INSTITUTE OF TECHNOLOGY

A TECHNICAL REPORT ON THE STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

UDERTAKEN AT: BERBCORNERPIX CONSTRUCTION LTD.

71, ITIRE ROAD, SURULERE LAGOS STATE.

BY

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ACKNOWLEDGEMENT

My sincere thanks to the King of all kings, the sustainer of my being and the reason I am all that I am, to the king of the angel armies. I am exceedingly grateful to be able to participate in this SIWES program.

To my number one fan that always got my back, Mummy, thanks for all you do. You are just the BEST. Cheers to more wins and milestones together, the sky is just the starting point!

To my ever supportive brother, thanks for always been there for me. I am blessed to have you sir.

To Engineer Adegboyega, thank you, sir for taking me as your brother and making sure I get the best of all you can offer. I promise to make you proud.

To Samson, Habeeb, Joshua, Emeka, Gbolahan and Ayo. Thanks for all the time we had together. W will all meet at the top.

To all Yunus family, thanks for praying and looking out for me and helping in every way you can. I am glad to be part of this great family, thanks for always checking up on me. Together we can.

To Civil Engineering sets 2023/2024, thanks for information right on time and cooperating as group. I see potential in this set and can't wait to see professional Engineers amidst us.

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CHAPTER ONE

1.1 INTRODUCTION TO SIWES

The Student Industrial Work Experience Scheme (SIWES) is a skill training program design to expose and prepare students of Universities, Polytechnics, Colleges of Technology, and Colleges Agriculture and or Colleges of Education for the Industrial work experience they likely to meet after graduation. The scheme also affords students the opportunity of familiarizing and exposing themselves to the needed experience in handling equipment and machinery that are usually not available in their institute. Before the establishment of the scheme, there was a growing concern among industrialists that graduate of tertiary institution lack adequate practical background (studies) preparatory for employment in industries. Thus, the employers were of the opinion that the theoretical education going on in institutions of higher learning was not responsive to their needs. It is against this background that the rationale for initiating and designing the scheme by the fund during its formative years-1973/74 was introduced to acquaint students with the skills of handling employer's equipment and machinery. The ITF solely funded the scheme during its formative years. But as the financial involvement becomes unbearable to fund, it withdrew from the scheme. The federal government handed over the scheme in 1979 to both the National Universities Commission (NUC) and the National Board for Technical Education (NBTE). Later, the Federal Government in November 1984 reverted the management and implementation of the SIWES programme to ITF and it was effectively taken over by industrial training fund in July 1985 with the funding being solely borne by the Federal Government.

SIWES is a tripartite programme involving the students, the Polytechnic and the industry (employer of labour). The programme is funded by the Federal Government of Nigeria and jointly coordinated by Industrial Training Fund (ITF) and National Board for technical Education (NBTE).

1.2 AIMS AND OBJECTIVES

Specifically, the objectives of the Students Industrial Work Experience Scheme (SIWES) are to:

- Provide an avenue for students in institutions of higher learning to acquire industrial skills and experience in their course of study, which is restricted to Engineering and Technology including Environmental studies and other courses that may be approved. Courses like, NCE (Technical), NCE Agriculture, NCE Business, NCE (Fine and Applied Arts) and NCE (Home Economies) in colleges of Education are also included.
- Prepare students for Industrial Work Experience they are to undergo after graduation
- Make transition from school to world of work easier and enhance students contacts for later job placement
- To Enlist and strengthen employer's involvement in the entire education process and prepare students for employment in Industry and commerce
- To satisfy accreditation requirement set by the NBTE.
- To provide student opportunity to see the real World of theirs

CHAPTER TWO

1.1 BRIEF HISTORY OF BERBCORNERPIX CONSTRUCTION

Berbcornerpix Limited was established in July 2015 as general construction company with an aim to sarve the nation professionally. We provide full contracting and construction services in Building / Civil Construction.

Electrical, Mechanical and infrastructural services. Turkay project services inclusive of consulting services. These services include: On-time delivery, Quality service, Professional and ethical conduct, Personal commitment and dedication.

CHAPTER THREE

3.1 INTRODUCTION TO AUTOCAD

Designing is the process of converting an idea into an object, product or a system. This process is iterative. CAD (Computer Aided Design) is a tool that can be used for design and drafting activities. Since it uses the computing power of a processor, CAD drawings are faster, better and more accurate than their manually drafted counterparts.

AutoCAD is sophisticated CAD software that is synonymous with engineering drafting. The concept of AutoCAD evolved way back in the 1980's, when engineers and architects were seeking to harness the power of newly introduced personal computers to reduce the drafting time. People began experimenting with internal graphic controllers which allowed them to draw engineering / architectural drawings at the front end which were efficiently replicated at the back end of the computer. AutoCAD was formally launched in December 1982 by Autodesk, a leader in 3D design, engineering and entertainment software. Simply put, AutoCAD enables engineers, designers and architects to produce 2D and 3D models using computers. AutoCAD started as a design tool for engineers and architects, but is now used by other professionals as well. Autodesk, the company behind AutoCAD, has developed custom versions that can be used by design engineers, civil engineers, electrical and electronics engineers and mechanical engineers. AutoCAD thus covers a vast canvas - from engineering to industrial sector, there is an AutoCAD package for everyone. In that sense, AutoCAD is a horizontal product. It is used by product development teams, manufacturing facilities, media and entertainment industries, engineers, architects; educators and students; entrepreneurs, non-profits, medical professionals, and including beginners. AutoCAD is thus useful for any domain that requires 2D and 3D designs.

List of Important AutoCAD Tools:

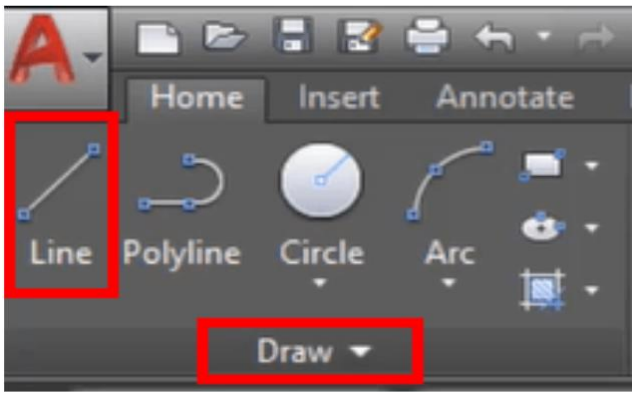
1. Line
2. Circle
3. Rectangle
4. Polyline
5. Copy
6. Rotate
7. Erase
8. Trim

1. Line

A line tool lets you create a straight path between two points in a CAD drawing.

How to open it?

Click the Line tool in the Draw panel.



Line

Command Prompt: Type “LINE” or “L” in the command prompt and press Enter.

Line 2Note: Similarly, you can type the command for other tools in the command prompt.

How to Use it?

- Pick a starting point: Click your mouse to tell AutoCAD where to begin the line.
- Choose the ending point: AutoCAD will then ask you to pick a second point, indicating where the line should end. Click again to set this point.
- Finish the command: You can end the LINE command by hitting Enter, Escape (ESC), or the Spacebar.

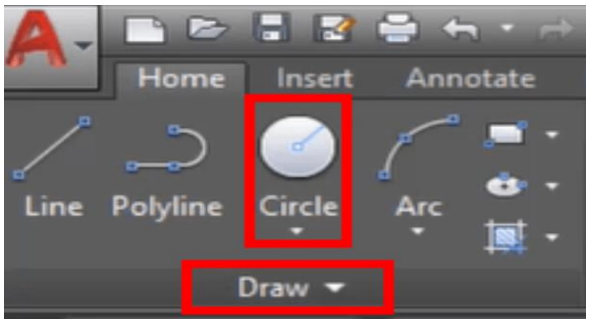
When to Use it?

- Creating walls and partitions in architectural drawings.
- Drawing electrical wiring diagrams with straight wire segments.
- Sketching basic geometric shapes (square, rectangle, triangle, etc.).

Output:

2. Circle

The circle tool generates a round shape with a constant radius in CAD designs.



How to open it?

- Look for an icon that resembles a circle or the letter “C” in the Draw panel of the Home tab.
- Circle
- Command Prompt: Type “CIRCLE” or “C” > Press Enter.

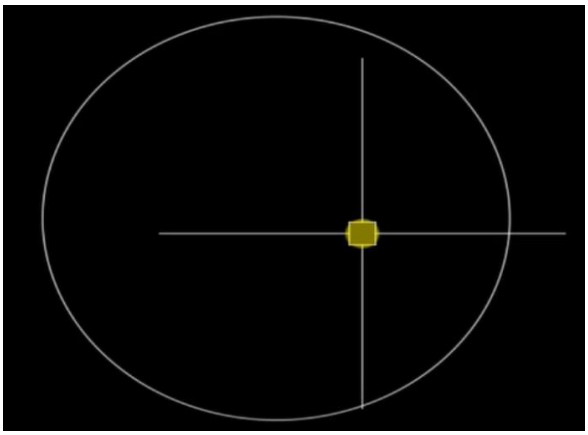
How to use it?

- Specify the center point: Choose the circle’s center by clicking at any point in the open window or by entering coordinates.
- Specify radius or diameter: Specify circle size as radius or diameter.
- Adjust properties: Modify attributes (e.g., layer, color) through the Properties palette or right-click menu.

When to use it?

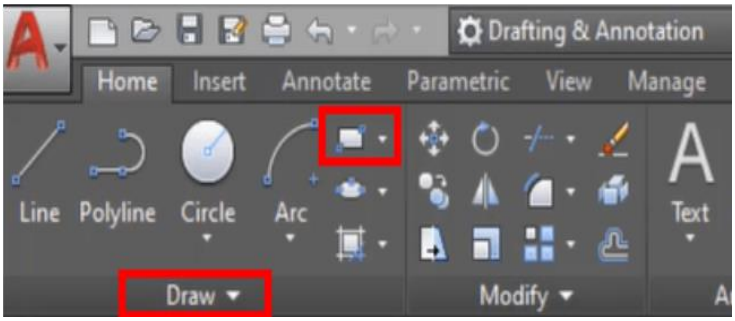
- Drawing wheels, gears, and other circular objects.
- Marking locations of circular objects in a site plan.
- Representing holes and openings in engineering drawings.

Output:



3. Rectangle

The rectangle tool constructs a four-sided shape with equal-length sides and right angles.



How to open it?

- It often appears as a rectangle-shaped icon under the Draw or Create panel.
- Rectangle
- Command Prompt: Type “RECTANGLE” or “REC” > Press Enter.

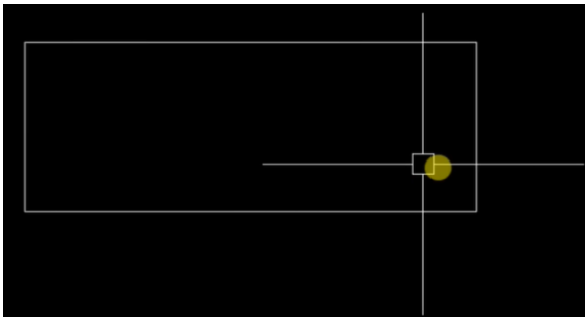
How to use it?

- First corner: Click to mark one corner of the rectangle.
- Second corner: Click again to mark the diagonally opposite corner. AutoCAD creates the rectangle between these two points.
- Adjust properties: You can change attributes like color or layer using the Properties palette or by right-clicking on the rectangle.

When to use it?

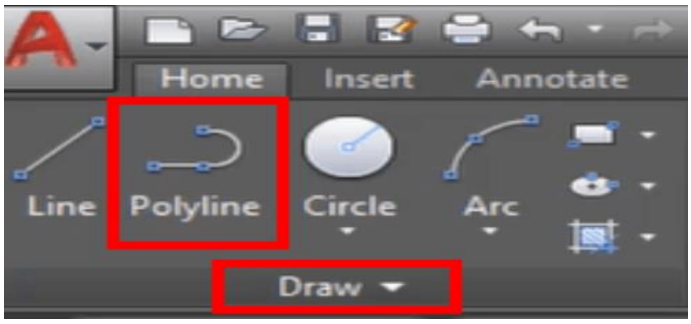
- Designing rooms and spaces in architectural drawings.
- Creating frames for illustrations and diagrams.
- Drafting floor plans and site layouts.

Output:



4. Polyline

The polyline tool connects multiple line segments or curves in CAD to form complex shapes.



How to open it?

- Search for the Polyline tool in the Ribbon. It typically looks like a series of connected line segments.
- AutoCAD Tools-Polyline
- Command Prompt: Type “PLINE” or “PL” > Press Enter.

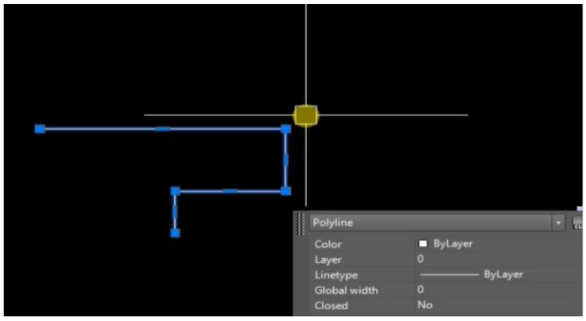
How to use it?

- Start: Click to begin the polyline at a point.
- Add segments: Click more points to create connected lines; AutoCAD joins them into one polyline.
- End: Double-click the last point or press Enter to finish creating the polyline. Also, AutoCAD closes the polyline only if the start and end points match; otherwise, you may have an open polyline.
- Adjust properties: You can change line attributes (like color) using the Properties palette or right-click menu.

When to use it?

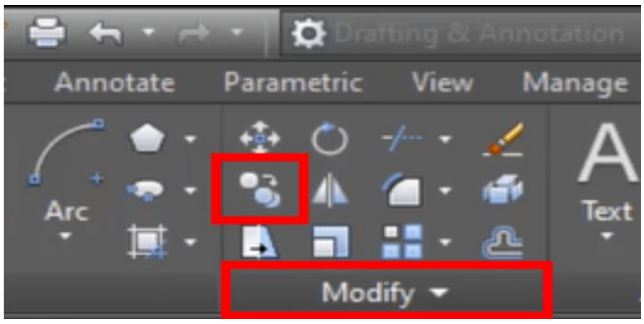
- Creating complex outlines and shapes like building footprints.
- Designing piping and ductwork layouts.
- Tracing irregular boundaries in land surveys.

Output:



5. Copy

The copy tool duplicates selected objects within a CAD drawing.



How to open it?

- The Copy tool is present in the Modify group. The icon has one small circle and two overlapping circles.
- Copy
- Command Prompt: Type “COPY” > press Enter.

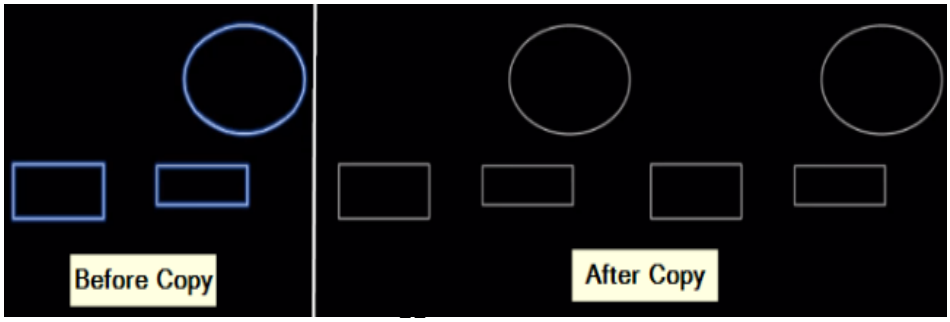
How to use it?

- Select what to duplicate: Click on the objects you want to copy. Hold Shift for multiple items or draw a box around them.
- Choose a starting point: Click where you want the copying to begin. Objects will be pasted in relation to this point.
- Pick the new spot: Click where you want to paste the copied objects (The objects will be positioned based on the starting point).
- Keep going: Repeat by selecting, choosing a start, and picking new spots. Finish with Enter or right-click and “Enter.”

When to use it?

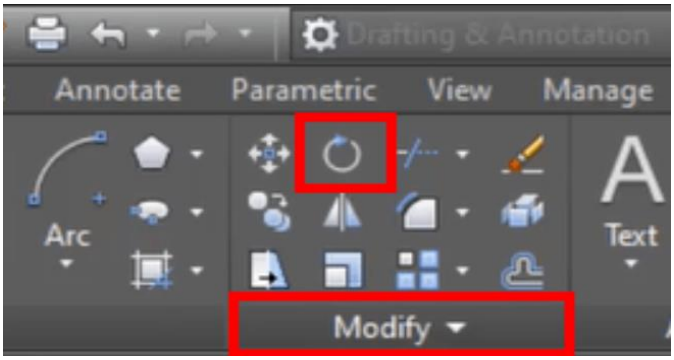
- Replicating furniture or fixtures in an interior design layout.
- Placing multiple instances of the same detail in a drawing.
- Creating symmetrical patterns and layouts.

Output:



6. Rotate

The rotate tool changes the orientation/direction of the selected object within a CAD design.



How to open it?

- Go to the Modify panel and select the tool that looks like a circular arrow or a rotation symbol.
- Rotate
- Command Prompt: Type “ROTATE” > press Enter.

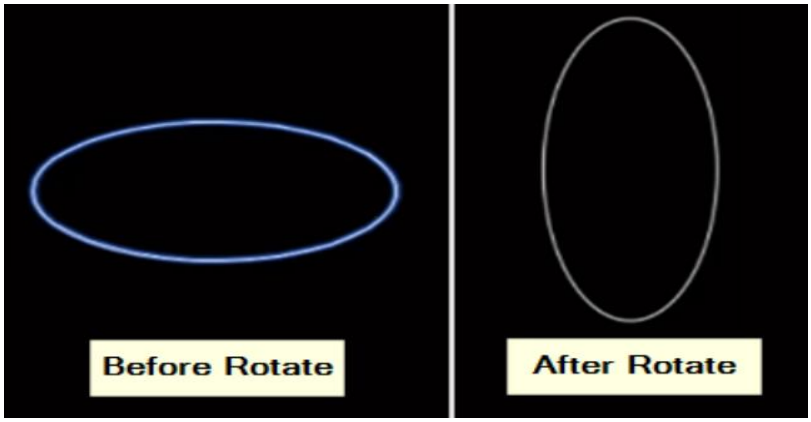
How to use it?

- Choose what to rotate: Click on the objects you want to turn. To pick multiple items, hold Shift or draw a box around them.
- Set the center point: Click on the screen to select the point from which you want the object to rotate. For example, it can be the top, bottom, or center of the object.
- Pick the angle: Type the rotation angle in degrees or use your mouse to set it visually. You can also specify angles in the command prompt.
- Keep rotating: Do more rotations by selecting, setting the center, and choosing angles. To finish, press Enter or right-click and “Enter.”

When to use it?

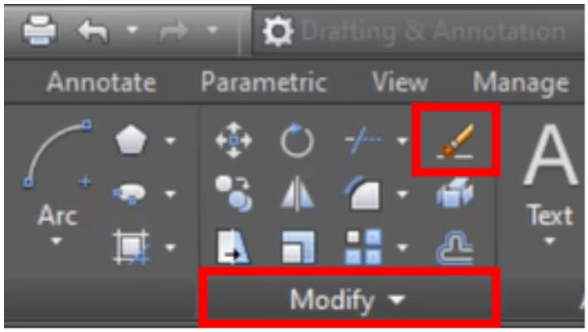
- Aligning objects at specific angles in architectural drawings.
- Positioning components in mechanical assemblies.
- Adjusting the orientation of text or labels.

Output:



7. Erase

The erase tool deletes unnecessary elements from a CAD drawing.



How to open it?

- Find the Erase command under the Modify panel. It looks like a pencil that has a back eraser.
- AutoCAD Tools-Errase
- Command Prompt: Type “ERASE” or “E” > press Enter.

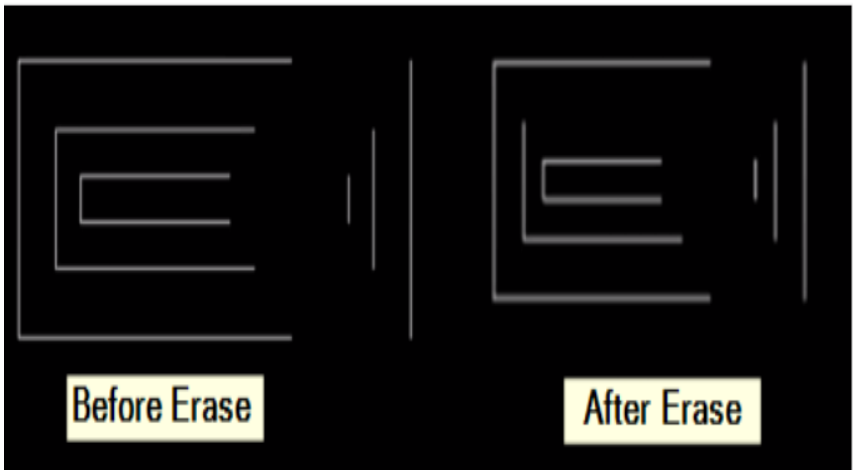
How to use it?

- Pick what to delete: Click on the things you want to eliminate. You can choose many by clicking on each or dragging a box around them.
- Finish deleting: After you have selected the objects to delete, press Enter or right-click and pick “Enter.” The selected objects vanish from your drawing.

When to use it?

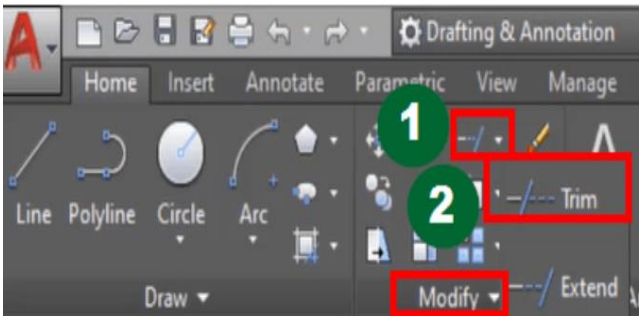
- Deleting unnecessary or unwanted elements from a cloth design.
- Cleaning up draft sketches before finalizing a design.

Output:



8. Trim

The trim tool removes unwanted portions of objects in a CAD drawing.



How to open it?

- Under the Modify panel, you will see a tool booking like scissors or a knife. Open the dropdown menu for that tool and then select the first option (Trim).
- AutoCAD Tools-Trim
- Command Prompt: Type “TRIM” > press Enter.

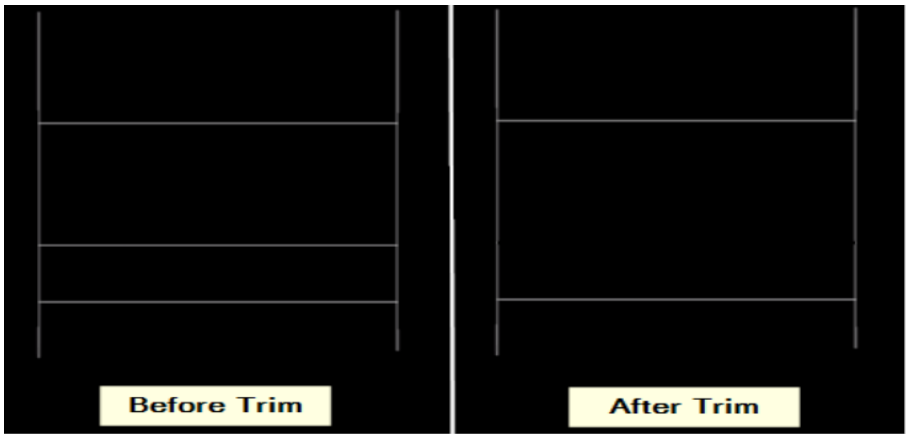
How to use it?

- Select the cutting edge: Click the line or object you want to use for cutting.
- Select what to trim: Click the parts of other objects you want to remove. AutoCAD erases what you choose up to the cutting line.
- Repeat if necessary: Keep selecting cutting lines and portions to trim as needed. To complete, press Enter or right-click and choose “Enter.”

When to use it?

- Trimming excess lines to create clean intersections.
- Creating doors and windows in walls.
- Removing overlapping geometry.

Output:



3.2 SIMPLE PLAN DRAWING

3.3 FOUNDATION LAYOUT ON AUTOCAD

Foundation plan drawings serve as the essential guide that transforms conceptual ideas into robust, enduring structures. These plans encompass vital information such as load-bearing specifications, dimensions, and material requirements, forming the blueprint for a robust foundation.

Components of Foundation Plan Drawings

1. Foundation Layout: Foundation plans show the outline and dimensions of the building's foundation. This includes the location of all walls, columns, and other structural elements that support the load of the building.

2. Footings: The size, shape, and location of footings are specified on the foundation plan. Footings are the structural elements that distribute the weight of the building to the soil. The type of footing (e.g., spread footing, slab footing) will be indicated.

3. Foundation Walls: The thickness, height, and location of foundation walls are detailed on the drawing. These walls provide lateral support to the structure and may also serve as a barrier against moisture.

4. Columns and Piers: Foundation plans include information about any columns or piers that are prt of the foundation system. These elements provide additional support to the structure.

5. Foundation Materials: The type of materials to be used in the foundation, such as concrete mix design and reinforcing details, may be specified on the foundation plan.

6. Sill and Floor Elevation: The elevation of the finished floor and the location of the sill (the bottom horizontal member of a window or door frame) are important for establishing the building's height and ensuring proper alignment with other construction elements

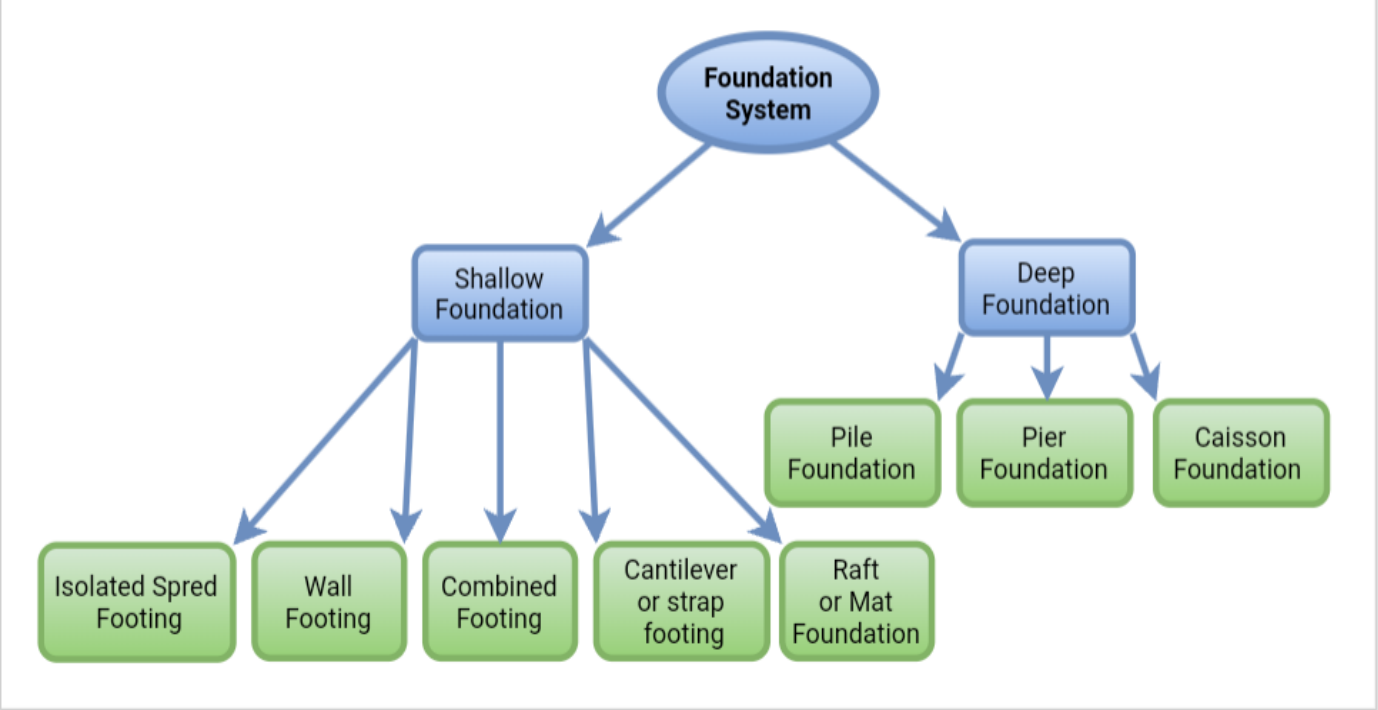
7. Drainage Details: Foundation plans may include details about drainage systems to manage water around the foundation, helping to prevent issues like water infiltration and damage.

8. Site Information: Relevant information about the site, such as contours, soil conditions, and any special considerations related to the foundation design, may be included.

3.4 TYPES OF FOUNDATION

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 a "Deep Foundation." However, deep foundation and shallow foundation can be classified as shown in the following chart.

The main aspects of different types of foundations, along with their images, are given below. As economic feasibility is one of the main factors in the type selection, it is also discussed briefly with each type. To know other factors that affect the range of foundations read: Factors Considered for Selection of Foundation.



Shallow Foundations

As the shallow foundation depth is low and it is economical, it is the most popular type of foundation for lightweight structures. Several types of shallow foundations are discussed below.

Types of Shallow Foundation

The followings are the types of shallow foundations.

1. Isolated Spread Footing

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. They are generally used for ordinary buildings (Typically up to five stories).

Figure: Isolated shallow foundation image

Isolated footing comprises a foundation directly at the base of the segment. Generally, every section has its footing. They straightforwardly transfer the loads from the column to the soil. It might be rectangular, square, or roundabout. It can comprise both reinforced and non-reinforced material. For the non-reinforced footing, however, the stature of the footing has to be more prominent to give the vital spreading of the load. They should possibly be utilized when it is sure beyond a shadow of a doubt that no differing settlements will happen under the whole structure. Spread footings are inadmissible for the orientation of large loads. It is given to lessen the twisting minutes and shearing powers in their primary areas.

The size of the footing can be roughly calculated by dividing the total load at the column base by the allowable bearing capacity of the soil.

The followings are the types of spread footing.

- Single pad footing.
- Stepped footing for a column.
- Sloped footing for a column.
- Wall footing without step.
- Stepped footing for walls.
- Grillage foundation.

To decide when to use shallow foundations, it is necessary to know when it is economical. It is economical when:

- The load of the structure is relatively low.
- Columns are not closely placed.
- The bearing capacity of the soil is high at a shallow depth.

2. Wall Footing or Strip footing

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 isn't 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.

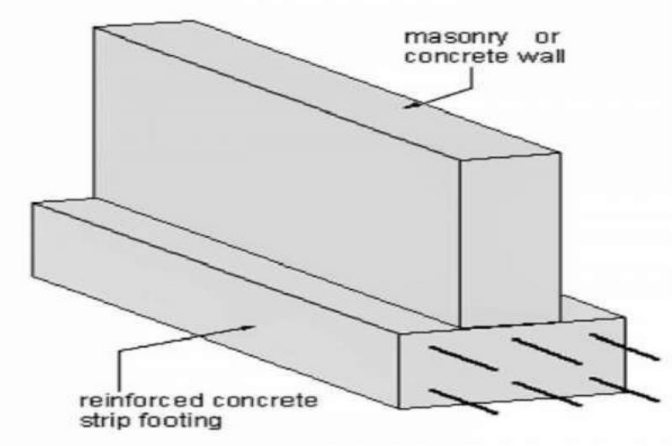


Figure: Wall or Strip footing

The wall footing is a continuous slab strip along the length of the wall. Stone, brick, reinforced concrete etc. are used for the construction of wall foundations.

On account of block walls, the footing comprises a few courses of bricks, the least course being generally double the expansiveness of the wall above.

On account of stone masonry walls, the counterbalances could be 15 cm, with the statues of the course as 30 cm. Along these lines, the size of the footings is marginally more than that of the block divider footings.

If the heap on the wall is substantial or the soil is of low bearing limit, this reinforced concrete foundation type can be given.

Wall footing is economical when:

- Loads to be transmitted are of small magnitude.
- It is placed on dense sand and gravel.

3. Combined Footing

The combined footing 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 overlaps 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, and 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.

Combined foundations are economic when:

- The columns are placed close to each other.
- When the column is close to the property line and the isolated footing would cross the property line or become eccentric.
- Dimensions of one side of the footing are restricted to some lower value.

4. Cantilever or Strap Footing

Strap footings are similar to combined footings. The reasons for considering or choosing strap 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 the interior footing.

Figure: Cantilever or Strap Footing

5. Raft or Mat Foundation

Raft or Mat foundations 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 the structure is subjected continuously to shocks or jerks.

A 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 a raft because, in this case, the building seems like a vessel that floats on a sea of soil.

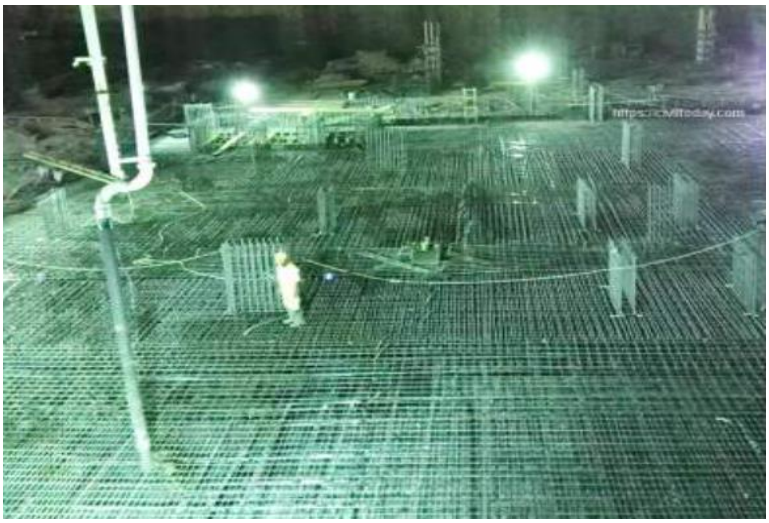


Figure: Raft or Mat foundations

Raft foundations are economic when:

- The soil is weak and the load has to be spread over a large area.
- The structure includes a basement.
- Columns are closely placed.
- Other kinds of foundations are not feasible.
- Differential settlement is to be prevented.

Types of Deep Foundation.

The followings are the types of deep foundations.

1. Pile Foundation

Pile is a common type of deep foundation. They are used to reduce cost, and when as per soil condition considerations, it is desirable to transmit loads to soil strata that are beyond the reach of shallow foundations.

The followings are the types of pile foundations.

- Based on Function or Use
- Sheet Piles
- Load Bearing Piles
- End Bearing Piles
- Friction Piles
- Soil Compactor Piles

Based on Materials and Construction Method

- Timber Piles
- Concrete Piles
- Steel Piles
- Composite Piles

Pile is a slender member with a small cross-sectional area compared to its length. It is used to transmit foundation loads to deeper soil or rock strata when the bearing capacity of soil near the surface is relatively low. Pile transmits load either by skin friction or bearing. Piles are also used to resist structures against uplift and provide structures stability against lateral and overturning forces.

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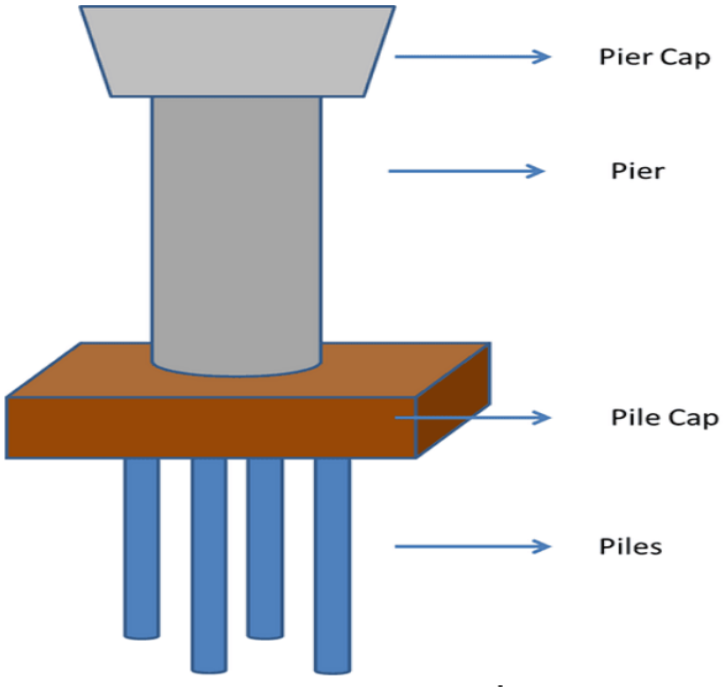
resist structures against uplift and provide structures stability against lateral and overturning forces.

Pile foundations are economic when

- Soil with great bearing capacity is at a greater depth.
- When there are chances of construction of irrigation canals in the nearby area.
- When it is very expensive to provide raft or grillage.
- When the foundation is subjected to a heavily concentrated load.
- In marshy places.
- When the topsoil layer is compressible in nature.
- In the case of bridges, when the scouring is more in the river bed.

It can again be classified based on its material and its mechanism of load transfer or function. Several types of pile foundations are shown in the following chart.



2. Pier Foundation

Pier is an underground structure that transmits a more massive load, which cannot be carried by shallow foundations. It is usually shallower than piles. The pier foundation is generally utilized in multi-story structures. Since the base region is determined by the plan strategy for the regular establishment, the single pier load test is wiped out. Along these lines, it is increasingly well-known under tight conditions.

Pier foundation is a cylindrical structural member that transfers heavy load from the superstructure to the soil by end bearing. Unlike piles, it can only transfer load by bearing and by not skin friction.

Pier Foundation is economic when:

- Sound rock strata lie under a decomposed rock layer at the top.
- The topsoil is stiff clay that resists driving the bearing pile.
- When a heavy load is to be transferred to the soil.
- Pier foundation has many advantages:

It has a broad scope of assortment with regard to structure. There are different materials we can here to build a stylish view, and it stays in our spending limit.

It sets aside cash and time as it doesn't require the broad removal of a ton of cement.

Bearing limits can increment by under-reaming the base.

Along with the advantages, it has a few disadvantages as well:

- If one post or dock is harmed, it can prompt critical harm to the general establishment.
- It can be vitality wasteful if not protected appropriately.
- Floors must be intensely, vigorously protected, and shielded from critters.

3. Caisson Foundation

Caisson foundation is a watertight retaining structure used as a bridge pier, construction of the dam, etc. It is generally used in structures that require a foundation beneath a river or similar water bodies. The reason for choosing the caisson is that it can be floated to the desired location and then sunk into place.

Figure: Caisson Foundation

A caisson foundation is a ready-made hollow cylinder depressed into the soil up to the desired level and then filled with concrete, which ultimately converts to a foundation. It is mostly used as bridge piers. Caissons are sensitive to construction procedures and lack construction expertise.

There are several types of caisson foundations.

- Box Caissons.
- Floating Caissons.
- Pneumatic Caissons.
- Open Caissons.
- Sheeted Caissons.
- Excavated Caissons.

Caisson foundations are economic when:

- The pile cap requirement is to be minimized.
- Noise and vibration needed to be reduced.
- It has to be placed beneath water bodies.
- Highly lateral and axial loading capacity is required.

3.5 GENERAL ARRANGEMENTS

General arrangement drawings are likely to be prepared at each stage of development of a design, showing the overall relationship between the main elements and the key dimensions. The level of detail will increase as the project progresses and they may need to be supplemented by more detailed drawings, showing specific elements and assemblies. On very simple projects these may be included on the general arrangement drawings themselves, but generally, separate drawings will be required. They can be very large drawings depending on the size and complexity of the obeject being represented and the scale used.

General arrangement drawings may include references to additional information, such as specifications and detail drawings, however they should not duplicate information included elsewhere as this can become contradictory and may cause confusion.

They may include notation, symbols, hatching and so on to indicate additional detail about particular elements. It is important that these are consistent with industry standards so that their precise meaning is clear and can be understood. For more information see: Symbols on architectural drawings.

They may also include other elements, such as a tile block indicating the drawing name and number, the creator of the drawing, the revision number, the scale, a north point and a key.

The scale at which drawings are prepared should reflect the level of detail of the information they are required to convey. Different line thicknesses can also be used to provide greater clarity for certain elements. For more information see: Scale in the construction industry.

General arrangement drawings may be drawn by hand, or prepared using Computer Aided Design (CAD) software. However, increasingly, building information modelling (BIM) is being used to create 3 dimensional representations of buildings and their components. General arrangement drawings can then be generated from the BIM model to the required scale.

CHAPTER FOUR

4.1 PROBLEM ENCOUNTERED DURING SITE

SAFETY: the safety precaution taken by students was very poor. All the SIWES students on site were not provided with safety materials such as: safety boot, helmet and other things they are suppose to have on site to keep them safe.

Some student were using face cap as helmet which is totally wrong.

4.2 RECOMMENDATIONS

The following suggestion refer to the establishment I undertook my SIWES program, my polytechnic,. Industrial training fund and the Government: in order to improve and enhance the expected results of the student Industrial Work Experience Scheme:

1. The federal government should establish and promote laws and agencies that regulate land use to prevent pollution
2. The federal government should provide industries and organizations with incentives to encourage and solicit for their cooperation and contribution to the program.
3. The Industrial Training Fund should provide a network in which Establishment and Students could communicate better to promote means of finding placements.

References

- Kwara State Polytechnic Students SIWES Manual