



Plumbing installation

Level-II

Learning Guide-28

Unit of Competence: Read plans and calculate plumbing quantities

Module Title: Reading plans and calculating plumbing quantities

LG Code: EISPLI2 M06 LO4-LG-28

TTLM Code: EISPLI2 M06 TTLM 0919v1

LO4: Locate and identify key features on a services plan



Instruction Sheet	Locate and identify key features on a services plan LG - 28
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying Key features and dimensions elevations, Sectional details and structural features
- Identifying Location and types of services
- Locating of major horizontal and vertical measurements

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Identify Key features and dimensions elevations, Sectional details and structural features
- Identify Location and types of services
- Locate of major horizontal and vertical measurements



Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2 and Sheet 3”.
4. Accomplish the “Self-check 1, Self-check 2 and Self-check 3 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet”.
6. Do the “LAP test” (if you are ready).

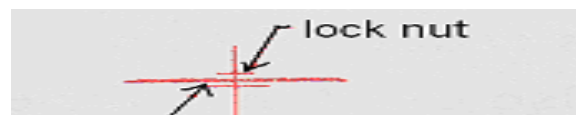
Information Sheet-1	Identifying Key features and dimensions elevations, Sectional details and structural features
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1.1 Identify elevation drawing

- Pipe drawing is 2-D representation of piping system.
- Pipes will be symbolized with a single line [diagrammatic layout] or double line [Scale layout] in drawing.
- These pipe symbols are applied to represent orthographic plan, elevation & pictorial [isometric] view of pipes or: drawing paper.
- To save time standard graphic symbols are very commonly
- To save time standard graphic symbols are very commonly used to \ represents pipes, pipe fitting, valves & pipe components.

1.1.1 Single line (Diaphragmatic) lay out

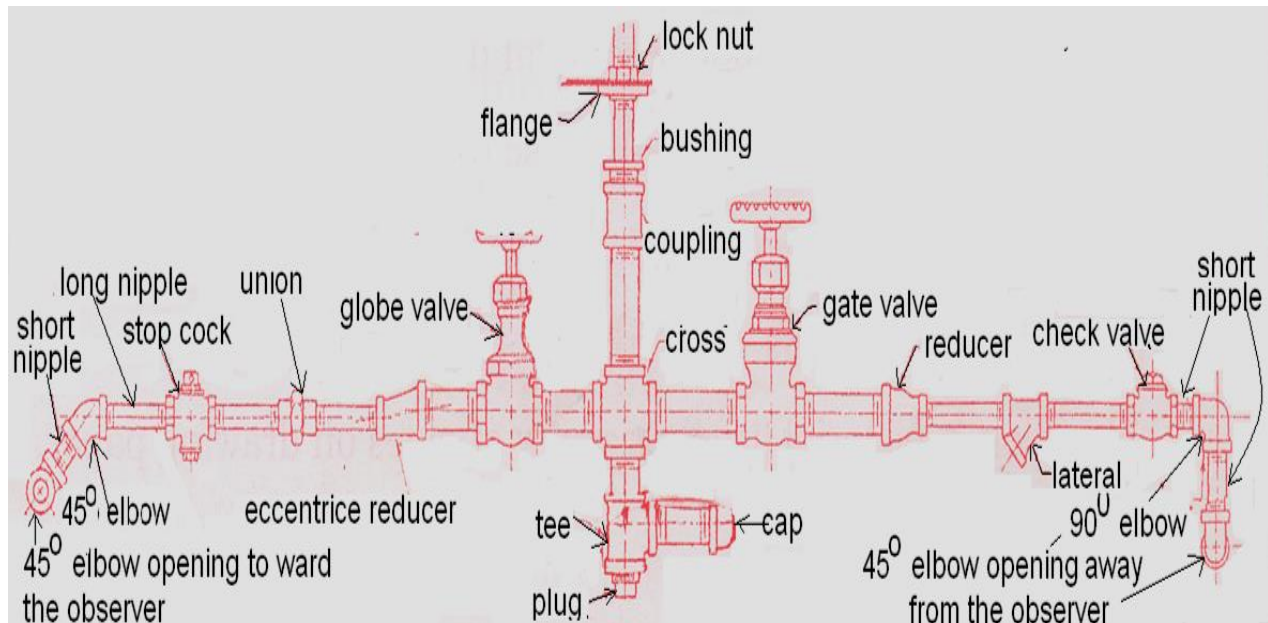
- This is used on small scale drawings such as architectural plans, plant layouts etc, or on sketches.
- All fittings & run of pipes are shown by a single line regardless of the pipe diameter.
- OR- these drawings simplify the creation of piping drawings by representing the center lines of pipes as thick solid lines
- Also symbols used to represent various components and drawn as thick lines.



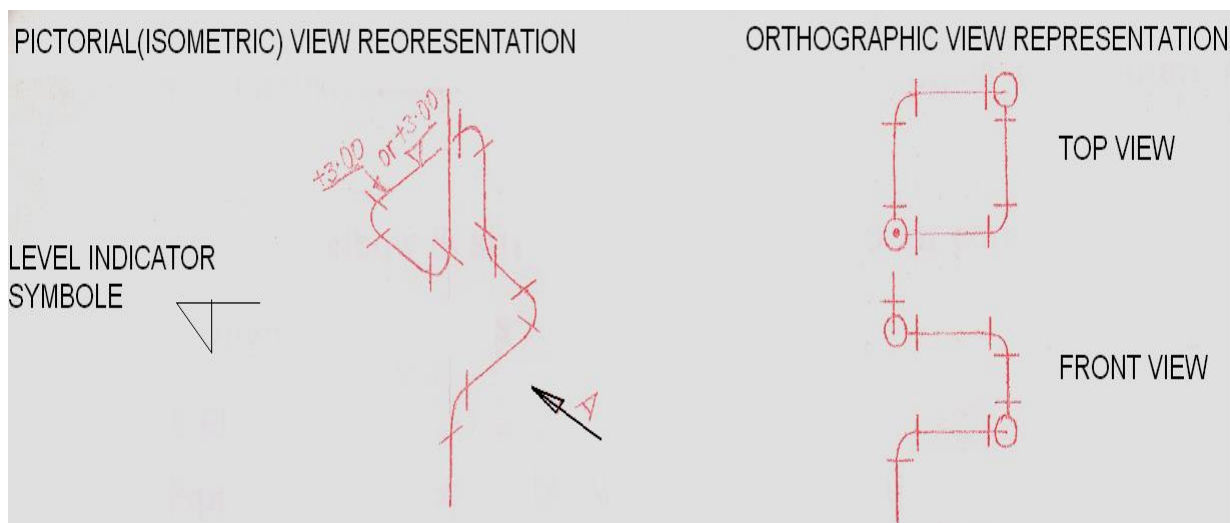
1.1.2 Double line (scale layout)

- This is used principally for large pipes as in power plant & boiler work where lengths are critical & pipe is not cut. OR- represents pipes as two parallel solid black lines.

- This drawing takes more time but is much more realistic looking than single line drawing.

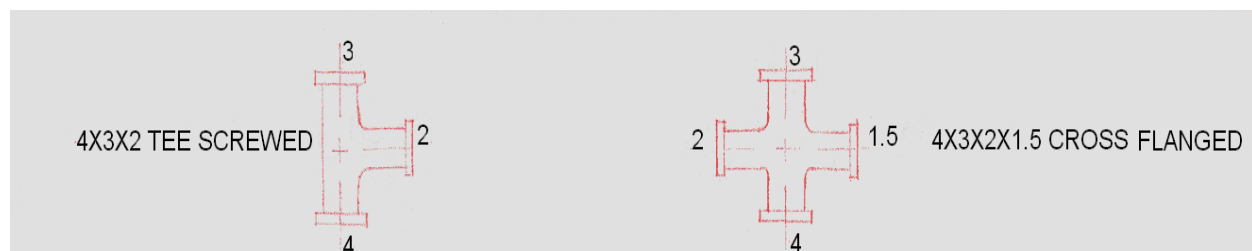


- Double line drawings are used for piping systems illustration & presentation drawings.
- Any type of pipe drawing [single line or double line] may be made as multiview, axonometric & oblique projection.
- Pictorial projection is used for all pipe bent in more than one plane & for assembly layout. [It shows the piping layout in space & reveals the change in direction & the difference in level.]



1.1.3 Pipe fitting:

- are used to connect lengths of pipes, change direction, create branching & change pipe size.
- Tees & cross are used for branching.
- 45⁰ & 90⁰ elbows & bends are used to change direction.
- The return bend is used to make an 180⁰ turn.
- Tee, cross, elbow are used to connect different sizes of pipes so they are called reducing fittings.
- Pipe fitting will be designated by the nominal pipe size. the name of fitting & the material.
- For the fitting having both or all ends same nominal size will be described as e.g. 2" screwed Tee.
- For reducing fitting-the largest opening is given 1st. opposite end 2nd and out let 3rd. [The run precedes the branch & the larger does the Smaller.



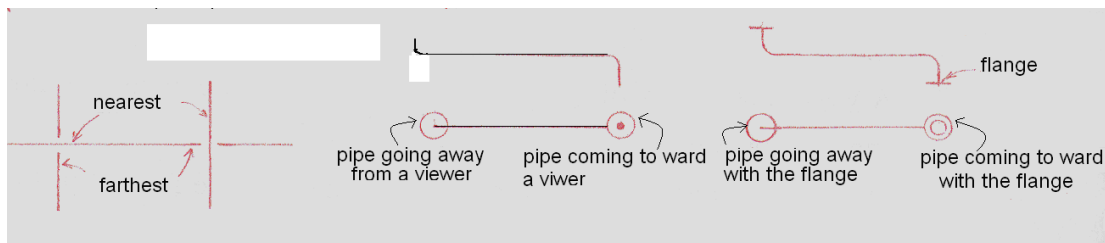
1.1.4 Pipe connection

- Pipes are connected by welding, screwing, gluing or the use of flanges-
- The piping material & size determines the joining method.
- Flared pipe ends require back up flanges for connection
- Plastic pipes are fastened by gluing with a solvent, slip joint, compression fitting or screwed.

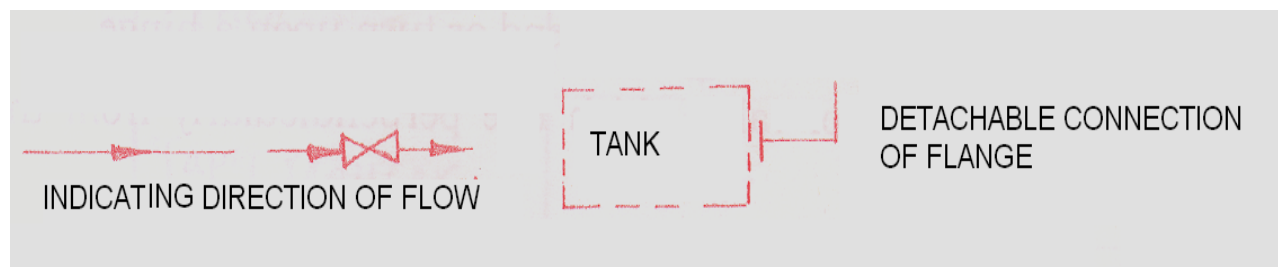
Pipe crossing:

- Crossing of pipes without connection are normally to be depicted without interrupting the line representing the hidden line.

- The line representing the pipe farthest from the viewer will be shown with a break or interrupted.



- Adjoining apparatus, such as tank, machinery etc not belonging to the piping itself may be shown- by an out line drawn with a thin phantom line.



- Additional information about pipes may be obtained from publication of research Association & from the catalogue of manufacturers

1.1.5 Diagram for supply system

Definition:-These are isometric or oblique drawings which are showing all piping, fitting and equipments that constitute the plumbing system.

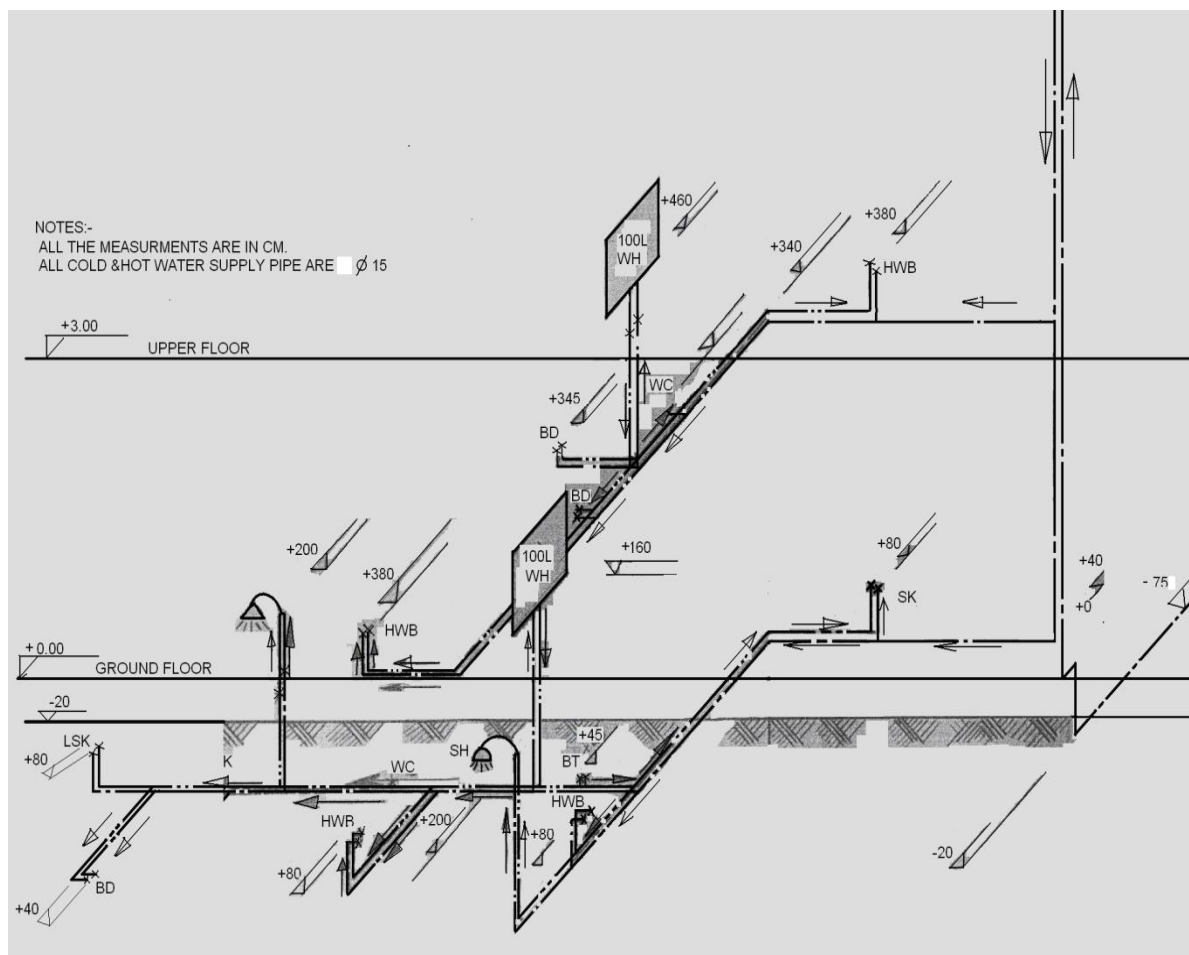
Purpose:

- It enables the designer to better visualize and stream line a design.
- It provides a bases on which all pipe size may be properly established and shown.
- It also provides an accurate format on the basis of which the plumbing contractor may accurately estimate the cost of the plumbing system.
- Includes:-Separate riser diagrams prepared for cold and hot water supply line and for drainage (waste disposal) line.

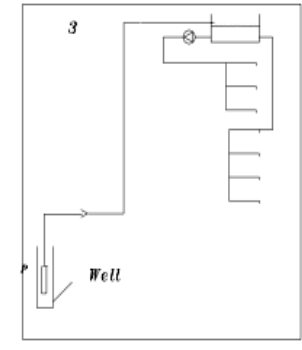
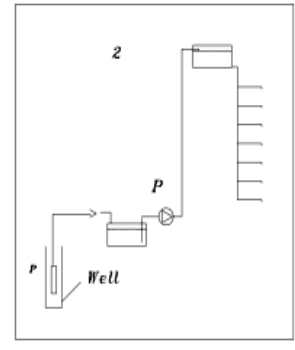
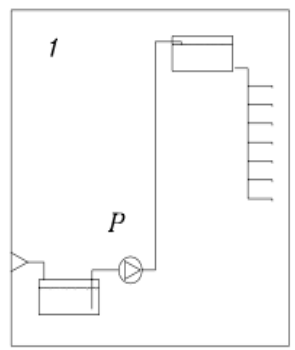
Riser diagram showing the supply system includes:-

- Isometric oblique drawing prepared for cold and Hot water supply line.
- Main cold water supply pipe.
- Branch pipes for cold and hot water feeders.
- Arrows showing direction of flow.
- Pipe sizes and types.
- Elevation of floors and fixtures (vertical heights) e.g. for WC /BD = 40cm, BT = 45cm, HWB =80cm, SH = 200cm BD 60cm valve of shower 120cm
- Volumes of hot water cylinder.
- Location and type of valves.
- Required Notes.

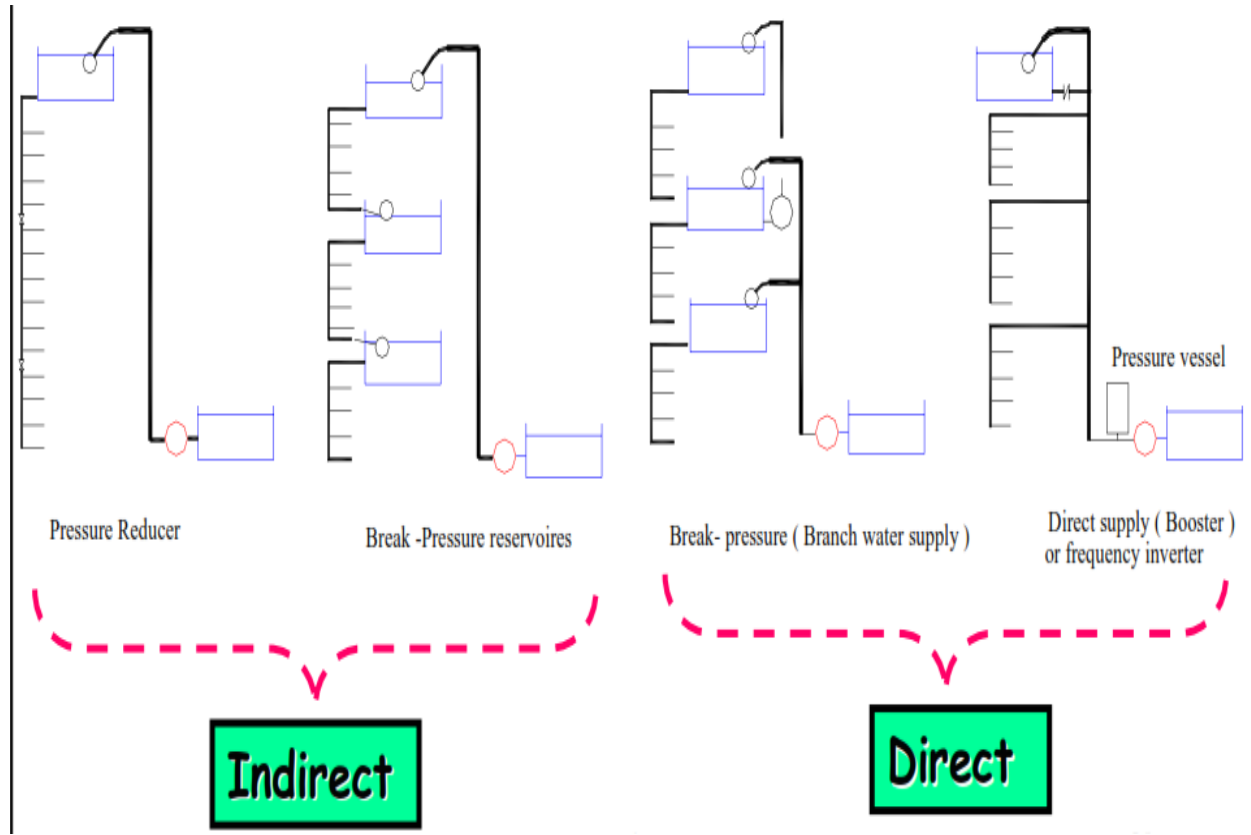
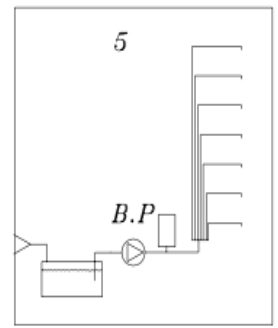
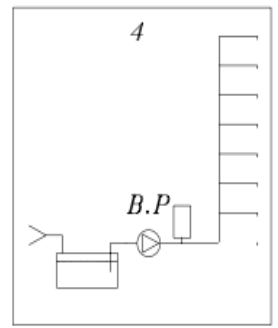
Riser diagram of supply system of the given building



Indirect



Direct



Pressure Reducer

Break-Pressure reservoirs

Break- pressure (Branch water supply)

Direct supply (Booster)
or frequency inverter

Indirect

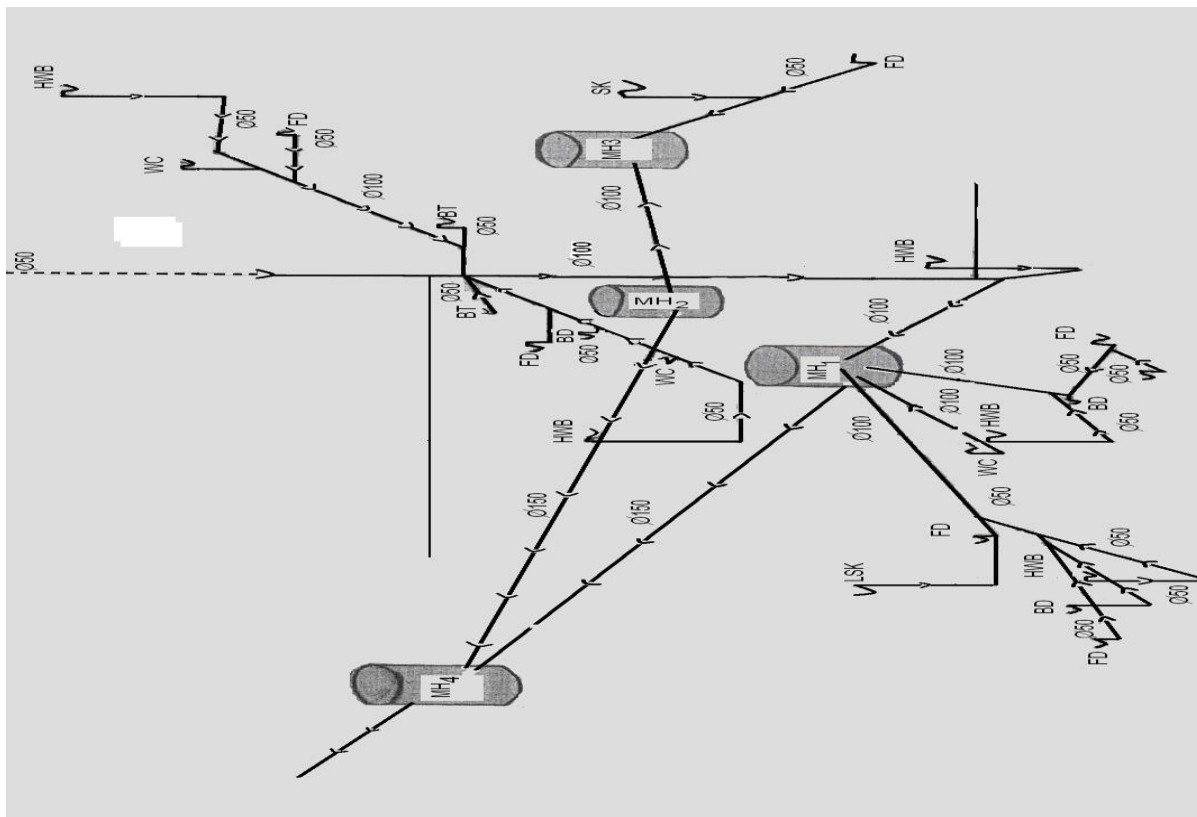
Direct

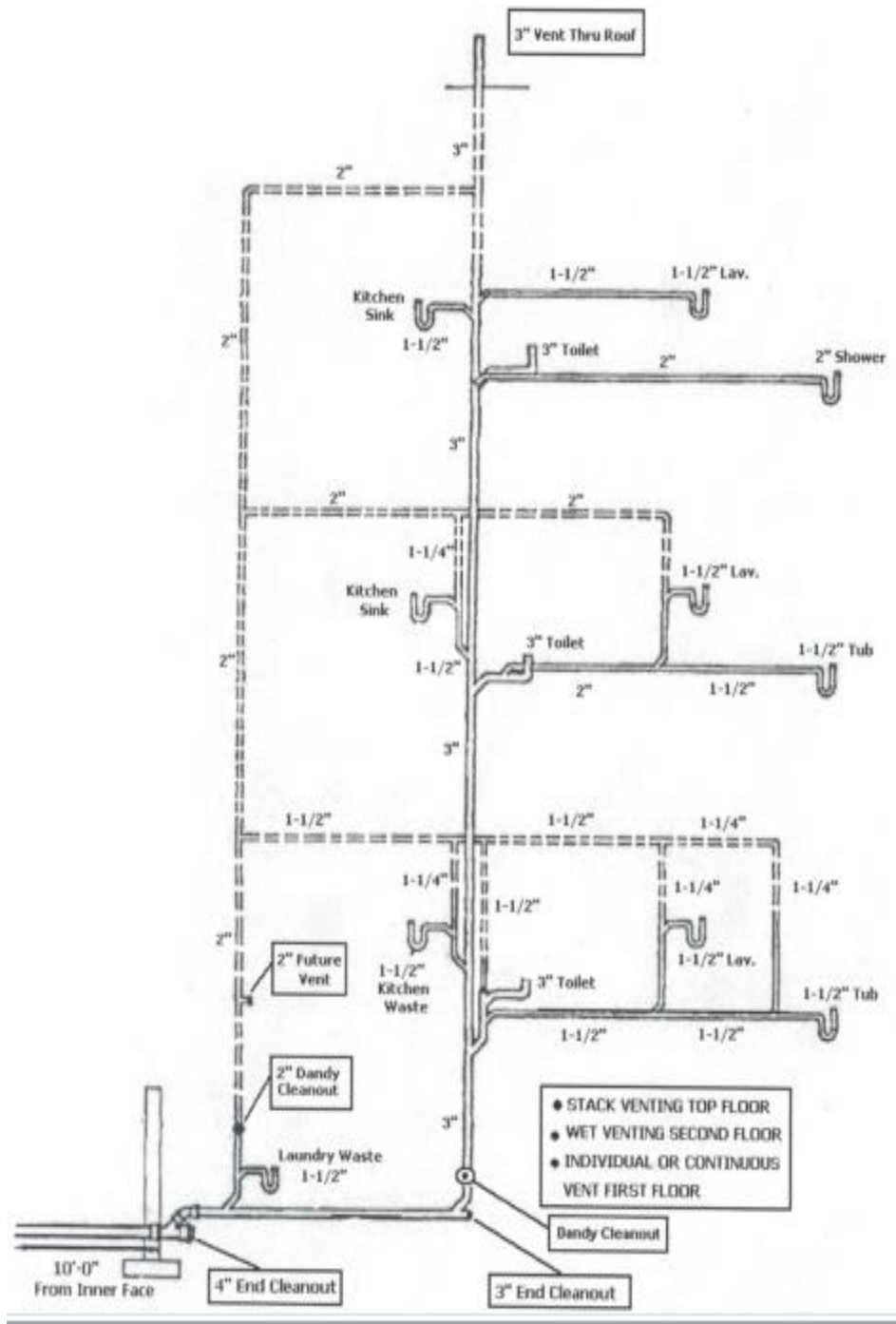
1.1.6 Riser diagram of disposal system

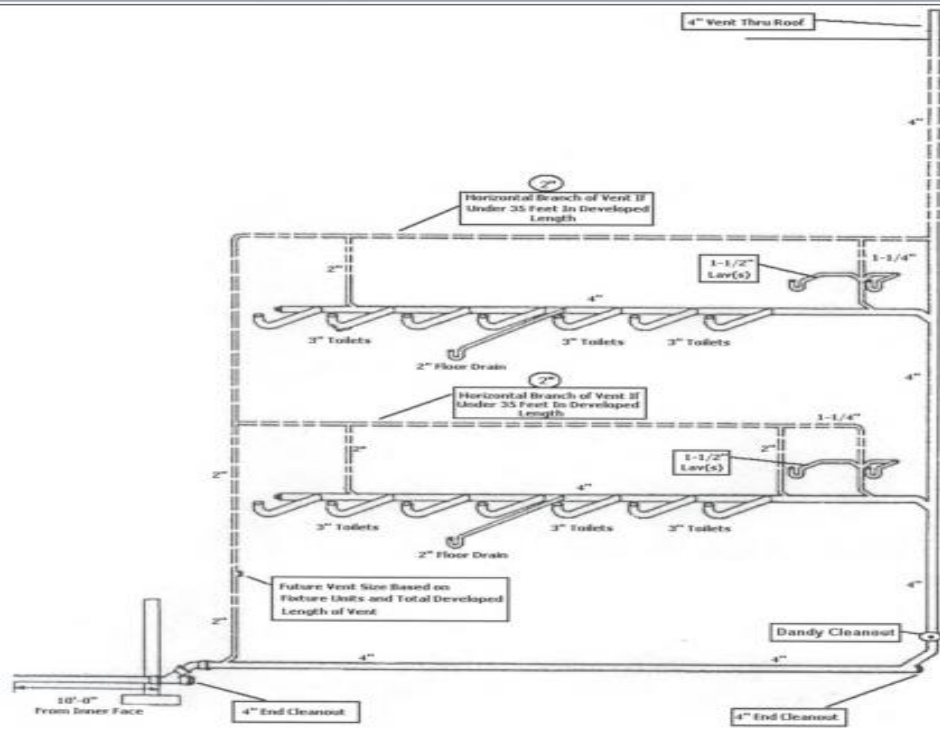
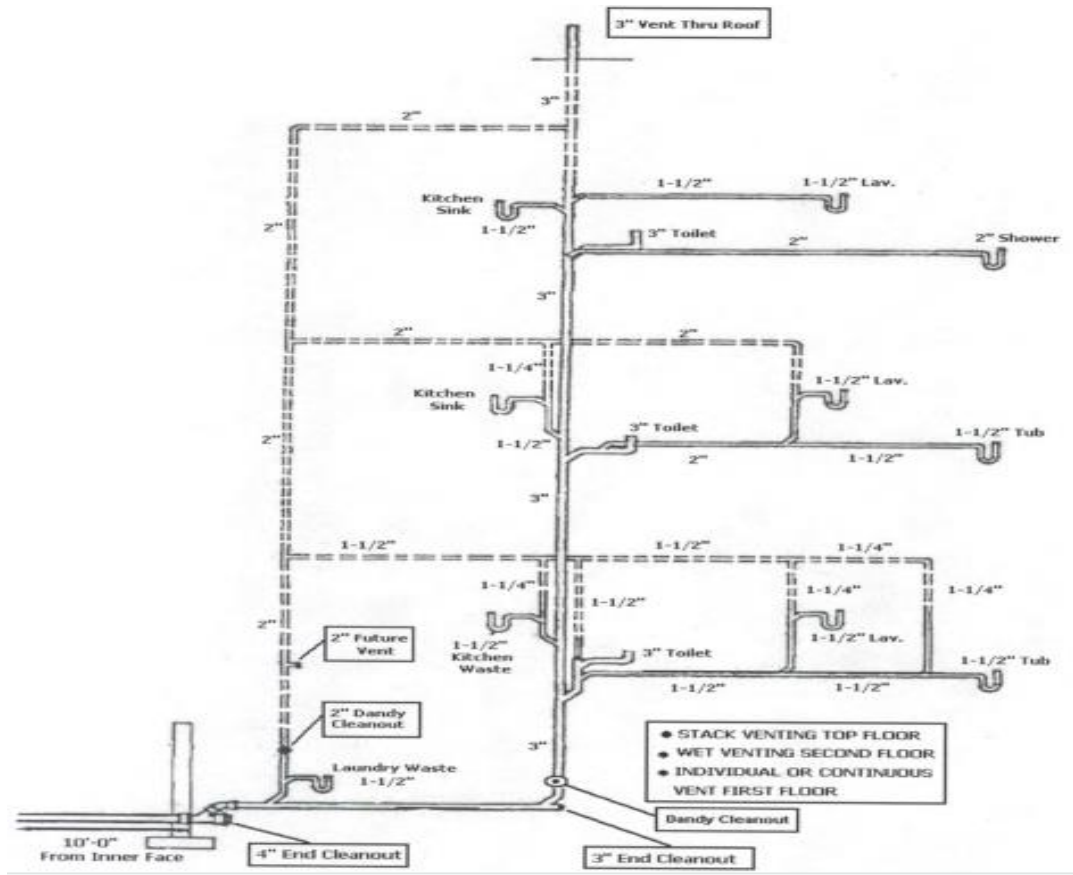
Riser diagrams showing the disposal system includes:

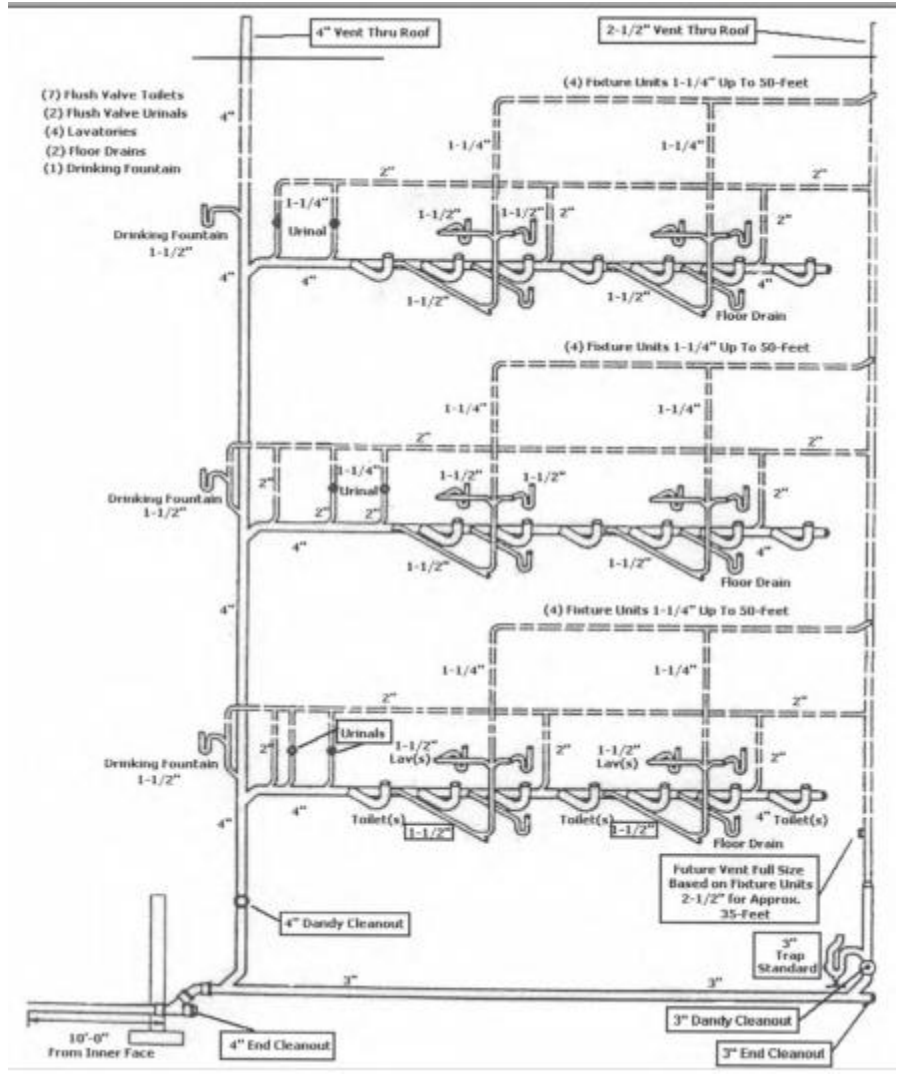
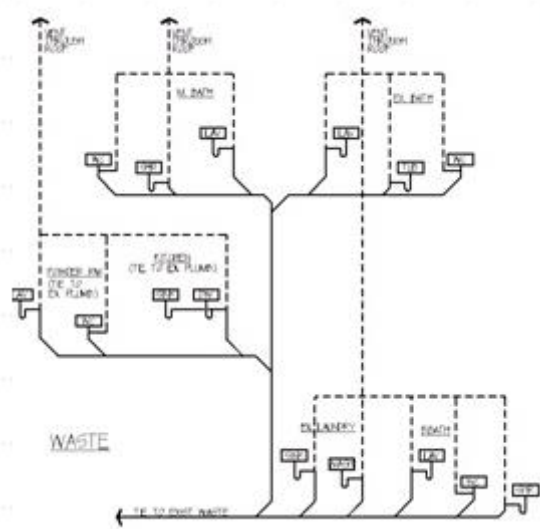
- Isometric/ oblique drawing prepared for waste disposal line.
- Main stack, stack vent ($\leftarrow \downarrow 100\text{mm}$, $\leftarrow \downarrow 50\text{mm}$).
- Branch discharge pipes to discharge stack ($\leftarrow \downarrow 50\text{mm}$).
- Arrows showing direction of flow.
- Pipe sizes and types.
- Slopes of waste pipes (eg.2% slope).
- Elevation (Vertical heights) of floors and fixtures.
- Location of vent pipes & cleans out.
- Location and type of valves.
- Necessary notes.

Riser diagram of sewerage system of the given building

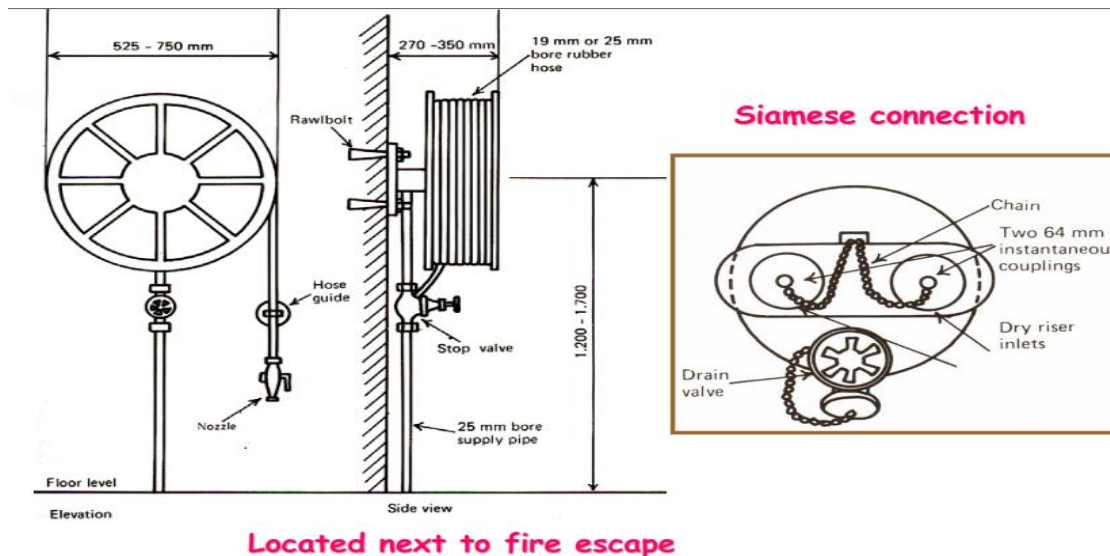




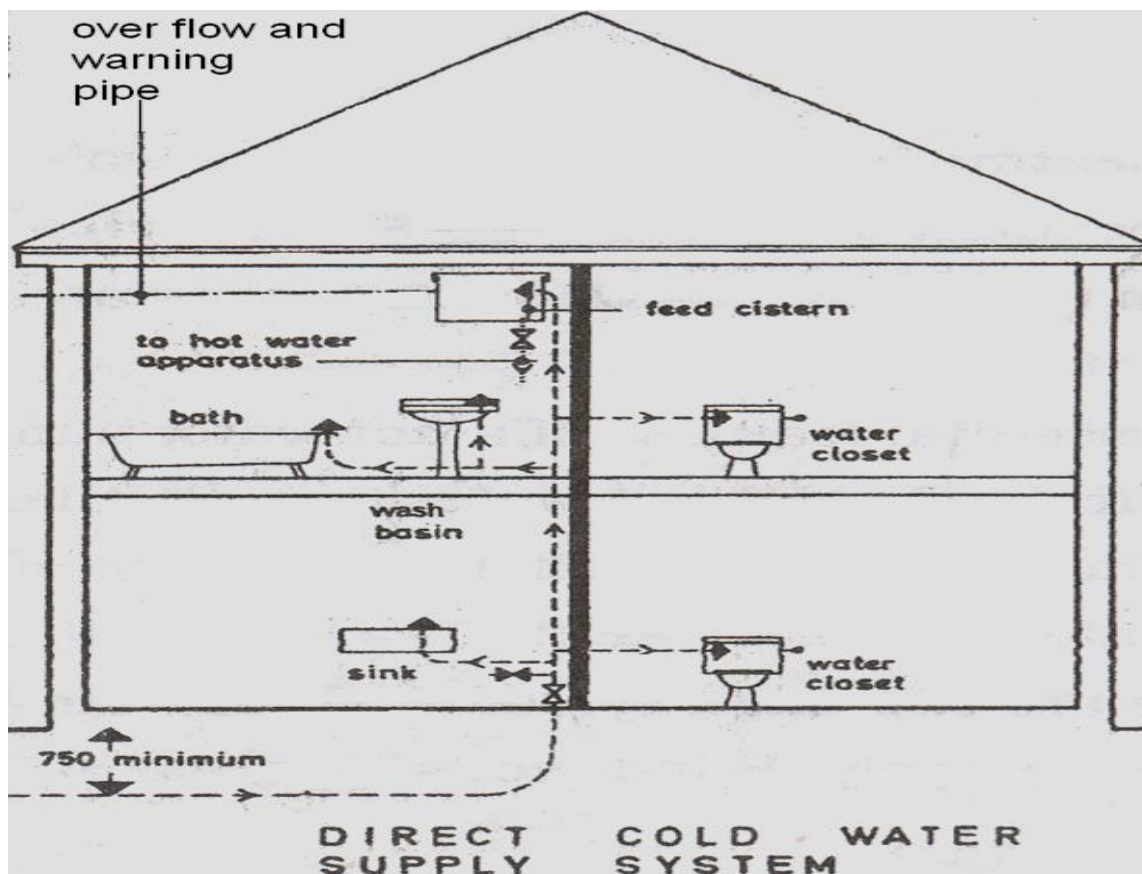




1.1.7 Diagram of hose reel system



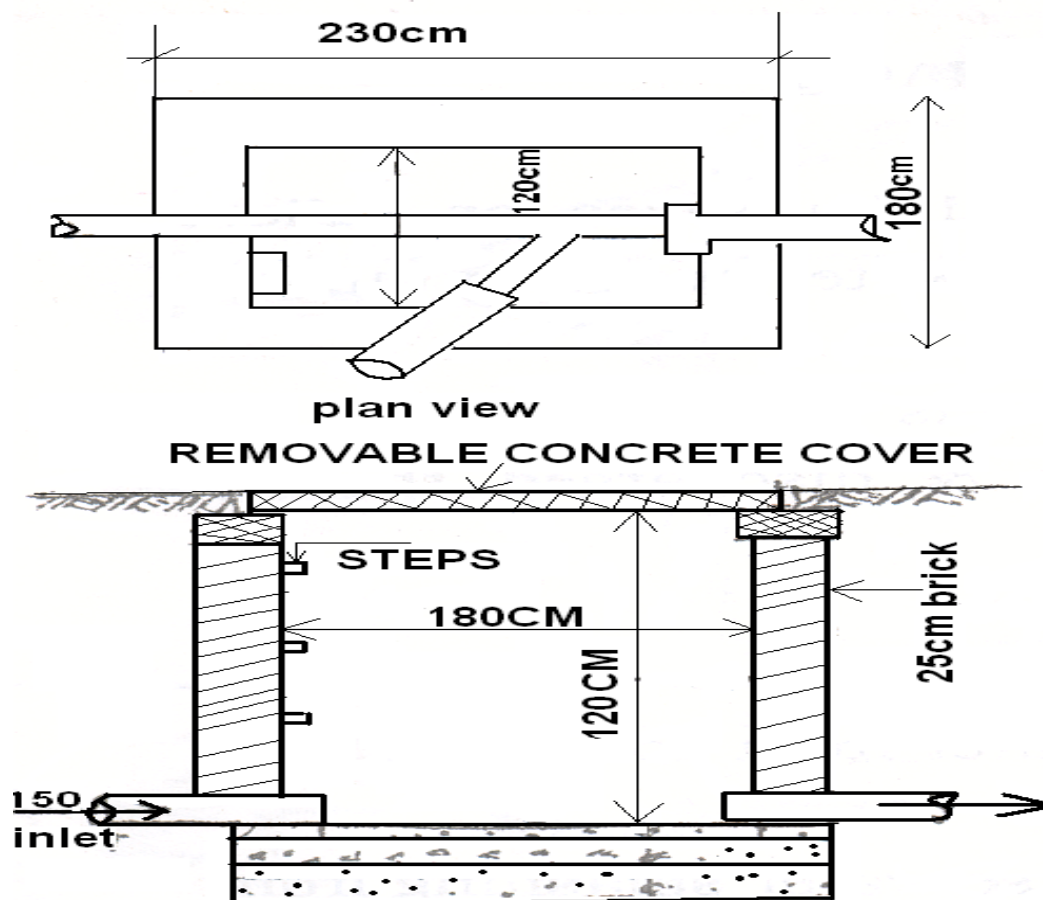
1.2 Drawing vertical sectional elevation of a supply system



1.3 Manholes and inspection chambers

Man holes are designed to permit the entry of a man, and inspection chambers should be situated to make lengths of drain accessible for maintenance (inspection, testing, clearing of blockages & repair)

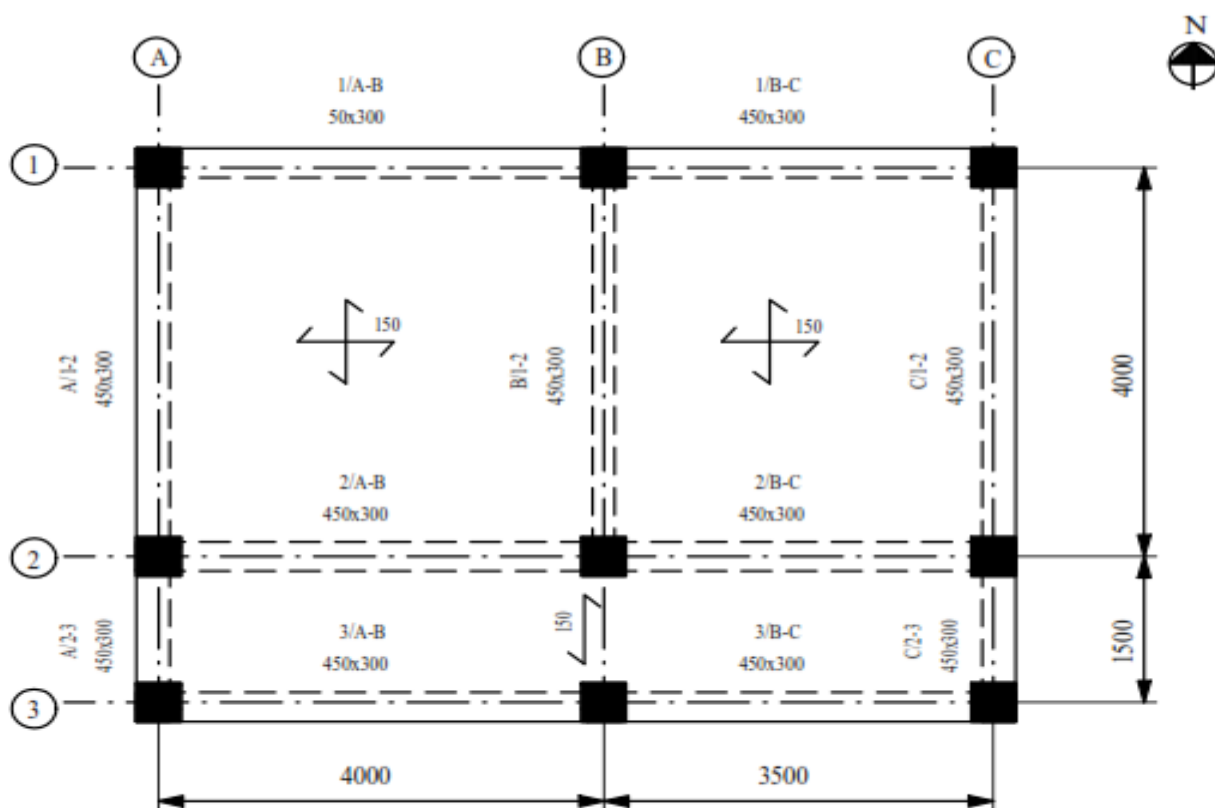
- They are normally provided at changes of direction & gradient, at drain junctions
- It can be constructed in brick work, in situ concrete, recast concrete etc.
- The dimensions of manholes & inspection chambers will be largely determined by the size and angle of the main drain, the position & number of branch drains and the depth to invert.
- The word invert is used to describe the lowest level of the inside of a channel in an inspection chamber, or the lowest point of the inside of a drain pipe, and measurements to the invert of a drain are used to determine the gradient of that drain.



1.4 Structural features

REINFORCED CONCRETE STRUCTURES

The two main groups of drawings for illustrating reinforced concrete structures are general arrangement drawings, reinforcement drawings. General arrangement drawings are floor plans, roof plans, sections and elevations, drawn to a small scale and providing an overall view of the work. They supply the setting out dimensions, the positions and sometimes the sizes of all the members. Figure is an example of a small plan of a typical floor showing slab thickness and reinforcement, beam serial numbers and sizes. A reference grid is provided similar to that previously described for a structural steel building. Reinforcement drawings of structural elements are drawn to a larger scale and give detailed information about the reinforcement below. There is no excuse for ambiguity, and it is essential that all drawings are easy to read, and cannot be misunderstood.



Slab and beam details on a small-scale floor plan

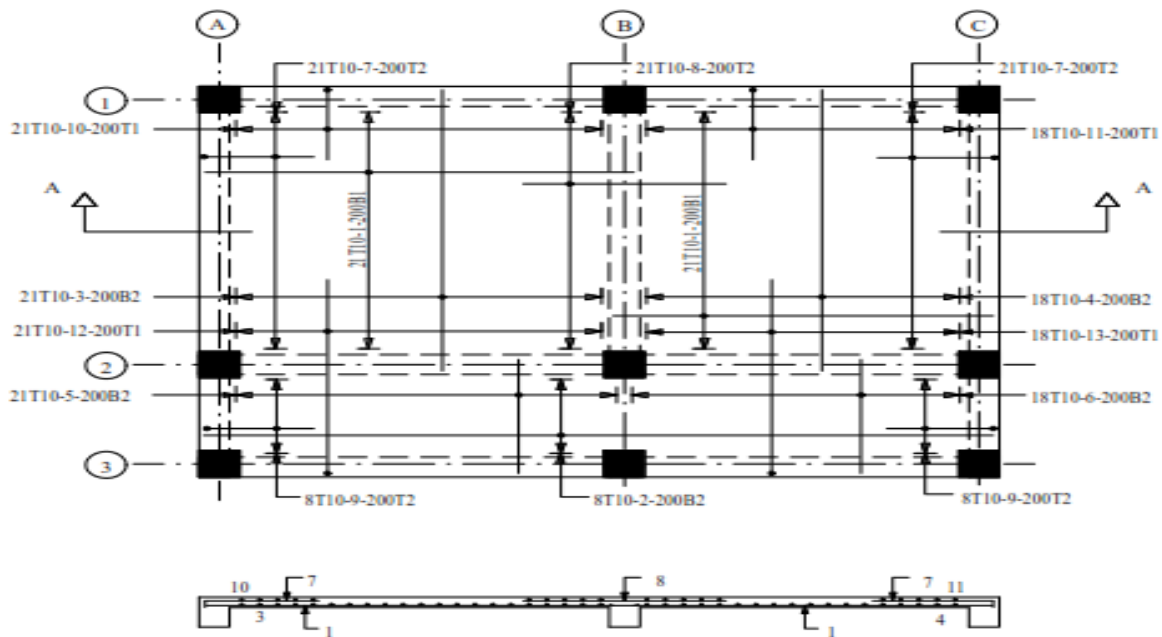


Fig R.C. Details of Floor Slab

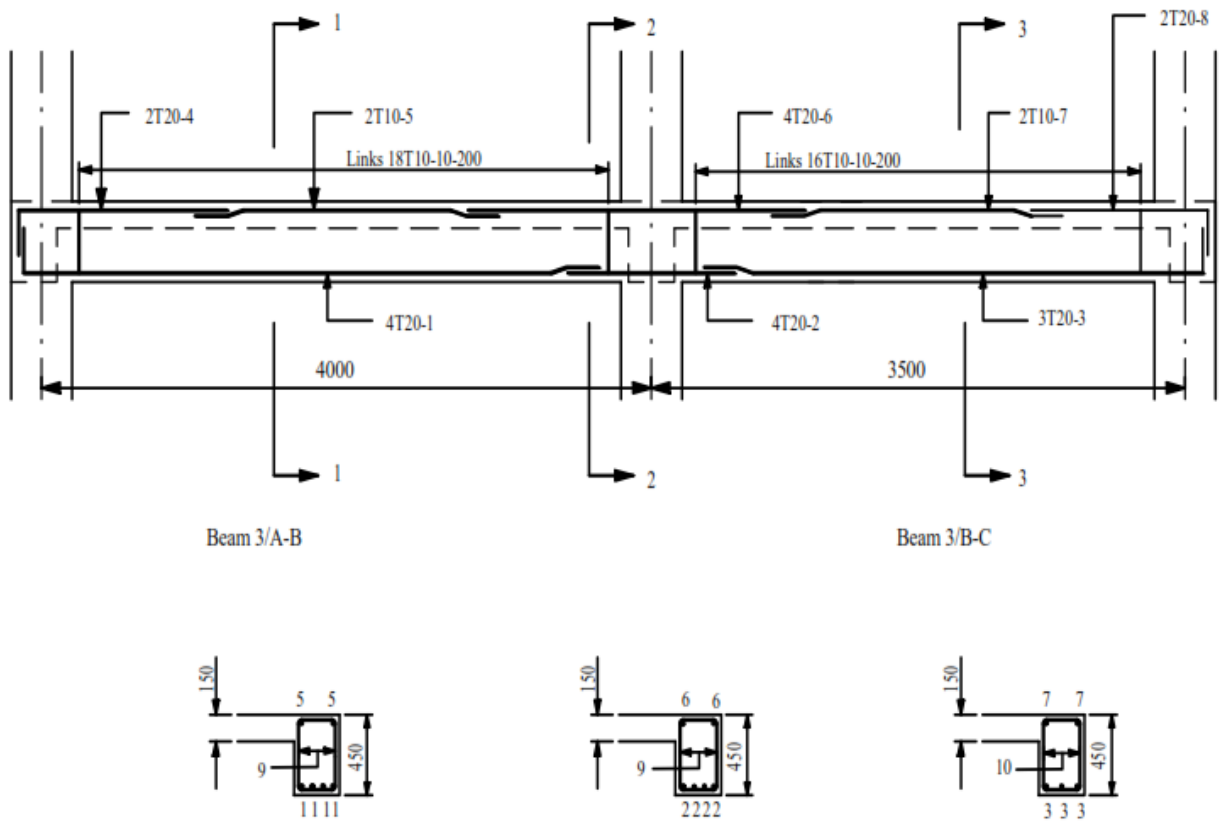


Figure Details of beams



Self-Check - 1	Written Test
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Direction: Match column 1 with column 2

- | | |
|------------------|--|
| 1. A single line | A. 3-d representation of piping system |
| 2. Double line | B. diagrammatic layout |
| 3. Orthographic | C. 2-d representation of piping system |
| 4. Isometric | D. scale layout in drawing |

Note: Satisfactory rating - 2 and 4 points

Unsatisfactory - below 2 and 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Name: _____

Date: _____

Answer sheet

1. _____ 2. _____ 3. _____ 4. _____



Information Sheet- 2

Identifying Location and types of services

2.1 Direction & location:

- Location and direction help to properly orient the isometric drawing
- A north arrow give direction and point to the upper-right corner of the paper
- Structural reference points that provide location can be shown on isometric
- Dimensions must always be given to points of reference; such as structures, existing equipment...etc
- Coordinates should also be shown on the isometric drawing



Self-Check - 2	Written Test
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Direction: Match part one with part two.

- | | |
|--------------------------------|--|
| 1. Location and direction | A. help to properly orient the isometric drawing |
| 2. North arrow | B. give direction and point |
| 3. Structural reference points | C. provide location |

Note: Satisfactory rating - 2 and 4 points

Unsatisfactory - below 2 and 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Name: _____

Date: _____

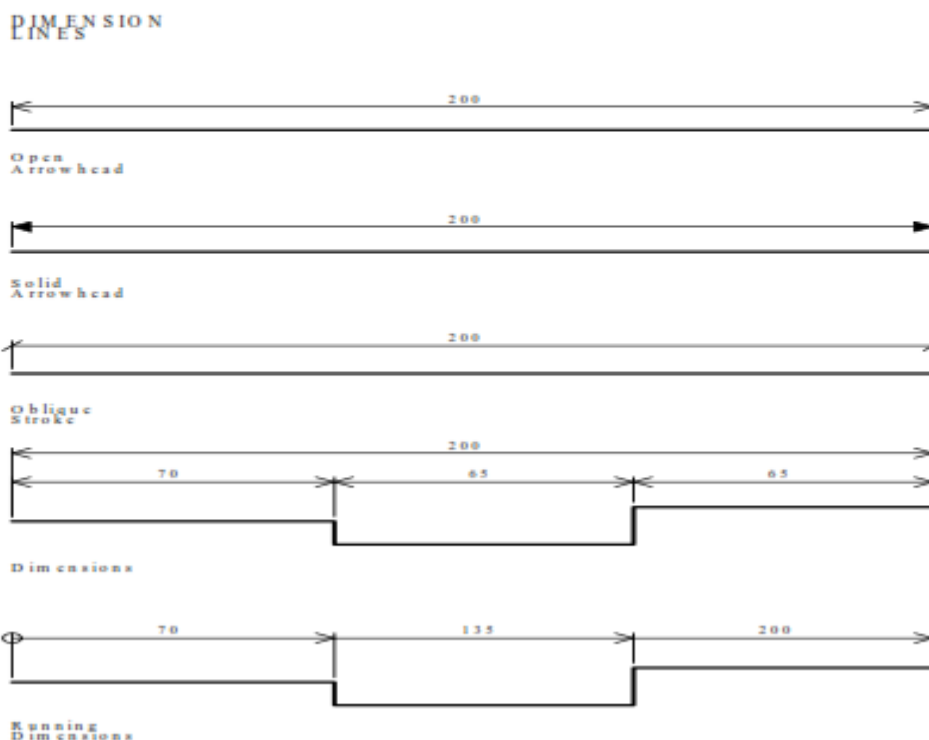
Answer sheet

1. _____ 2. _____ 3. _____ 4. _____

Information Sheet- 3	Locating of major horizontal and vertical measurements
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HORIZONTAL DIMENSIONS

Horizontal dimensions should, where possible, be indicated on plans rather than on elevations. Where feasible dimension lines should be located outside the building or object rather than inside it.



VERTICAL DIMENSIONS

Vertical dimensions should, where possible, be indicated on sections rather than on elevations. All vertical dimensions of a building should relate to a site datum. The site datum is a fixed vertical level on the site, and for convenience is often set at the ground floor level of the building under construction.



Self-Check - 3	Written Test
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Directions: answer false or true for the question given below.

1. Vertical dimension indicated on sections rather than on elevations.
2. All vertical dimensions of a building should relate to a site datum.
3. Horizontal dimension indicated on plan than on elevation.
4. Feasible dimension line should be located inside the building or object line rather than outside it.

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Name: _____

Date: _____

Answer sheet

1. _____ 2. _____ 3. _____ 4. _____



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4 hours.

Task 1: Select plumbing drawing with its specification before practical demonstration day.

Task 2: Identify Key features and dimensions elevations, Sectional details and structural features

Task 3: Identifying Location and types of services

Task 4. Locating of major horizontal and vertical measurements



List of Reference Materials

- Seeley IH. (1998). Building Quantities Explained 5th Revised edition, Macmillan ISBN 978-0-333-71972-5
- Seeley IH. (1997). Quantity Surveying Practice, 2nd Revised Macmillan; ISBN 978-0-333-68907-3
- Lee S. Trench W. Willis A. (2005) Elements of Quantity Surveying. 10th Edition WileyBlackwell; ISBN 978-1-4051-2563-5
- Ashworth A. Hogg K. (2007). Willis's Elements of Quantity Surveying 12 Rev Ed edition Blackwell Publishing. ISBN 978-1-4051-4578-7
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