom, Reading Room: It should be laid with the north aspect as light received from the north will be diffused and evenly distributed.

2. Prospect

Aesthetic Appearance

Prospect in building planning is the view desired by the occupants of the building from certain of the house. Prospect is dictated by surrounding peculiarities good or bad of the selected site like a flower garden or garbage dumps, It demands the disposition of doors and windows-like aspect. However, a good layout should not be disturbed for the sake of good prospects only.
Certain projecting windows or a blind face of the bay with window openings at sides would help for concealment of inside views of a building.

3. Furniture Requirements

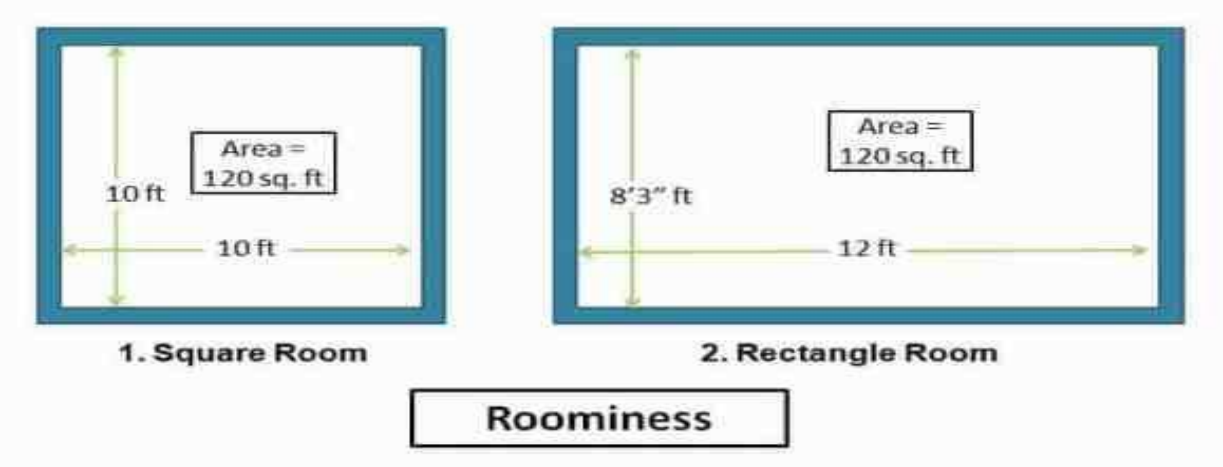
Furniture is a **functional requirement** of a room. A living room, drawing room, kitchen, classroom, office room, **laboratory**, **hospital room**, etc. all have their own furniture requirements.

Proper Furniture Placement

A room should have **enough space** to accommodate all the **furniture** required for the maximum number of people without **overcrowding**.

4. Roominess

Roominess is obtained by getting the maximum benefit from the **minimum dimension** of a room without **cramping** the plan. By using every **nook** and **corner** of the building advantage roominess is derived.



In **residential buildings**, considerable **storage space** is required for various purposes which are provided by making space for wall **cupboards**, **lofts**, **wooden shelves**, etc.

A **rectangular room** is more useful than a square room in the same area.
The **length** and **breadth ratio** of a good room should be between **1.2 to 1.5**. A ratio more than that creates a bad effect. A small room should not be made **unnecessary** too high.

5. Grouping

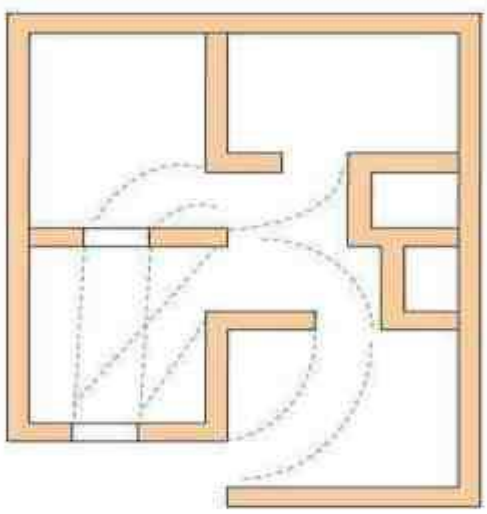
Grouping in building planning means **setting different rooms** of a building according to their inter-relationship of **invitation** and **transition**. The rooms arranged in the layout in a proper correlation of their **functions** and in due **proximity** with each other.

Grouping In Residential Building Plan

- The **dining room** should be close to the kitchen.
- The kitchen should be kept away from the main **living room.**
- Main bedrooms should have **independent** and separate access from each room towards the **sanitary units.**
- In an **office building, hospitals**, etc. the administrative department should be located centrally for **convenience** and **economy** of services.

6. Circulation

Access or **internal connection** between rooms on the same floor or between floors is known a **circulation.** Circulation between rooms of the same floor is called **horizontal circulation** like- **passages, corridors, halls**, etc. Circulation between various floors is known as vertical circulation, like- **stairs, lifts**, etc.



Easy Circulation in House

Horizontal Circulation should be independent, short, and straight not invade the **property** of any room. All the passages should be **well ventilated** and lighted.

Stairs should also be **well** lighted and **ventilated** and properly planned in regard to width, **rise**, and **tread**. Stairs should not have **winder steps**.

7. Sanitation

Sanitation of building not only **associated with urinals**, bath-rooms, wash-basins, sinks but also the overall lighting and **ventilation**. All the parts of a building should have well **lighting** and ventilation to maintain **good hygienic** conditions. This could be done in a natural way or in an **artificial way (air condition)**.

Necessary provision to **facilitate the cleaning** of the building be installed. Washing closets, lavatories, urinals, **bathrooms** like **sanitary conveniences** should be installed adequate in number in relation to the occupant load.

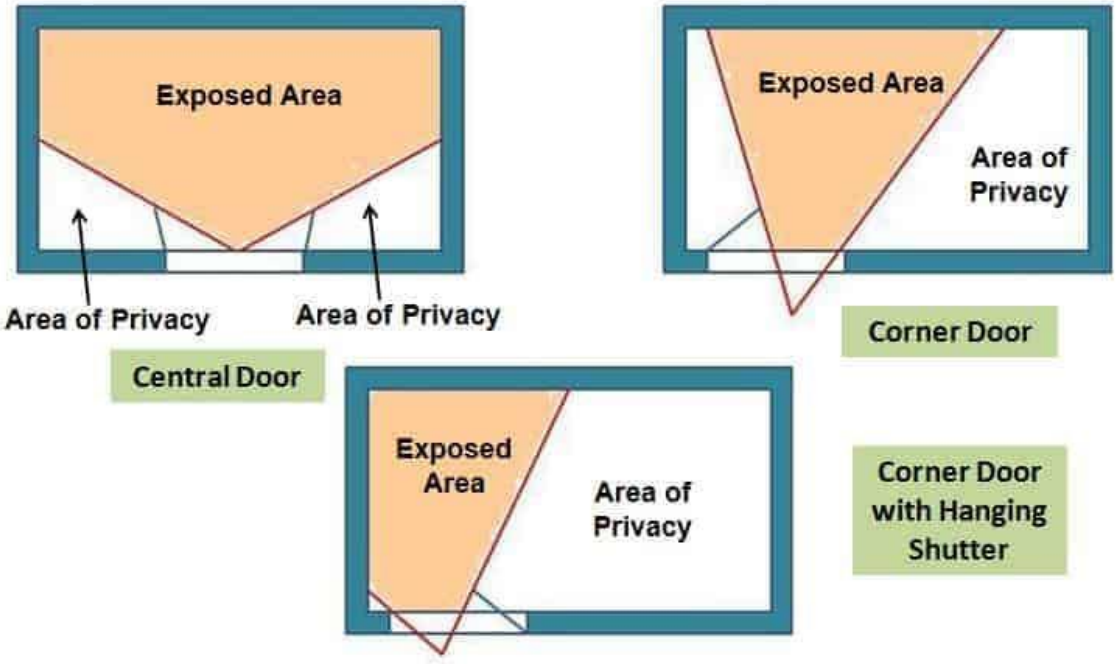
8. Elegance

Elegance is the overall effect produced by **elevation** and **general layout** of the **plan** of a building. To get good elegance of a building it is better if elevation is **developed first** and then the plan is **adjusted** accordingly.

Selection of site or open plot for the **construction of building** greatly affects the **elegance**. Building located in depression will give bad elegance whereas building on an **elevated spot** gives an **impressive appearance**. Buildings located on backward sloping upwards ground give **good elevation** & **elegance**.

9. Privacy

Privacy is an important part of building planning. Privacy may be from one part to another of the same building or could be from **neighboring buildings, streets**, etc.



In **residential buildings**, every room should have certain privacy which can be secured carefully **planning** the **entrance, path-ways,** and **drives**.

Proper grouping of rooms, **good positioning** of **doors** and **windows, lobbies, or screens** can give required internal privacy. Toilet rooms, bedrooms, w.c. and urinals should have **absolute privacy.**

10. Flexibility

Flexibility means planning the rooms in such a way that though **originally designed** for a specific purpose, may be used for other purposes also when desired.

For designing houses for **middle-class families** or other buildings where the **economy** is the main consideration **flexibility** should always be considered.

If **large space** is needed in a certain time a house to accommodate the **gathering**. It can be obtained by removing a removable **partition wall** or **curtain** between the room and the dining room. Alternatively, an **open yard**, **garden**, or **verandah** can also be provided.

11. Economy

The **economy** is a **major factor** in building planning. To fit the proposed scheme within the **limitations** of the resources and funds certain **alterations** and omissions in the original **plan** have to make. But while considering the **economy**, the required **strength** and **durability** of the structure should not be compromised.

Some simple economy achieving approaches in buildings are,

- Simple **elevation**, dispensing of **porches**, **lobbies**, etc.
- Steeper rise to the **stair**, wider steps in the stair.
- Reducing the **story height** to a bare minimum.
- Standardization of sizes of various **components** and **materials**.

12. Practical Consideration

Besides all the **Principles of planning** discussed, the following **practical points** should be additionally considered,

1. The **strength**, **stability**, **convenience**, and **comfort** of the occupants of the building, should be considered first.
2. Provisions for **future extension**s without dismantling should be made in the planning.
3. The building should be **strong** and **capable** to withstand the likely adverse effects of **natural agencies** (earthquake, flood, storm, etc.)
4. **Elevation** should be **simple** yet **attractive**. Too many porches may give good elevation for some time, but in the end, **simple designs** fit better for **generations**.
5. The **larger size** of the room should always be considered as far as possible as it can be **shortened** by providing partitions but smaller rooms cannot be **enlarged** easily.

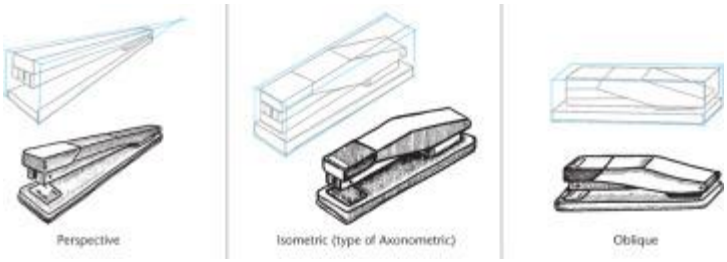
Question 03: What do you understand by the term pictorial sketching? Give in details the different aspects of isomeric sketching. (10)

Answer: Pictorial Sketching

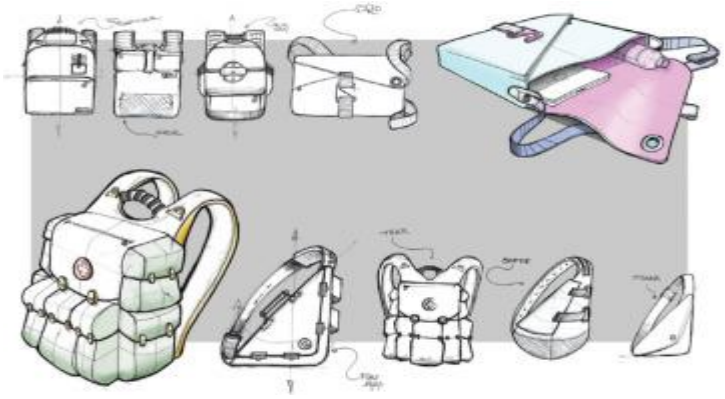
A ***pictorial sketch*** represents a 3D object on a 2D sheet of paper by orienting the object so you can see its width, height, and depth in a single view.

Pictorial sketches are used frequently during the ideation phase of engineering design to record ideas quickly and communicate them to others. Their similarity to how the object is viewed in the real world makes them useful for communicating engineering designs to nonengineers. Later in the design process, pictorial drawings are often used to show how parts fit together in an assembly and, in part catalogs and manuals, to make it easy to identify the objects.

This chapter examines three common methods used to sketch pictorials: isometric sketching, which is a subtype of the general category of axonometric projection, oblique sketching, and perspective sketching. Figure 3.30 shows perspective, isometric, and oblique sketches of a stapler. Figure 3.31 shows pictorial sketches for backpack concepts.



3.30 Three Types of Pictorial Sketches



3.31 *Pictorial sketching is used frequently to convey preliminary design ideas, as in these backpack concept sketches.*

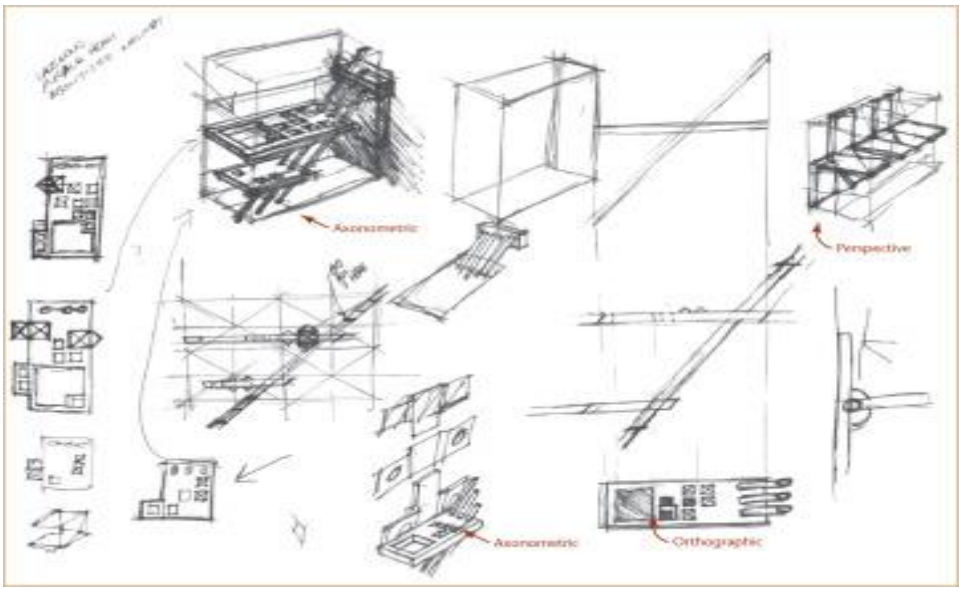
Each of the pictorial methods differs in the way points on the object are located on the 2D viewing plane (the piece of paper).

A perspective sketch presents the most realistic looking view. It shows the object much as it would appear in a photograph—portions of the object that are farther from the viewer appear smaller, and lines recede into the distance.

An axonometric sketch is drawn so that lines do not recede into the distance but remain parallel. This makes isometric views easy to sketch but takes away somewhat from the realistic appearance.

An oblique sketch shows the front surface of the object looking straight on and is easy to create, but it presents the least realistic representation because the depth of the object appears to be out of proportion.

Various types of pictorial drawings are used extensively in catalogs, sales literature, and technical work. They are often used in patent drawings; in piping diagrams; in machine, structural, architectural design, and in furniture design; and for ideation sketching. The sketches for a wooden shelf in Figure 3.32 are examples of axonometric, orthographic, and perspective sketches.



3.32 Sketches for a Wooden Shelf Using Axonometric, Orthographic, and Perspective Drawing Techniques. *The axonometric projections in this sketch are drawn in isometric.*

In axonometric and oblique drawings, distant features are not shown proportionately smaller, the way they appear in a photograph or to our vision. Edges that are parallel on the object always appear parallel in an axonometric view. The most common axonometric projection is isometric, which means “equal measure.” When a cube is drawn in isometric, the axes are equally spaced (120° apart). Though not as realistic as perspective drawings, isometric drawings are much easier to draw. CAD software often displays the results of 3D models on the screen as isometric projections. Some CAD software allows you to choose between isometric, axonometric views (see Figure 3.35 for examples), or perspective representation of your 3D models on the 2D computer screen. In sketching, dimetric and trimetric sometimes produce a better view than isometric but take longer to draw and are therefore used less frequently.

Isometric Drawing:
Have you ever tried to draw a 3-dimensional shape, such as a cube? It can be a bit of a challenge. Every artist faces the challenge of creating 3-dimensional images on 2-dimensional paper. A painter or sketch artist may use techniques such as shadowing to make the image appear as lifelike as possible. For a technical or engineering drawing, however, different strategies have to be used. This is where an isometric drawing becomes useful.

An isometric drawing allows the designer to draw an object in three dimensions. Isometric drawings are also called isometric projections. This type of drawing is often used by engineers and illustrators that specialize in technical drawings. For example, when an engineer has an idea for a new product, he or she will probably create a sketch to show a client or investor. And chances are, the sketch will be an isometric drawing.

A Third Dimension:
It is simple to draw a 2-dimensional object on paper because paper has two dimensions, height and width. But objects in real life have a third dimension, depth, which needs to be represented in the drawing. In isometric drawings, all three dimensions are represented on paper.
The three dimensions are represented as three axes: one vertical axis and two horizontal axes.

It's All About the Angles
So what makes an isometric drawing different from other 3-dimensional drawings? The axes are drawn so that the two horizontal axes are drawn at 30 degree angles. It's as if the vertical axis is in its true position, but the horizontal axes are bent 30 degrees from their true position.

Examples
Here are some examples of isometric drawings. Notice that each image shows three axes to represent each dimension of the object: the vertical axis is blue and two horizontal axes are drawn in orange and green.

Question 04: Write in detail about the Electrical Drawing and its schematics. (10)

Answer: Electrical Drawings and Schematics:

Designing, installing, and troubleshooting of electrical systems requires the use of various drawings to give engineers, installers, and technicians a visual representation of the systems they work with.

Electrical equipment and circuitry is often expressed as symbols and lines that represent the various components and connections within a system. The level of complexity within an electrical drawing will vary depending on the intended purpose and personnel working with the drawing. Design engineers and technicians use schematics to build and troubleshoot complex circuits, while plant operators use single-line and riser diagrams to facilitate switching operations within their distribution system. Knowing how to read and interpret various types of electrical drawings are an essential skill that all electrical workers must posses to effectively carry out their tasks.

The symbols and lines within an electrical drawing speak a language that everyone involved must understand in order to design, build, and troubleshoot electrical systems. In this article, we will briefly describe several types of common electrical diagrams encountered in the field and explain their purpose.

One-line Diagram

When you need a birds eye view of a power system, the single-line diagram is often the first drawing to consult. Also called one-line diagrams, these drawings show the flow of electrical power or the course of electrical circuits and how they are connected.

Physical relationships are typically disregarded in a single-line diagram, however they should show all of the major components in the power system and list all important ratings. System voltage, transformer impedance, interrupting ratings, and fault current are just a few of the basic items included on a single-line diagram.

These drawings should be kept on display in the main control room of a facility to help guide switching operations by identifying feeders and the loads they serve. System voltage, frequency, phase, and normal operating positions are typically included.

Other items such as instrument transformer ratios and protective relays can be found on a single-line diagram. If the diagram cannot cover all of the components involved, additional diagrams can be drawn in conjunction with the main diagram.

Three-Line Diagram

For a more detailed view of an electrical distribution system, a three-line diagram is used to show phase relationship. In polyphase AC systems, these drawings illustrate the various connections for A, B, C, neutral and ground – each represented with their own line.

Three-line diagrams expand on the single-line by providing a basic visual guide for actual feeder cabling, instrument transformer connections, and protective devices. These drawings show how phases are wired and specific winding configurations without regard for their physical location.

Riser Diagram

To help illustrate the electrical distribution system of a multilevel building, the riser diagram is used. These drawings have a similar to relationship to single-line drawings but often focus on how power flows from one level of the building to another.

Riser diagrams show distribution components such as bus risers, bus plugs, panelboards, and transformers from the point of entry up to the small branch circuits on each level. These drawings can sometimes share the layout with alarm systems, telecom, and internet cables.

Schematic Diagram
The main purpose of a schematic diagram is to emphasize circuit elements and how their functions relate to each other. Schematics are an extremely valuable troubleshooting tool that identify which components are in series or parallel and how they connect to one another. Components that are commonly found on schematic diagrams include resistors, capacitors, inductors, diodes, logic gates, fuses contacts, switches, and more. Every component in a circuit diagram has its own symbol to represent it.
Schematic diagrams should be arranged for simplicity and ease of understanding without regard for the actual physical location of any component, only focusing on how they connect together. These diagrams should always be drawn with switches and contacts shown in a de-energized position.

Wiring Diagram
The main purpose of a wiring diagram is to show all of the components in an electrical circuit and are arranged to show their actual physical location. Unlike a schematic diagram, which can be thought of as a conceptual drawing, the wiring diagram is designed for end users and installers who focus on making connections and troubleshooting components.
Wiring diagrams should identify all equipment parts, devices, and terminal strips with their appropriate numbers, letters, or colors. Designation of terminals and connections between the components are clearly identified to help build or repair the equipment shown in the drawing.

Block Diagram
Arguably the most basic type of electrical drawing, block diagrams represent the principle components of a complex system in the form of blocks interconnected by lines that show their relation to one another. These diagrams should not be confused with one-line drawings as they do not convey any technical information, only the major components in a complex system.
The block diagram provides a conceptual idea how a process is completed without regard for electrical symbols or terms. Each block represents a complicated circuit that can be explained using other drawings such as schematics and wiring diagrams.

Logic Diagram
Modern protective relays utilize logic diagrams to represent complex circuits and processes where the signal is considered in binary format (1 or 0). The logical functions in these diagrams are represented by their respective symbols whereas the blocks are used to represent the complex logic circuit.
The blocks in a logic diagram are labeled for a better understanding without knowing the internal structure and are connected by lines which represent input and outputs for the binary signals. Logic diagrams generally do not show electrical characteristics such as voltage, current, and power.

Schedules
When listing out items such as feeder breakers and wire sizes for a particular project or piece of distribution equipment, the schedule is used. The term "schedule" can also refer to the dates in which a certain activity is to be completed, usually referenced as a "project schedule."
In terms of electrical distribution, schedules are often included on switchboard and panelboard drawings to list the number of circuit breakers, their size, and the loads they serve. Feeder schedules are used to help identify the size and number of wires used for the incoming service and outgoing loads within a construction project.
Schedules are usually expressed in tabular form and organized in a self-explanatory way that makes it easy to identify information quickly. The information on a schedule does not generally

include one-line or connection diagrams, but they will typically identify this information with reference drawings, legends, and notes.

As-Built Drawings

Whenever a construction project is completed, the “As Built” is a revised drawing created and submitted by the contractor to highlight any changes that were made from the initial design drawings during the construction process. These drawings are an exact reflection of a project after it has been completed and should detail the shape, dimensions, and precise locations of all elements within the scope of the project.

Any modification, no matter how small, should be included on the as-built if they differ from those indicated in the original plan. As-built drawings should include a record of approvals to go along with the changes made.