DRAUGHTSMAN CIVIL

PRACTICAL I & II

VOCATIONAL EDUCATION

Higher Secondary - Second Year

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Untouchability is a sin
Untouchability is a crime
Untouchability is inhuman

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SYLLABUS

PRACTICAL - I

1. A SINGLE ROOM BUILDING
2. A RESIDENTIAL BUILDING
3. AN OFFICE BUILDING
4. PRIMARY SCHOOL BUILDING
5. A SMALL INDUSTRIAL BUILDING

PRACTICAL - II

1. Study of pipe specials
2. Cutting and threading of the given G.I. pipe
3. Identification of the given types of TAPS AND WATER METER and explaining the same
4. Giving water supply connection from Street main line to house with details of plumbing work
5. Identification of the given types of TRAPS and explaining the same
6. Connection of INDIAN TYPE WATER CLOSET with 'P' trap
7. Connection of EUROPEAN TYPE WATER CLOSET with 'S' trap
8. Water connection to WASH BASIN
9. Water connection to Shower and Tap
10. Laying and joining of three lengths of stoneware pipes
11. Principle and working of a single acting Reciprocating pump with neat sketch
12. Principle and working of a Centrifugal Pump

CONTENTS

PRACTICAL-I
BUILDING DRAWING

INTRODUCTION

A building is a living place surrounded by walls and covered by roof for the purpose of keeping out rain, sun, wind and snow. It may be a bungalow, apartment, school, hospital, shopping complex, industry, residential building etc. Any building essentially comprises of three parts namely foundation, super structure and roof. Before construction the civil engineer has to plan and prepare the building drawing with all details.

The main aim of building drawing is to give sufficient informations by the designer to the construction engineer. In order to give sufficient information about the building the following views are generally drawn :

A) Plan

B) Elevation and

C) Section

A) PLAN

The building is imagined to be cut by a horizontal plane at the sill level of the window. The upper portion is removed. Now building is seen from top. A projection of the remaining portion of the building on a horizontal plane will be known as the plan.

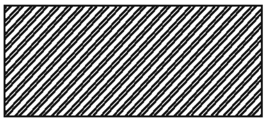
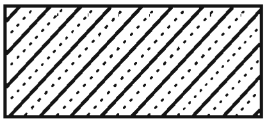
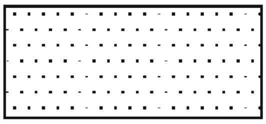
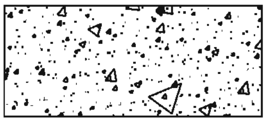
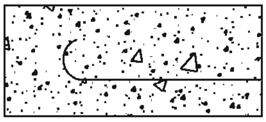
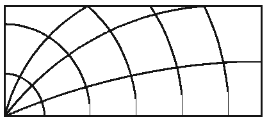
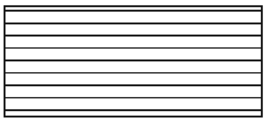
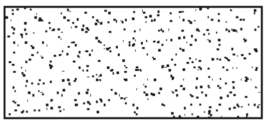
B) ELEVATION

It is the front view of building. Imagine to stand in front of it. Whatever the portion of the building is visible above the ground level, take its first angle projection on a vertical plane behind the building. It will be known as the elevation.

C) SECTION

The building is imagined to be cut by a vertical plane in order to show the internal details such as details of foundation, flooring, doors, windows, ventilators, thickness of walls, lintels, roof, parapet wall, sunshade, etc. Arrows at the extreme ends of the section plane or planes show the directions in which these details are required. The details drawn and marked on a vertical plane, after removing the part of the building behind the cut section is known as the section.

SYMBOLS OF BUILDING MATERIALS IN SECTION:

SI.NO	NAME OF MATERIAL	SYMBOL
1	Brick	
2	Stone — Random Rubble Masonry Stone — Course Rubble Masonry	
3	Sand	
4	Plain cement concrete(P.C.C)/Lime concrete	
5	Reinforced cement concrete (R.C.C)	
6	Wood / Timber	
7	Glass	
8	Plaster	

TERMINOLOGY

BUILDING MATERIALS

1. MASONRY: According to the type of material used for construction, it is called as stone masonry, brick masonry or concrete masonry.
2. CEMENT MORTAR (C.M): It is a substance produced from prescribed proportions of cement, sand and water which gradually sets hard after mixing and binds the building materials together.
3. CEMENT CONCRETE (C.C): It is a mixture of cement, sand (Fine aggregate), jelly (coarse aggregate) and water. Concrete mix of 1:1½:3 means 1 part by weight of cement, 1½ parts of sand and 3 parts of jelly are used to form the Mix.
4. PLAIN CEMENT CONCRETE (P.C.C): A plain cement concrete is the concrete without any reinforcement. It is usually referred as cement concrete.
5. REINFORCED CEMENT CONCRETE (RCC): It is the concrete reinforced by mild steel or twisted bars.

BUILDING COMPONENTS:

1. FOUNDATION : It is the portion of a building below the ground level (G.L). It transmits the load coming from the superstructure to the ground.
2. FOOTINGS : Footings are stepped courses in foundation. These are constructed in brick masonry or stone masonry or concrete under the walls or columns for distributing the load of the superstructure on to a larger area of subsoil.
3. BASEMENT : It is the lower storey of a building, below or partly below the ground level.
4. SUPER STRUCTURE : It is the portion of the building above the ground level.
5. PLINTH : It is the portion of the structure between the ground level and the floor level. The level of the floor is usually known as plinth level. Plinth height may be 300mm to 600mm, but 450mm is more common. For water logging prone areas, the plinth height will be 600mm.
6. FLOORING :The flooring will be generally in plain cement concrete (P.C.C) 1:4:8 of about 130mm thick, plastered smooth with cement mortar 1:3 of 20mm thick. This may be finished with tiles or marbles.
7. DAMP PROOF COURSE (DPC) : It is a continuous layer of an impervious material such as bitumen, slate or rich concrete provided at the plinth level beneath the walls to prevent the entry of moisture into the building through basement.

8. MASONRY WALLS : Masonry walls may be of either brick or stone. Actual size of Modular brick is 190 x 90 x 90mm. The thickness of a single brick wall including plastering is 200mm and of $1^1/_2$ brick wall is 300mm.

9. DOORS, WINDOWS AND VENTILATORS: The size of door to be adopted for a room depends basically upon the functional requirement of the room. Commonly adopted sizes of doors for different types of buildings are given below.

Sl.No	TYPES OF BUILDINGS	SIZE OF DOORS in 'mm'
1	Public buildings like office,school,hospital,library etc	1200x2100, 1500x2100 etc.
2	Residential buildings	1100x2100, 900 x2000 etc.
3	Door for bath and water closet	800x 2000 etc.

10. SILL : It is the bottom horizontal frame of a window.

11. LINTEL : It is defined as a horizontal member provided on the top of door and window openings to support the brick work over door and window opening.

12. SUNSHADE : It is a projection from the wall, provided above the door or window for the protection against the sunrays and rain.

13. ROOF : It is a flat or inclined structural member provided as a cover to the building. It is used to protect the building from weathering actions namely rain, sun, wind etc., Generally it is constructed of RCC of about 125mm thick.

14. CEILING : The lower level of the roof slab exposed to the room is known as ceiling. Sometimes, special materials will be used below the concrete roof to improve the appearance of the ceiling, which is known as false ceiling.

15. WEATHERING COURSE : It is of about 100mm thick brick jelly lime concrete, provided at the top of the roof slab to protect the slab from weathering actions of sunshine, rain etc.

16. PARAPET WALL : It is a short wall of about 450 to 900mm built over the roof all round the building.

17. COPING : It is a projection on the top of the parapet wall on outside or both sides to throw off rainwater.

18. STEPS : Steps are generally in brick work in cement mortar 1:5 laid on PCC base. Rise and Tread of a step are 150 to 200mm and 230 to 300mm respectively.

1) A SINGLE ROOM BUILDING

The following line sketch shows the internal dimensions of A SINGLE ROOM BUILDING. Draw to a scale of 1:50, the following views:

A) Plan B) Section on AB C) Elevation

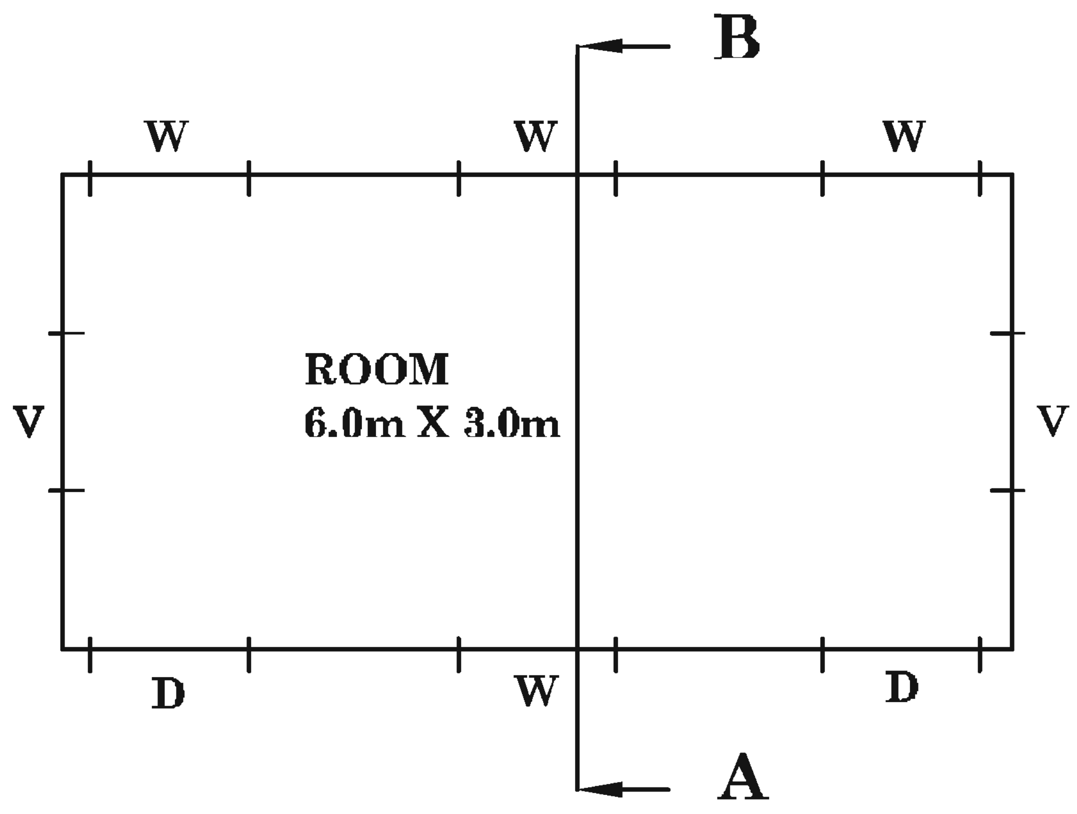
SPECIFICATIONS

a) FOUNDATION	:	Depth of foundation is 1m below natural ground level. The concrete base course is 1m wide and 0.3m thick in PCC of 1:3:6.
b) FOOTING	:	A footing of RR masonry in CM 1:5, having width 0.6m and depth 0.7m will be provided over the base course layer.
c) BASEMENT	:	The basement will be of RR masonry in CM 1:5 and of height 0.45m above the natural ground level. The thickness of plinth wall is 0.45m and a damp proof course 0.02m thick in CM 1:3 will be provided all round the building.
d) FLOORING	:	Over 0.340m depth of sand filling, flooring of 0.110m thick in CC 1:5:10 finished with granite tiles is provided.
e) SUPERSTRUCTURE	:	The thickness of walls above plinth level is 0.2m in brick work using CM 1:5.The height of the parapet wall is 0.6m above the roof top level. Lintel-cum-sunshade will be provided over the door and window openings. Thickness and bearing of RCC lintel in CC 1:1.5:3 will be 0.15m. The projection of sunshade will be 0.45m from the wall with RCC in CC 1:1.5:3 of thickness 0.08m at support and 0.05m at free end. Ceiling height will be 3m above the floor level.
f) ROOFING	:	Roofing will be of flat RCC in CC 1:1.5:3, 0.12m thick. A weathering course of 0.1m thick is provided over the roof slab with sufficient slope to drain rainwater.
g) STEPS	:	Tread = 0.3 m. Rise = 0.15 m.

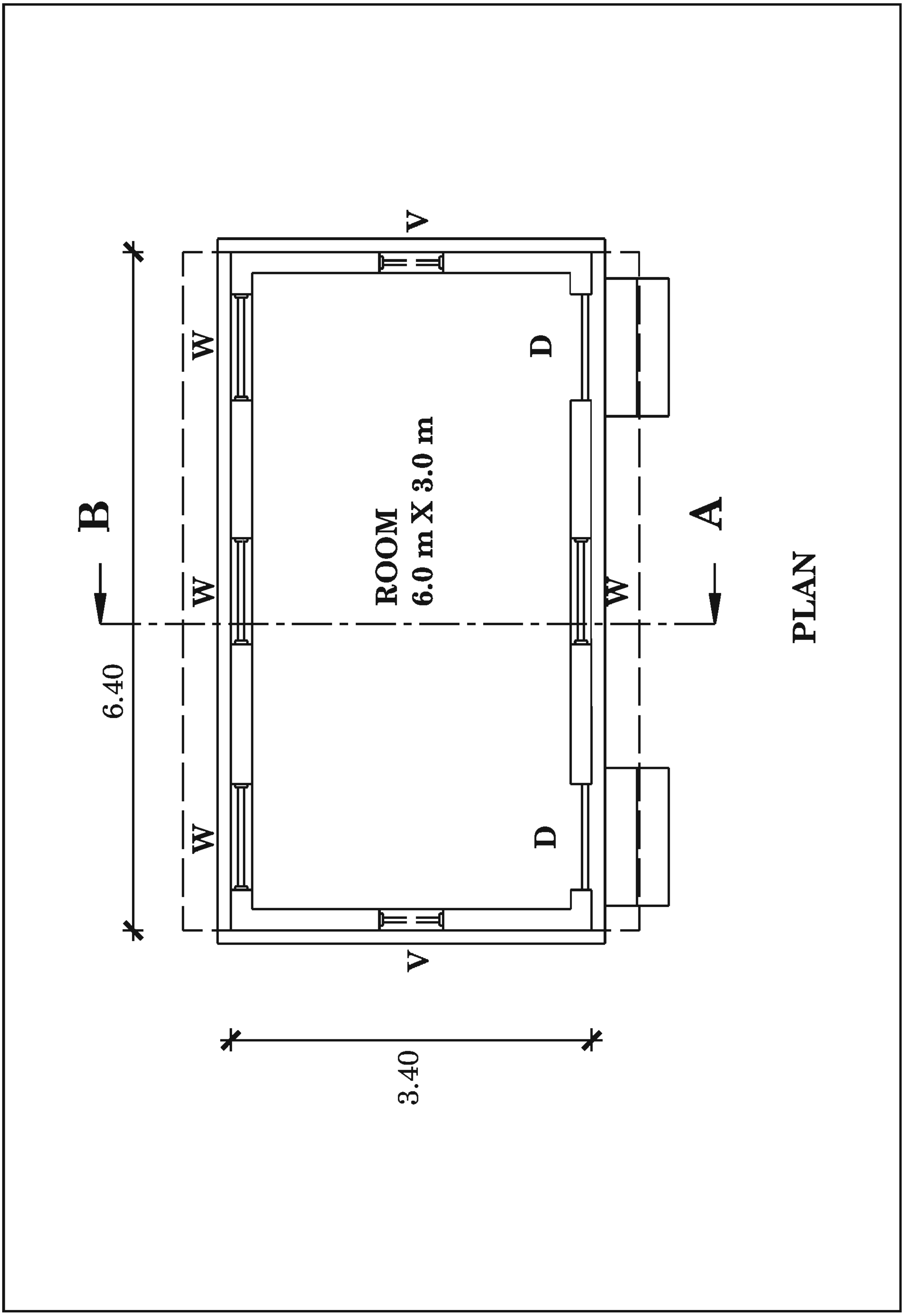
REFERENCE

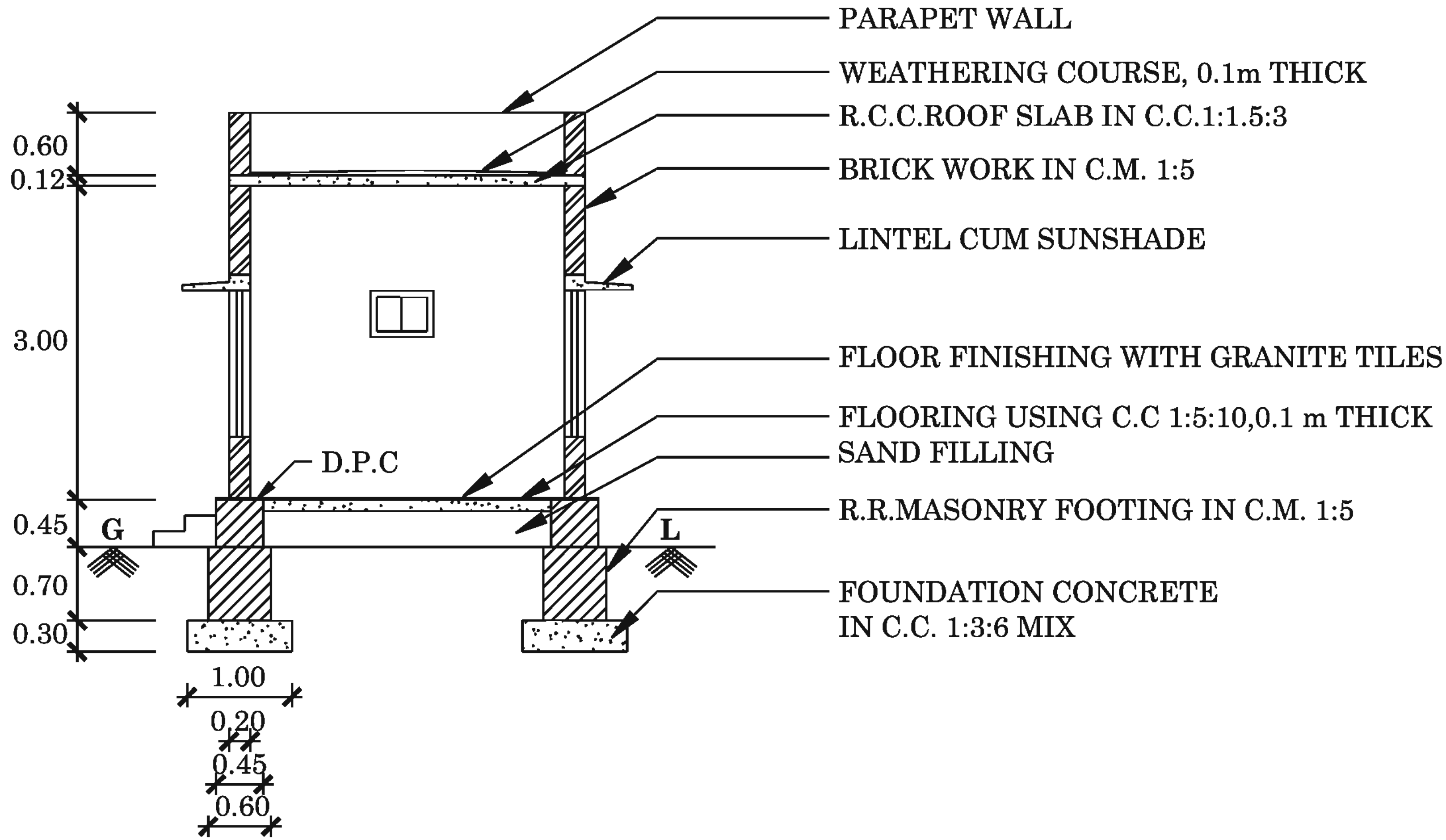
D	-	Panelled Wooden Door	- 1.2 m x 2.00 m
W	-	Panelled Wooden Window	- 1.2 m x 1.40 m
V		Glazed Ventilator	- 0.6 m x 0.45 m

Assume any other data suitably, if necessary.

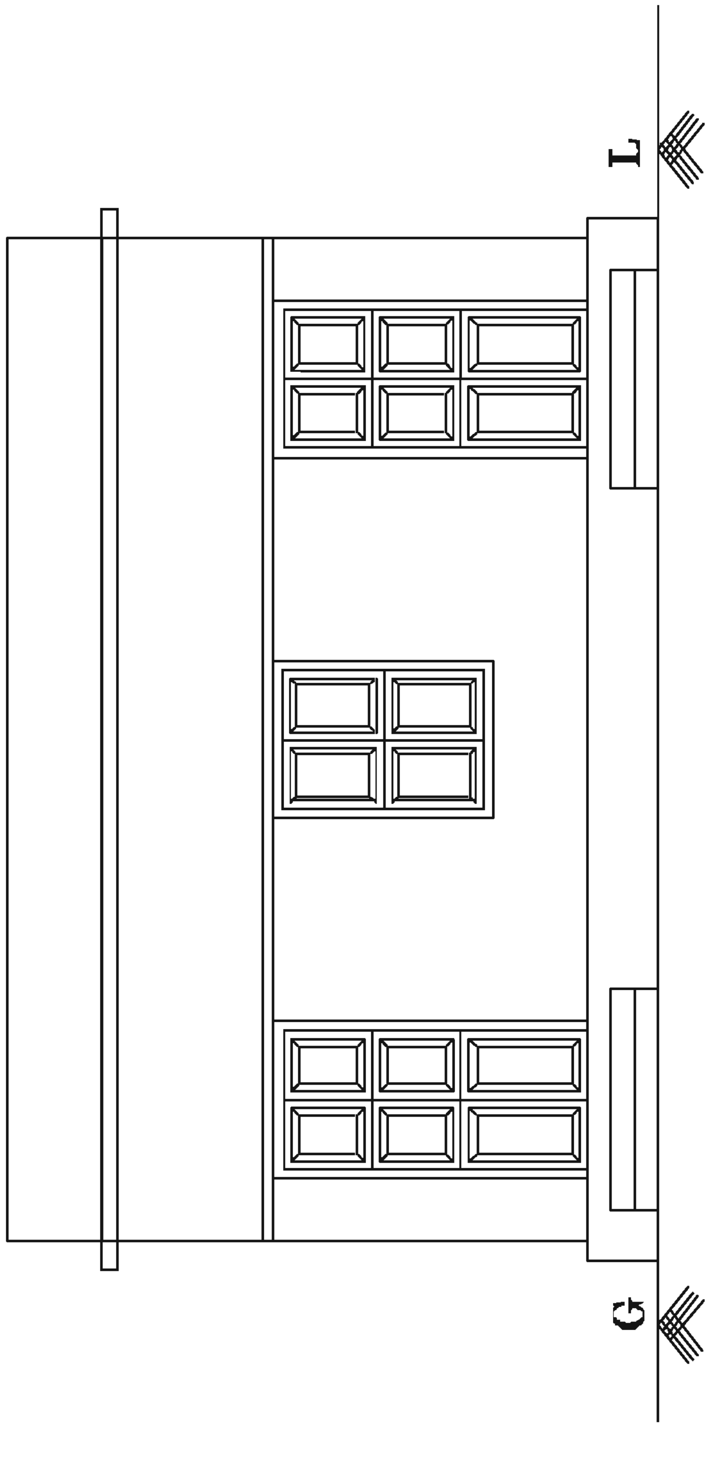


A SINGLE ROOM BUILDING

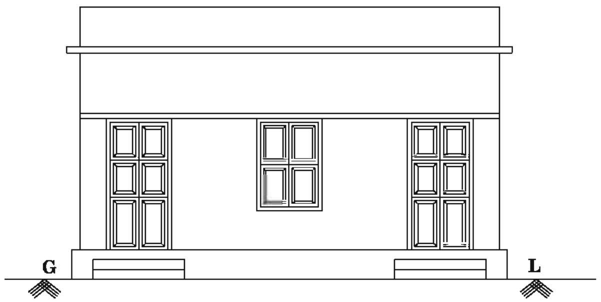

ROOM
6.0 m X 3.0 m
W
W
W
W
D
D
V
V
A
B
6.40
3.40
PLAN


PARAPET WALL
WEATHERING COURSE, 0.1m THICK
R.C.C.ROOF SLAB IN C.C.1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH GRANITE TILES
FLOORING USING C.C 1:5:10,0.1 m THICK
SAND FILLING
R.R.MASONRY FOOTING IN C.M. 1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
G
L
0.60
0.12
3.00
0.45
0.70
0.30
1.00
0.20
0.45
0.60

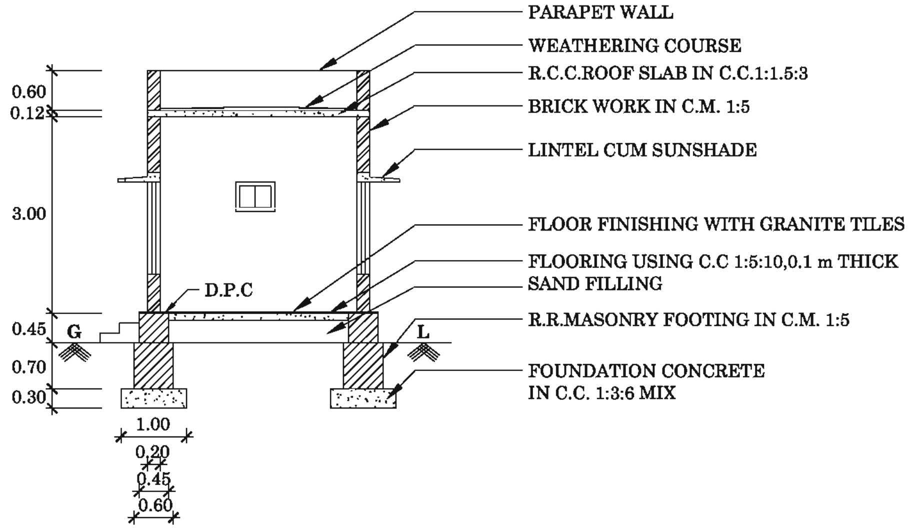
SECTION A-B



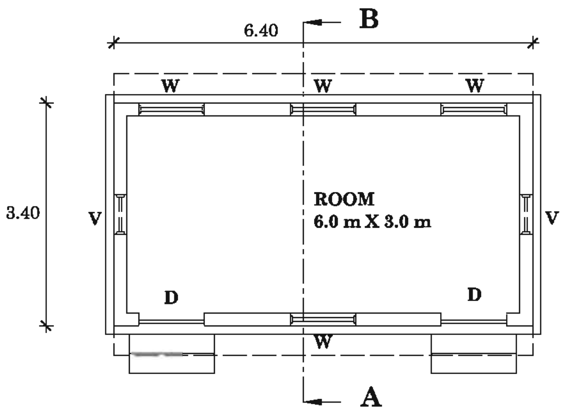
ELEVATION



ELEVATION



SECTION A-B



PLAN

A SINGLE ROOM BUILDING

SCALE 1:50

ALL DIMENSIONS ARE IN 'm'

REFERENCE	
D- PANELLED WOODEN DOOR	1.20 X 2.00
W- PANELLED WOODEN WINDOW	1.20 X1.40
V- VENTILATOR	0.60 X0.45

NAME	
CLASS	
ROLL NO	
PLATE NO	
DATE	

2) A RESIDENTIAL BUILDING

The following line sketch shows the internal dimensions of a residential building: Draw to a scale of 1:50, the following views:

A) Plan B) Section on AB C) Elevation

SPECIFICATIONS

a) FOUNDATION : Depth of foundation is 1.2m below ground level. The concrete base course is 0.9m wide and 0.3m thick in PCC 1:4:8.

b) FOOTING : First footing of RR masonry in CM 1:5, having width 0.6m and depth 0.45m and second footing of RR masonry in CM 1:5, having width 0.45m and depth 0.45m will be provided over the base course layer.

c) BASEMENT : The basement will be of CR masonry in CM 1:6 and of height 0.6m above the ground level. The thickness of plinth wall is 0.4m and a damp proof course 0.02m thick in CM 1:3, which is mixed with 5% of crude oil will be provided all round the building.

d) FLOORING : Over 0.450m depth of sand filling, flooring of 0.1m thick in CC 1:4:8 finished with marble is provided.

e) SUPERSTRUCTURE : The thickness of walls above plinth level is 0.2m in brick work using CM 1:5.The height of the parapet wall is 0.9m above the roof top level. Lintel-cum-sunshade will be provided over the door and window openings. Thickness and bearing of RCC lintel in CC 1:1.5:3 will be 0.15m.The projection of sunshade will be 0.45m from the wall with RCC in CC 1:1.5:3 of thickness 0.08m at support and 0.05m at free end. Ceiling height will be 3m above the floor level.

f) ROOFING : Roofing will be of flat RCC in CC 1:1.5:3, 0.12m thick. A weathering course of 0.1m thick is provided over the roof slab with sufficient slope to drain rainwater.

g) STEPS : Tread = 0.3 m. Rise = 0.15 m.

REFERENCE:

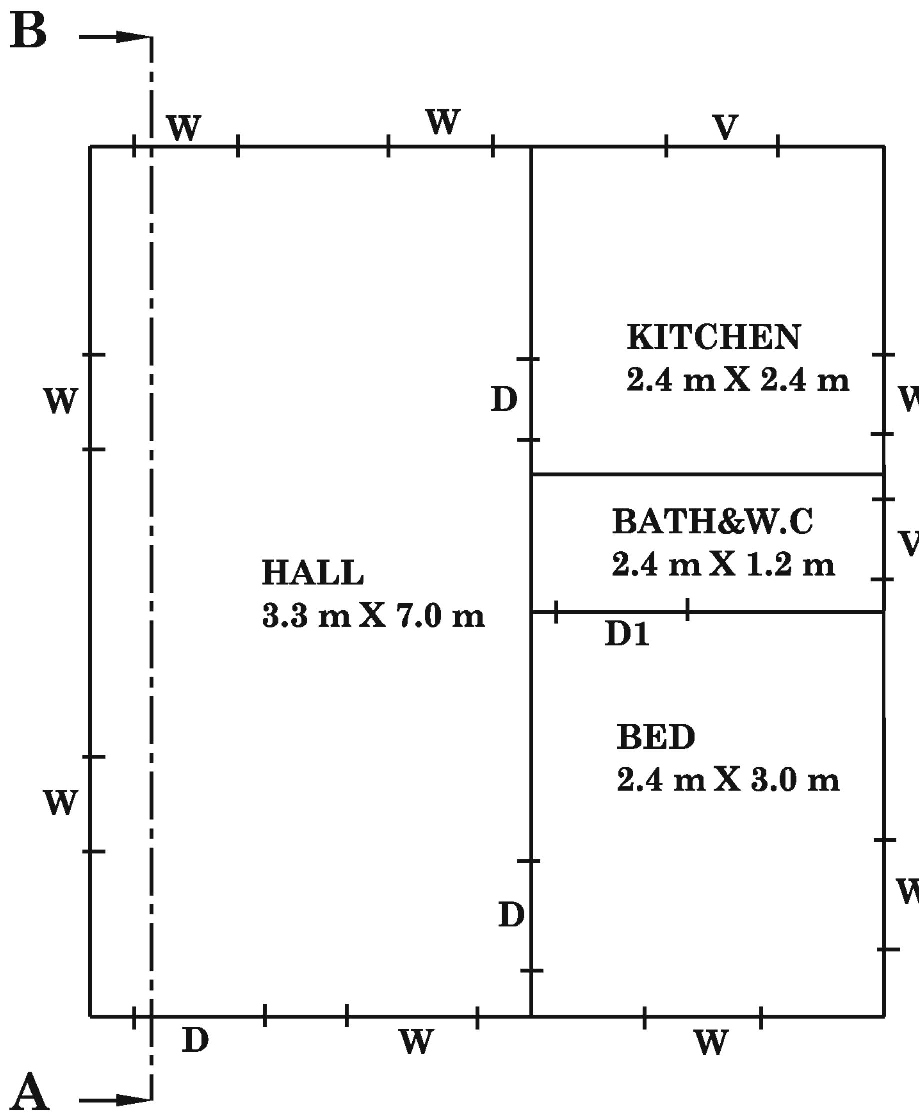
D - Panelled Wooden Door - 1.2 m x 2.00 m

D - Panelled Wooden Door - 0.75m x 2.00m

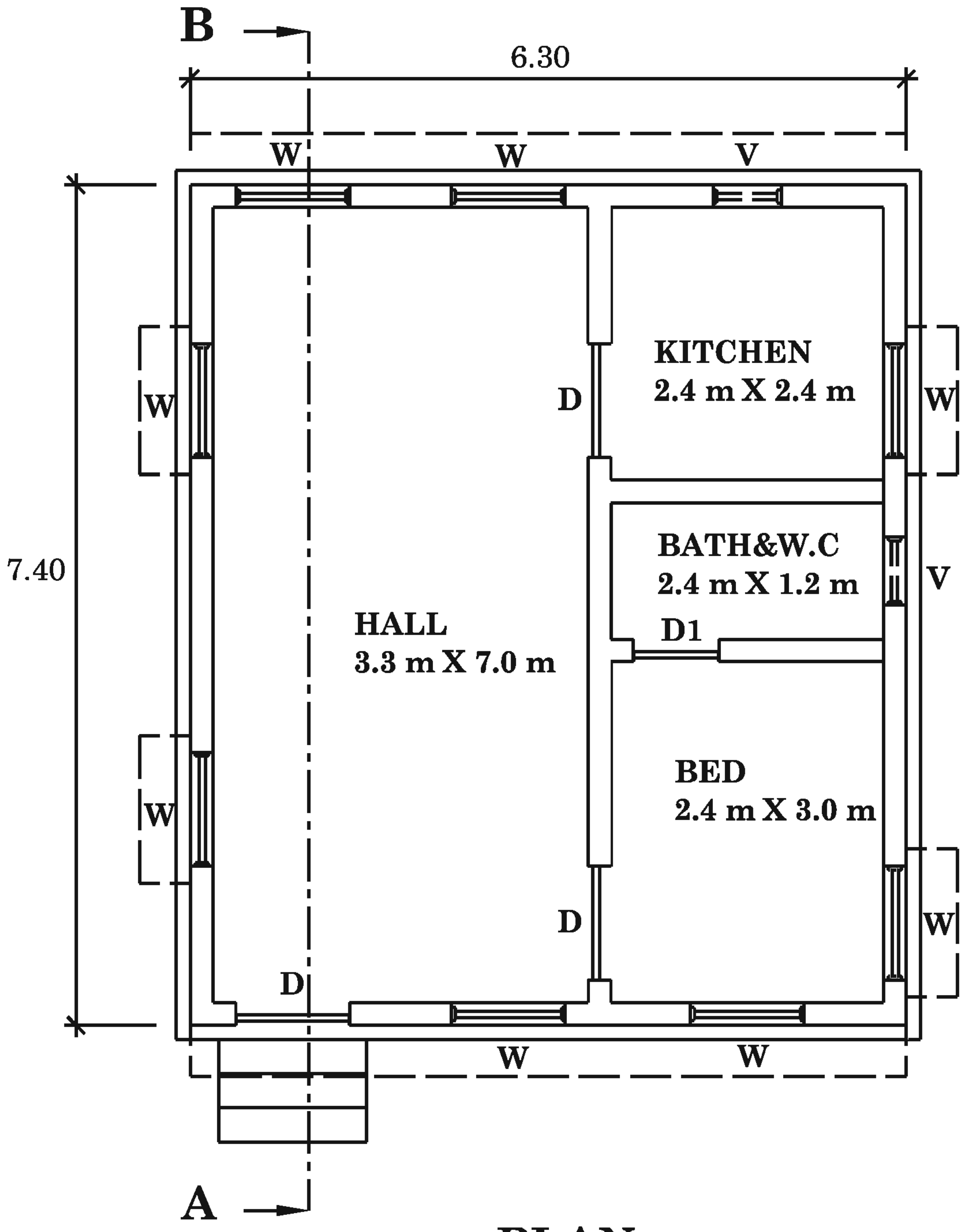
W - Panelled wooden Window - 1.2 m x 1.40 m

V - Glazed Ventilator - 0.6 m x 0.45 m

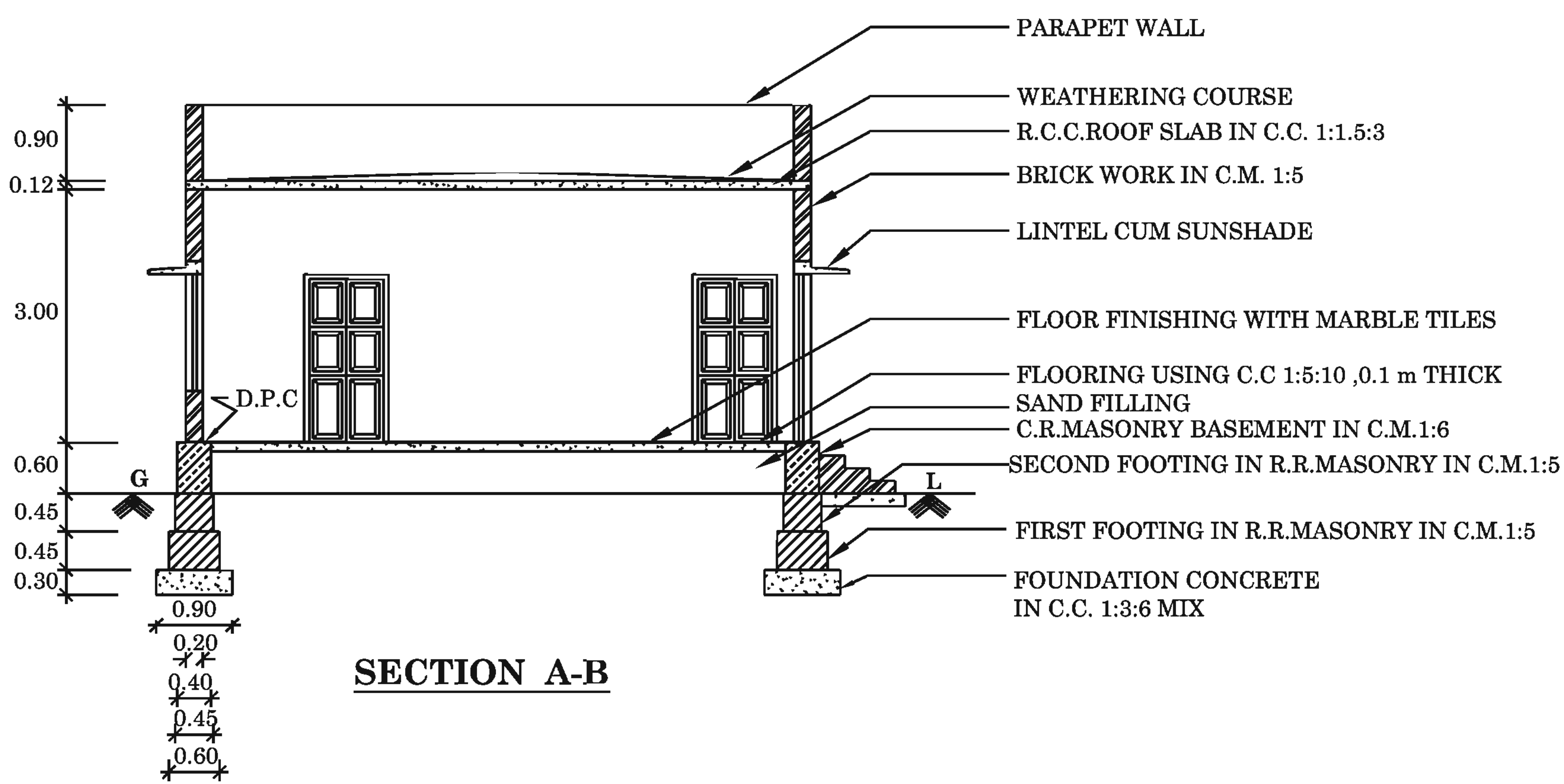
Assume any other data suitably, if necessary.



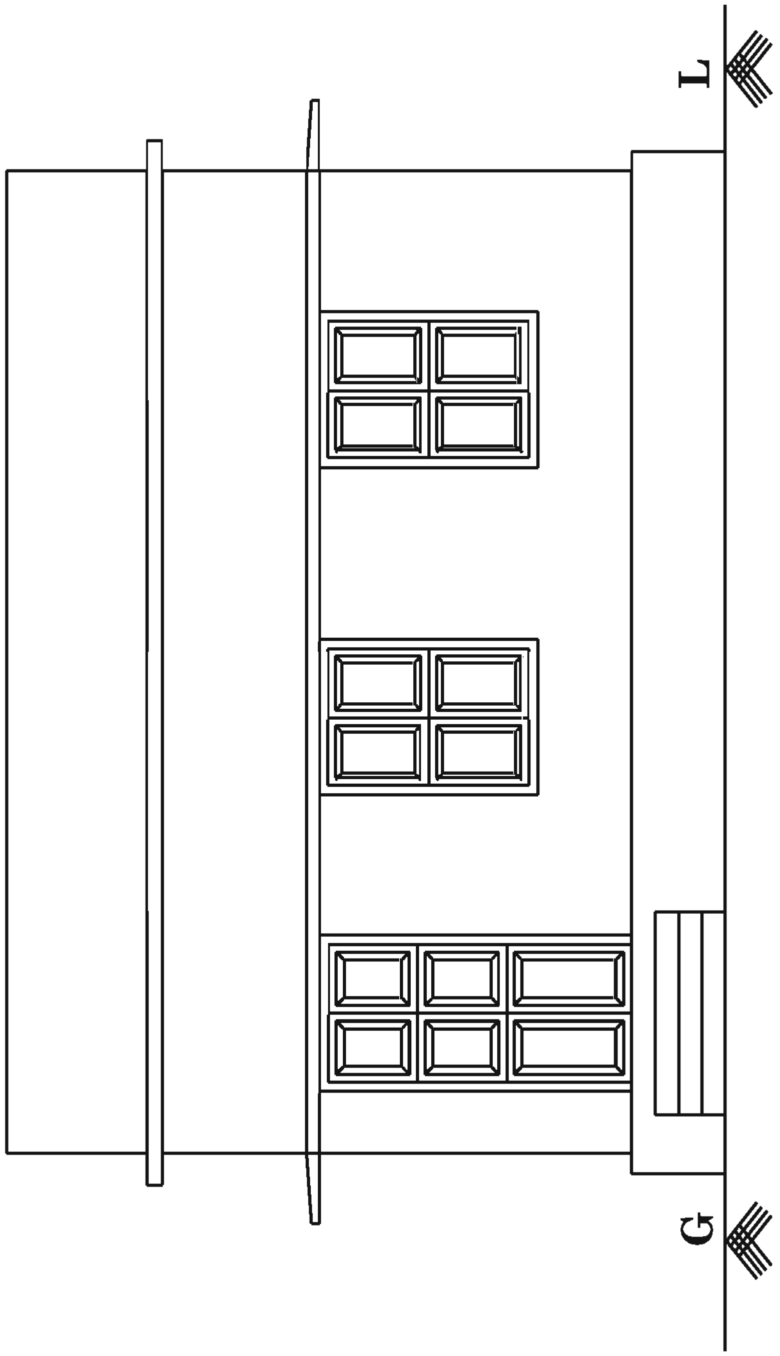
A RESIDENTIAL BUILDING


B
6.30
W
W
V
KITCHEN
2.4 m X 2.4 m
W
W
D
7.40
BATH&W.C
2.4 m X 1.2 m
V
HALL
3.3 m X 7.0 m
D1
BED
2.4 m X 3.0 m
W
W
D
D
W
W
A

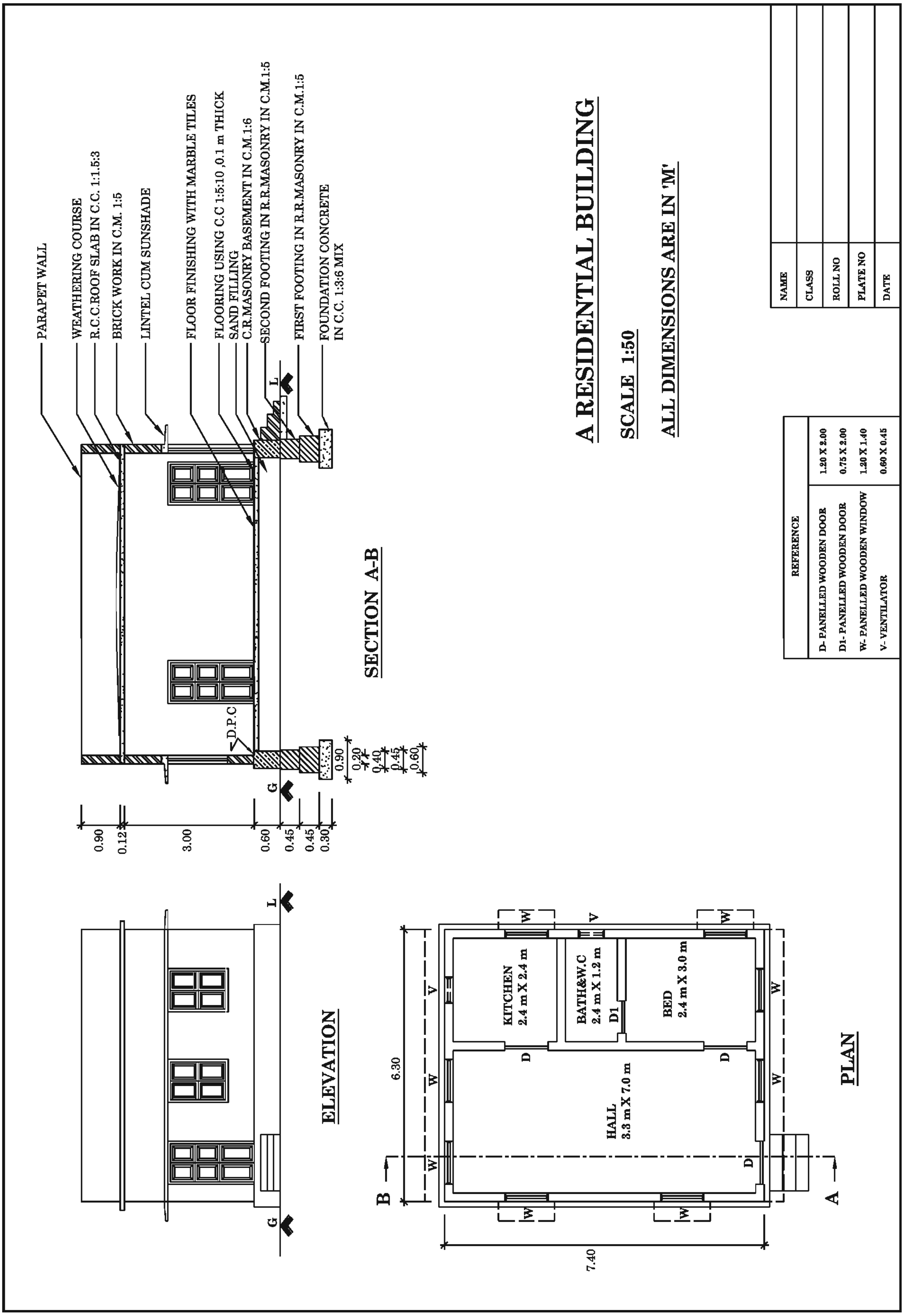
PLAN


PARAPET WALL
WEATHERING COURSE
R.C.C.ROOF SLAB IN C.C. 1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH MARBLE TILES
FLOORING USING C.C 1:5:10 ,0.1 m THICK
SAND FILLING
C.R.MASONRY BASEMENT IN C.M.1:6
SECOND FOOTING IN R.R.MASONRY IN C.M.1:5
FIRST FOOTING IN R.R.MASONRY IN C.M.1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
G
L
0.90
0.12
3.00
0.60
0.45
0.45
0.30
0.90
0.20
0.40
0.45
0.60

SECTION A-B



ELEVATION


A RESIDENTIAL BUILDING
SCALE 1:50
ALL DIMENSIONS ARE IN 'M'
ELEVATION
SECTION A-B
PLAN
PARAPET WALL
WEATHERING COURSE
R.C.C.ROOF SLAB IN C.C. 1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH MARBLE TILES
FLOORING USING C.C 1:5:10 ,0.1 m THICK
SAND FILLING
C.R.MASONRY BASEMENT IN C.M.1:6
SECOND FOOTING IN R.R.MASONRY IN C.M.1:5
FIRST FOOTING IN R.R.MASONRY IN C.M.1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
0.90
0.12
3.00
0.60
0.45
0.45
0.30
0.20
0.40
0.45
0.60
G
L
KITCHEN
2.4 m X 2.4 m
BATH&W.C
2.4 m X 1.2 m
BED
2.4 m X 3.0 m
HALL
3.3 m X 7.0 m
D1
6.30
7.40
A
B
REFERENCE
D- PANELLED WOODEN DOOR 1.20 X 2.00
D1- PANELLED WOODEN DOOR 0.75 X 2.00
W- PANELLED WOODEN WINDOW 1.20 X 1.40
V- VENTILATOR 0.60 X 0.45
NAME
CLASS
ROLL NO
PLATE NO
DATE

3) AN OFFICE BUILDING

The following line sketch shows the internal dimensions of an office building:

Draw to a scale of 1:50, the following views:

A) Plan   B) Section on AB   c) Elevation

SPECIFICATIONS

a) FOUNDATION : Depth of foundation is 1.2m below ground level. The concrete base course is 0.9m wide and 0.3m thick in PCC 1:3:6.

b) FOOTING : First footing of RR masonry in CM 1:5, having width 0.6m and depth 0.45m and second footing of RR masonry in CM 1:5, having width 0.45m and depth 0.45m will be provided over the base course layer.

c) BASEMENT : The basement will be of CR masonry in CM 1:6 and of height 0.6m above the ground level. The thickness of plinth wall is 0.4m and a damp proof course 0.02m thick in CM 1:3, which is mixed with 5% of crude oil will be provided all round the building.

d) FLOORING : Over 0.450m depth of sand filling, flooring of 0.1m thick in CC 1:4:8 finished with Vitrified tiles is provided.

e) SUPERSTRUCTURE : The thickness of walls above plinth level is 0.2m in brick work using CM 1:5.The height of the parapet wall is 0.9m above the roof top level. Lintel-cum-sunshade will be provided over the door and window openings. Thickness and bearing of RCC lintel in CC 1:1.5:3 will be 0.15m. The projection of sunshade will be 0.45m from the wall with RCC in CC 1:1.5:3 of thickness 0.08m at support and 0.05m at free end. Ceiling height will be 3m above the floor level.

f) ROOFING : Roofing will be of flat RCC in CC 1:1.5:3, 0.12m thick. A weathering course of 0.1m thick is provided over the roof slab with sufficient slope to drain rainwater.

g) STEPS : Tread = 0.3 m. Rise = 0.15 m.

REFERENCE:

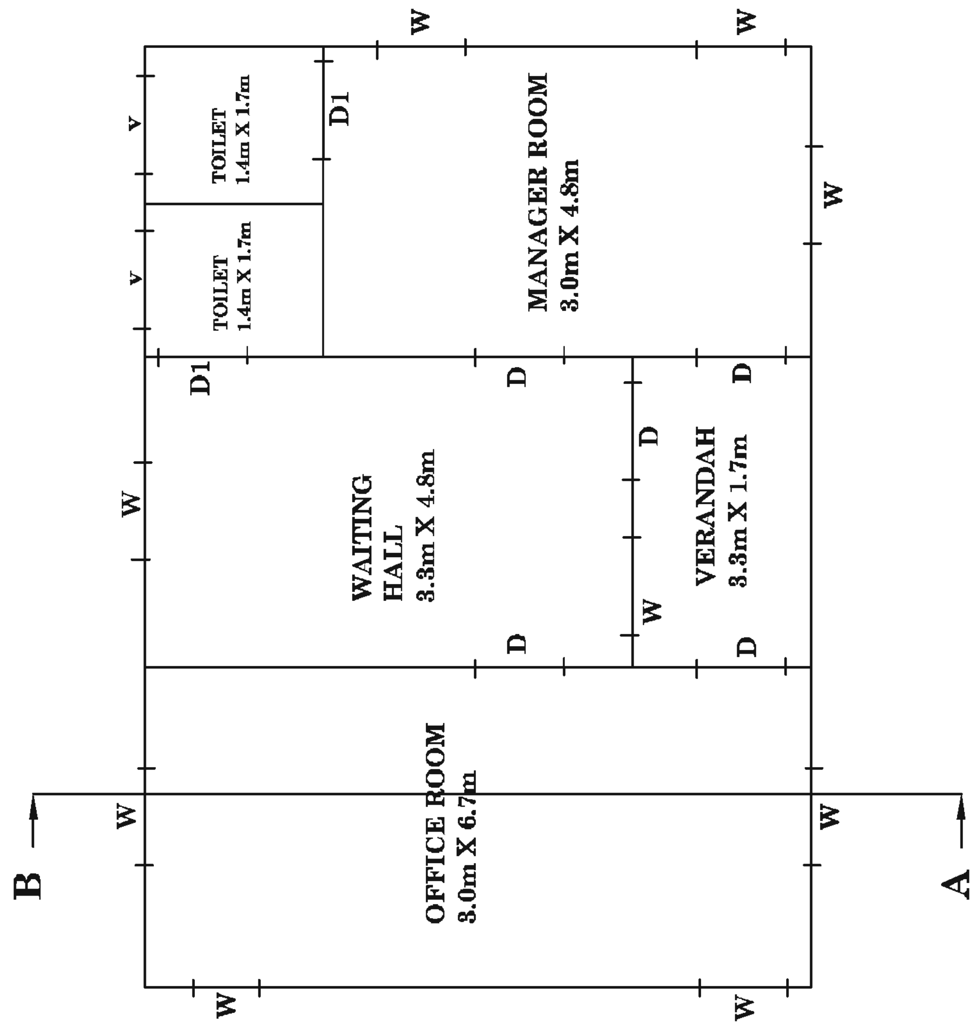
D - Panelled Wooden Door - 1.20 m x 2.00 m

D1 - Panelled Wooden Door - 0.75 m x 2.00 m

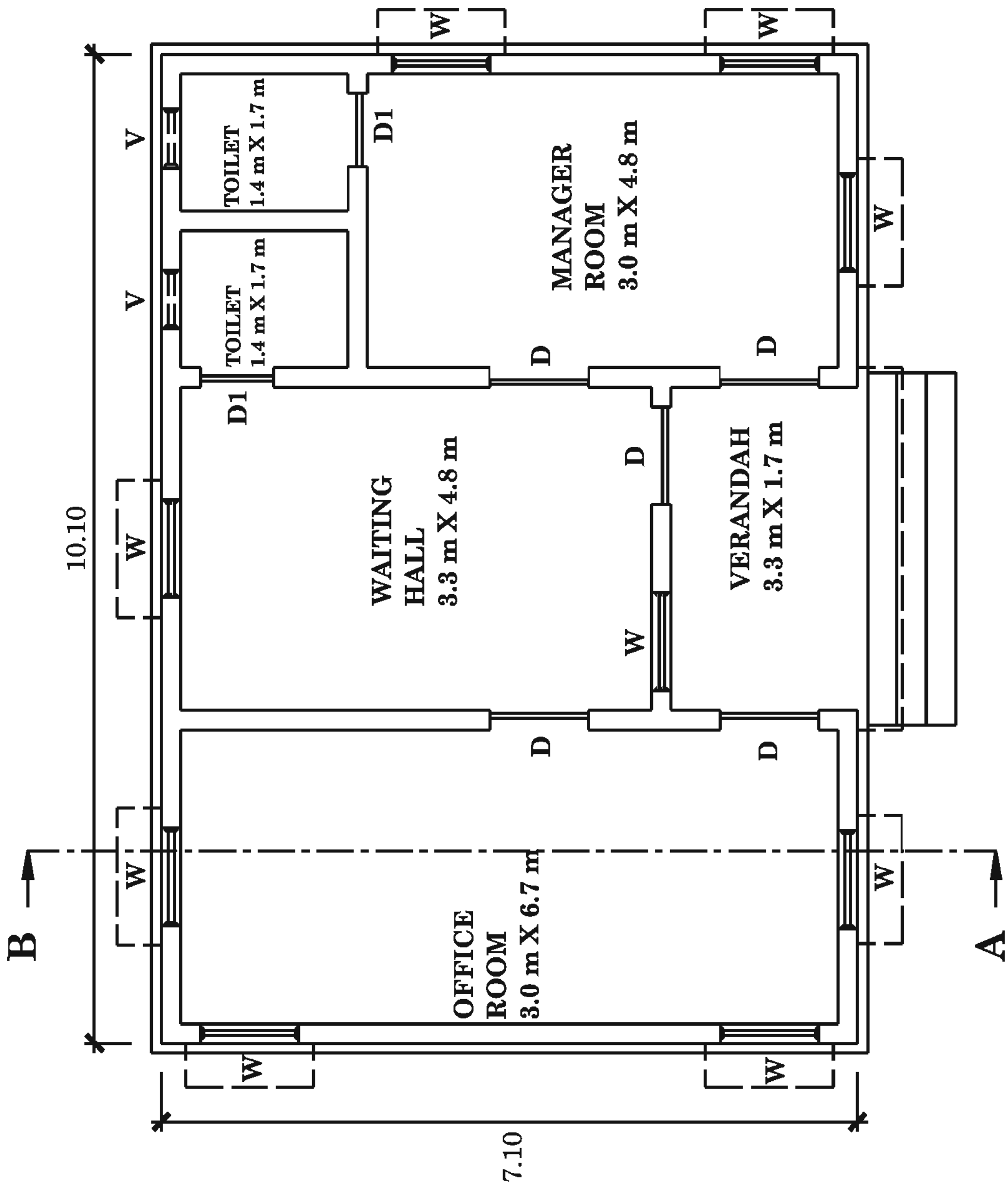
W - Panelled wooden Window - 1.20 m x 1.40 m

V - Glazed Ventilator - 0.60 m x 0.45 m

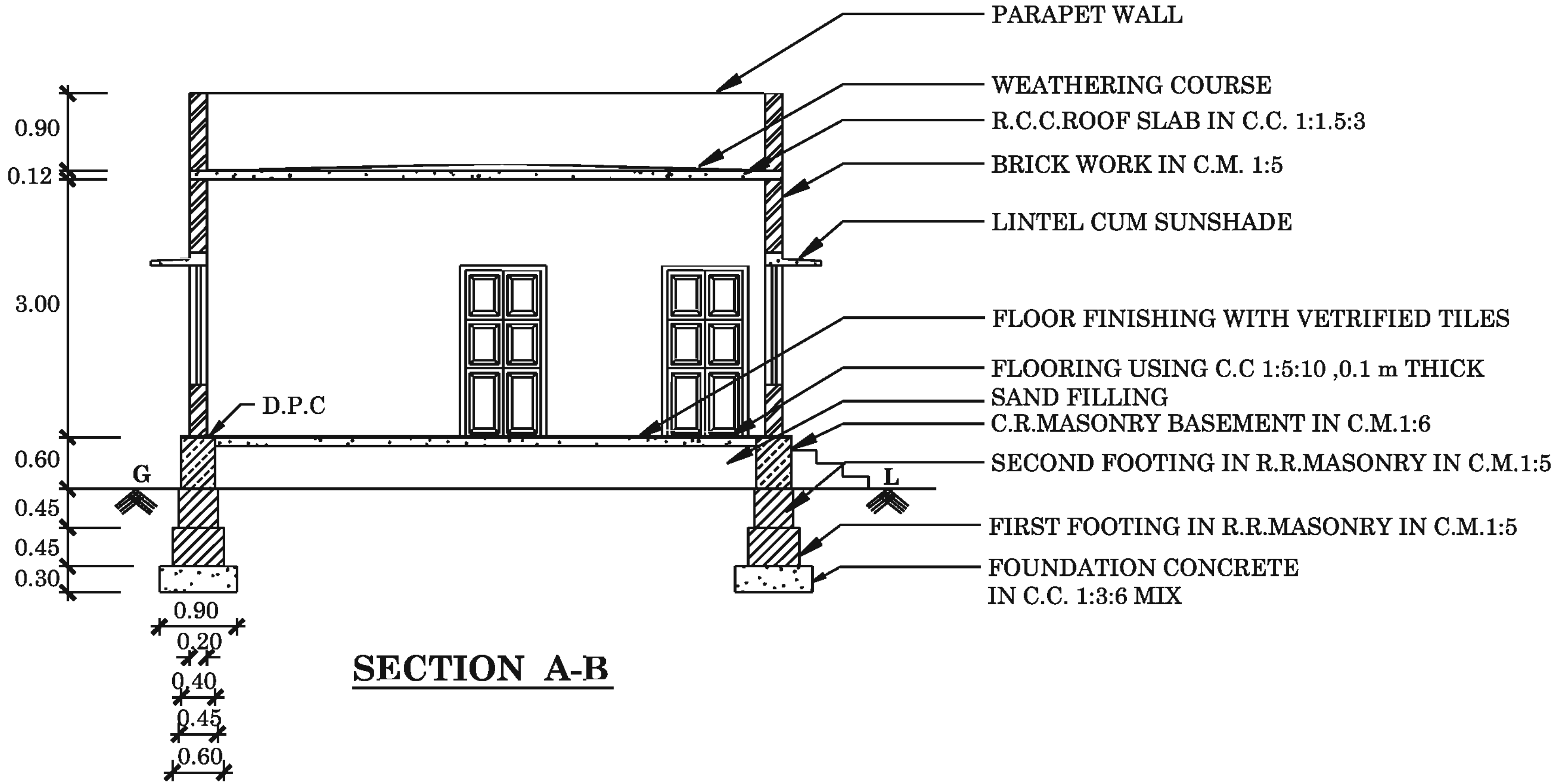
Assume any other data suitably, if necessary.



AN OFFICE BUILDING

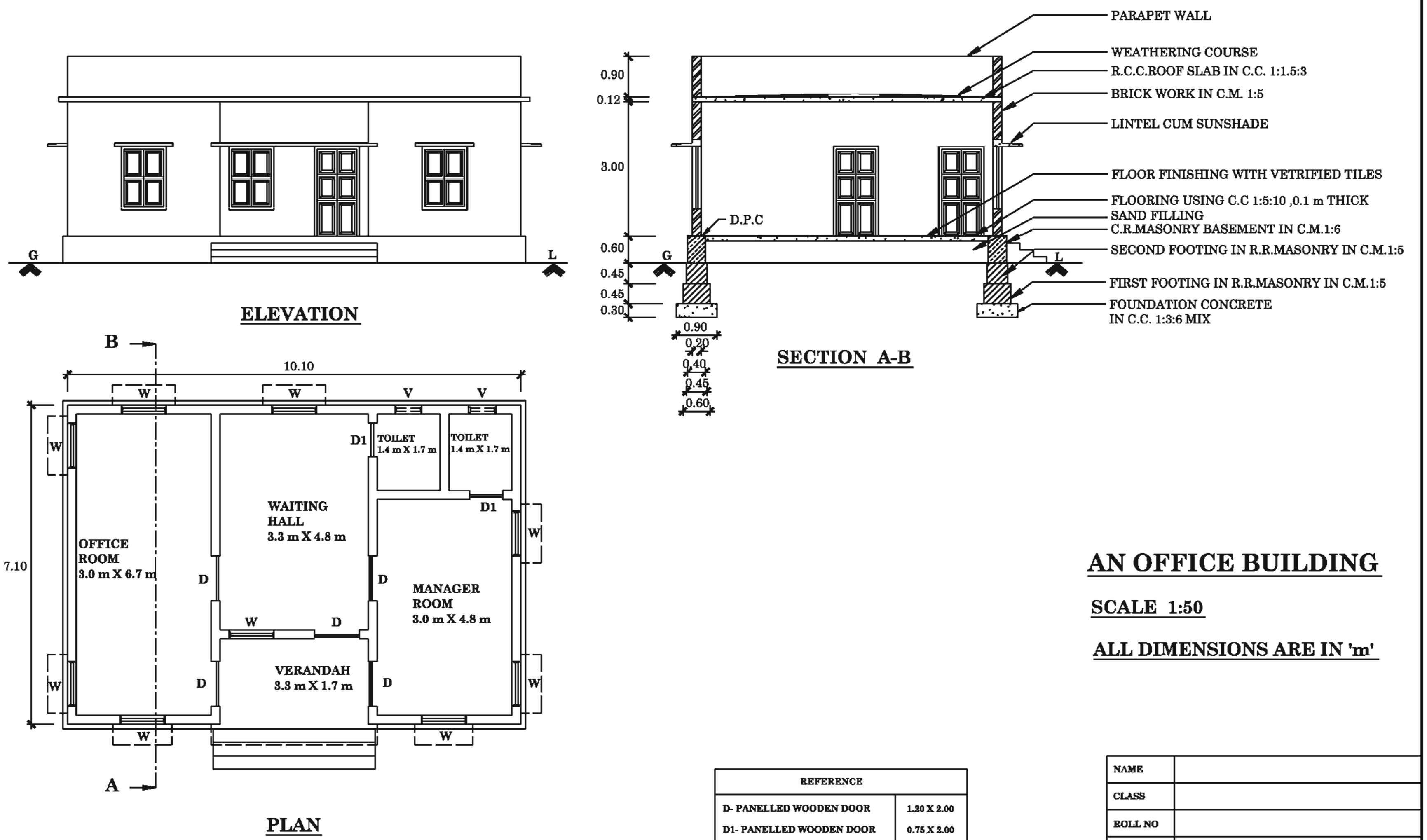

TOILET
1.4 m X 1.7 m
TOILET
1.4 m X 1.7 m
MANAGER
ROOM
3.0 m X 4.8 m
WAITING
HALL
3.3 m X 4.8 m
VERANDAH
3.3 m X 1.7 m
OFFICE
ROOM
3.0 m X 6.7 m
D1
D1
D
D
D
D
D
V
V
W
W
W
W
W
W
W
W
W
W
10.10
7.10
A
B

PLAN


PARAPET WALL
WEATHERING COURSE
R.C.C.ROOF SLAB IN C.C. 1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH VETRIFIED TILES
FLOORING USING C.C 1:5:10 ,0.1 m THICK
SAND FILLING
C.R.MASONRY BASEMENT IN C.M.1:6
SECOND FOOTING IN R.R.MASONRY IN C.M.1:5
FIRST FOOTING IN R.R.MASONRY IN C.M.1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
G
L
0.90
0.12
3.00
0.60
0.45
0.45
0.30
0.90
0.20
0.40
0.45
0.60

SECTION A-B

ELEVATION



AN OFFICE BUILDING

SCALE 1:50

ALL DIMENSIONS ARE IN 'm'

REFERENCE	
D- PANELLED WOODEN DOOR	1.20 X 2.00
D1- PANELLED WOODEN DOOR	0.75 X 2.00
W- PANELLED WOODEN WINDOW	1.20 X 1.40
V- VENTILATOR	0.60 X 0.45

NAME	
CLASS	
ROLL NO	
PLATE NO	
DATE	

4) A PRIMARY SCHOOL BUILDING

The following line sketch shows the internal dimensions of a PRIMARY SCHOOL BUILDING : Draw to a scale of 1:50, the following views:

A) Plan B) Section on AB C) Elevation

SPECIFICATIONS

a) FOUNDATION : Depth of foundation is 1m below ground level. The concrete base course is 1m wide and 0.3m thick in PCC 1:3:6.

b) FOOTING : A footing of RR masonry in CM 1:5, having width 0.6m and depth 0.7m will be provided over the base course layer.

c) BASEMENT : The basement will be of RR masonry in CM 1:5 and of height 0.45m above the ground level. The thickness of plinth wall is 0.45m and a damp proof course 0.02m thick in CM 1:3 will be provided all round the building.

d) FLOORING : Over 0.340m depth of sand filling, flooring of 0.110m thick in CC 1:5:10 finished with Mosaic tiles is provided.

e) SUPERSTRUCTURE : The thickness of walls above plinth level is 0.2m in brick work using CM 1:5.The height of the parapet wall is 0.6m above the roof top level. Lintel-cum-sunshade will be provided over the door and window openings. Thickness and bearing of RCC lintel in CC 1:1.5:3 will be 0.15m. The projection of sunshade will be 0.45m from the wall with RCC in CC 1:1.5:3 of thickness 0.08m at support and 0.05m at free end. Ceiling height will be 3m above the floor level.

f) ROOFING : Roofing will be of flat RCC in CC 1:1.5:3, 0.12m thick. A weathering course of 0.1m thick is provided over the roof slab with sufficient slope to drain rainwater.

g) STEPS : Tread = 0.3 m. Rise = 0.15 m.

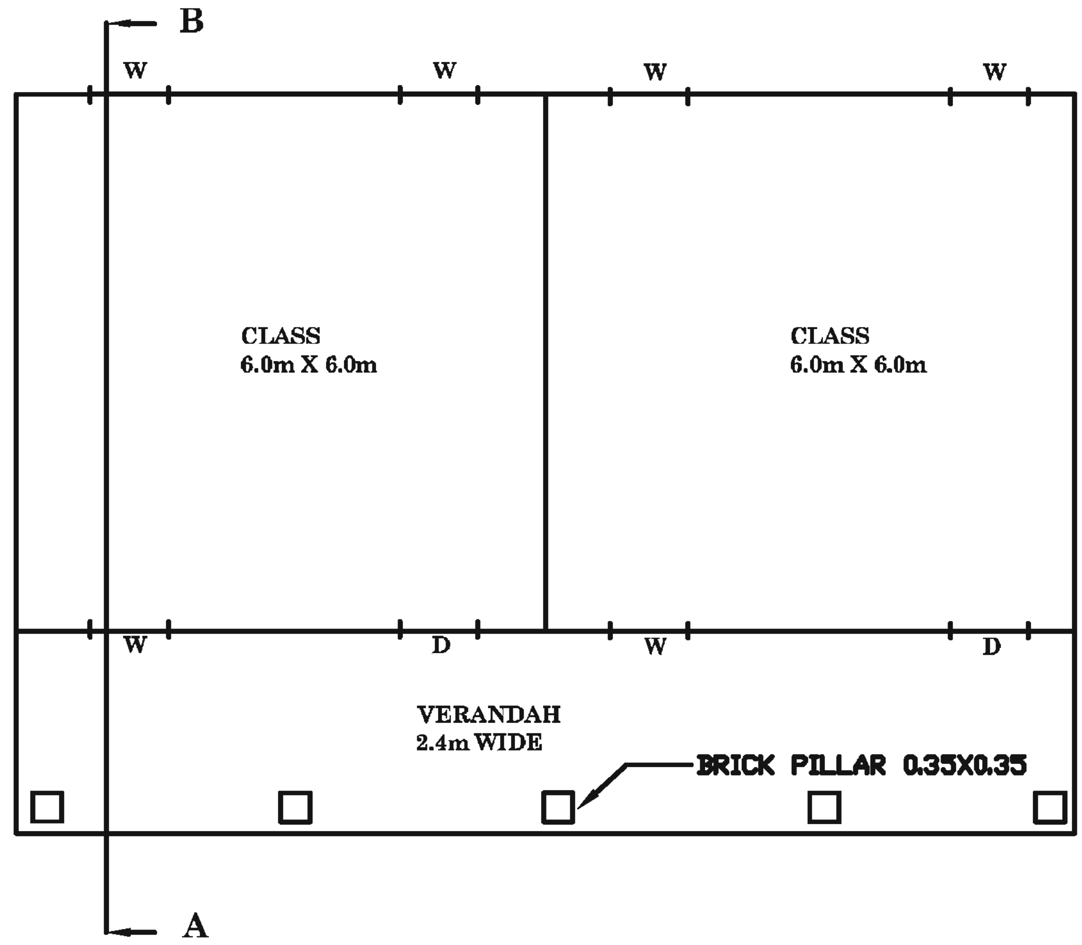
REFERENCE

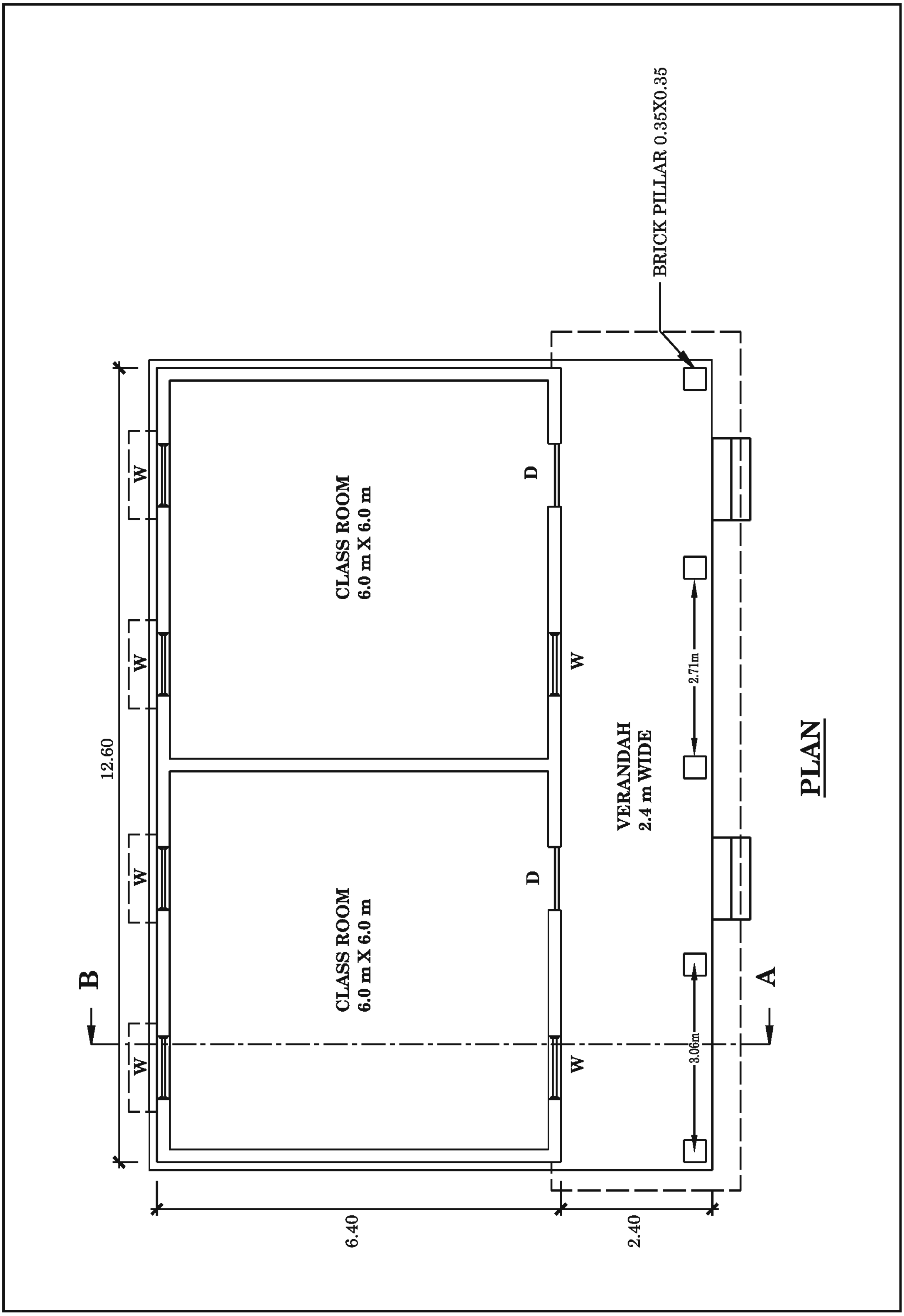
D - Panelled Wooden Door - 1.2 m x 2.00 m

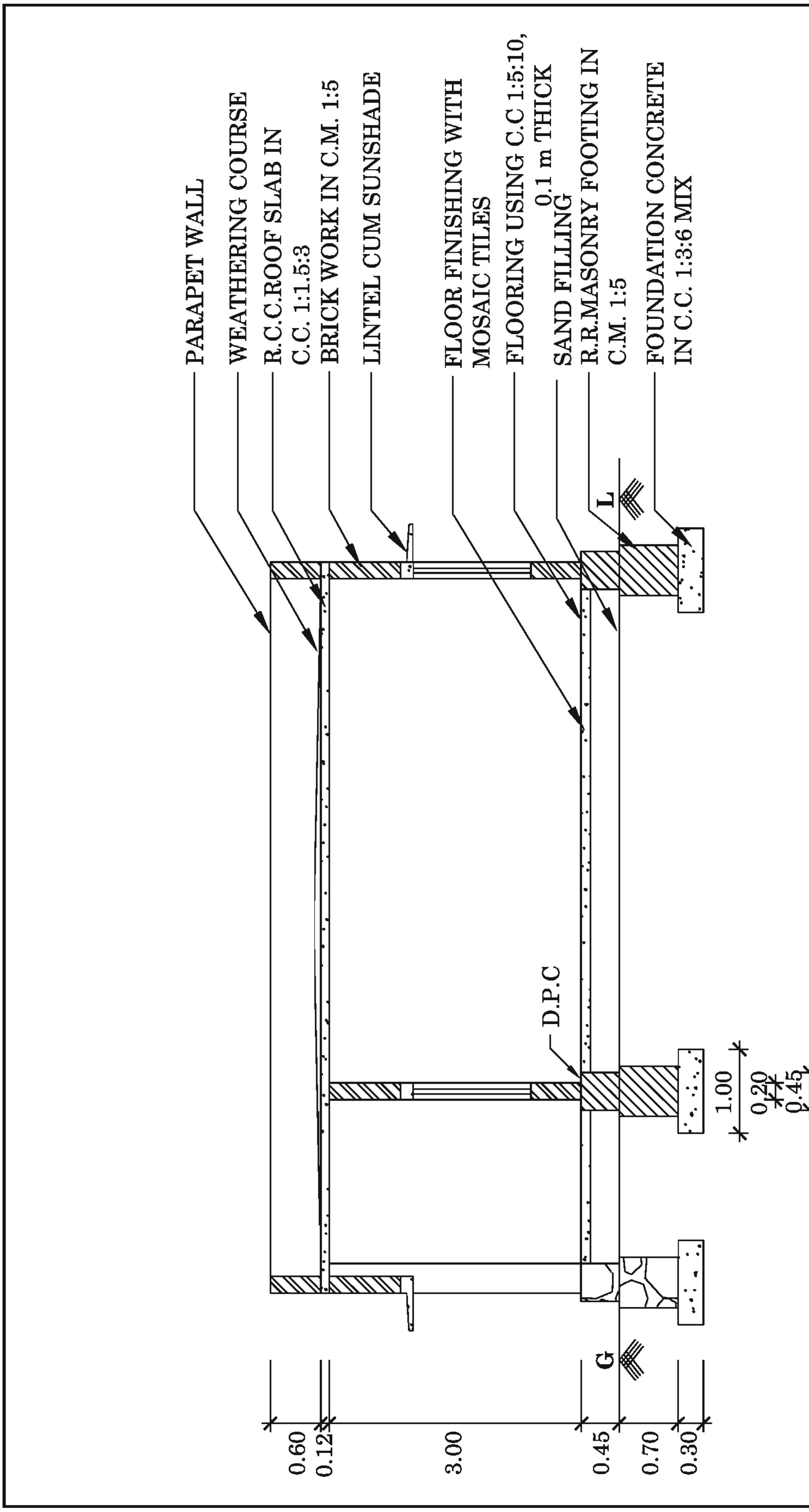
W - Panelled Wooden Window - 1.2 m x 1.40 m

Assume any other data suitably, if necessary.

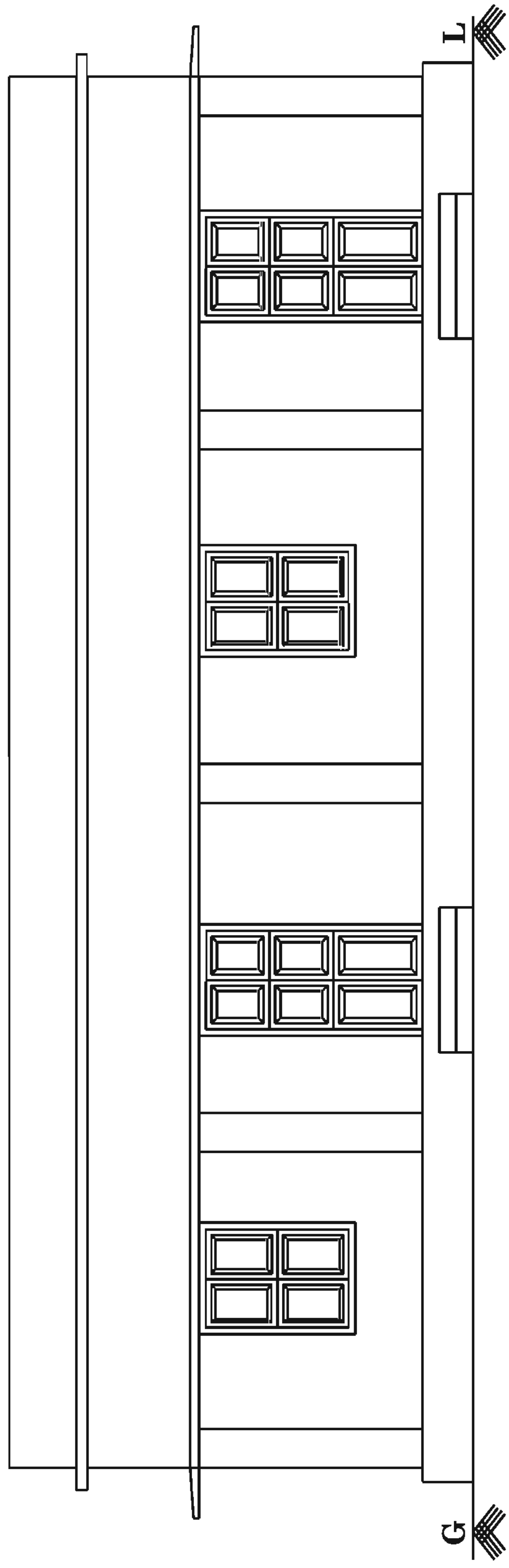
A PRIMARY SCHOOL BUILDING



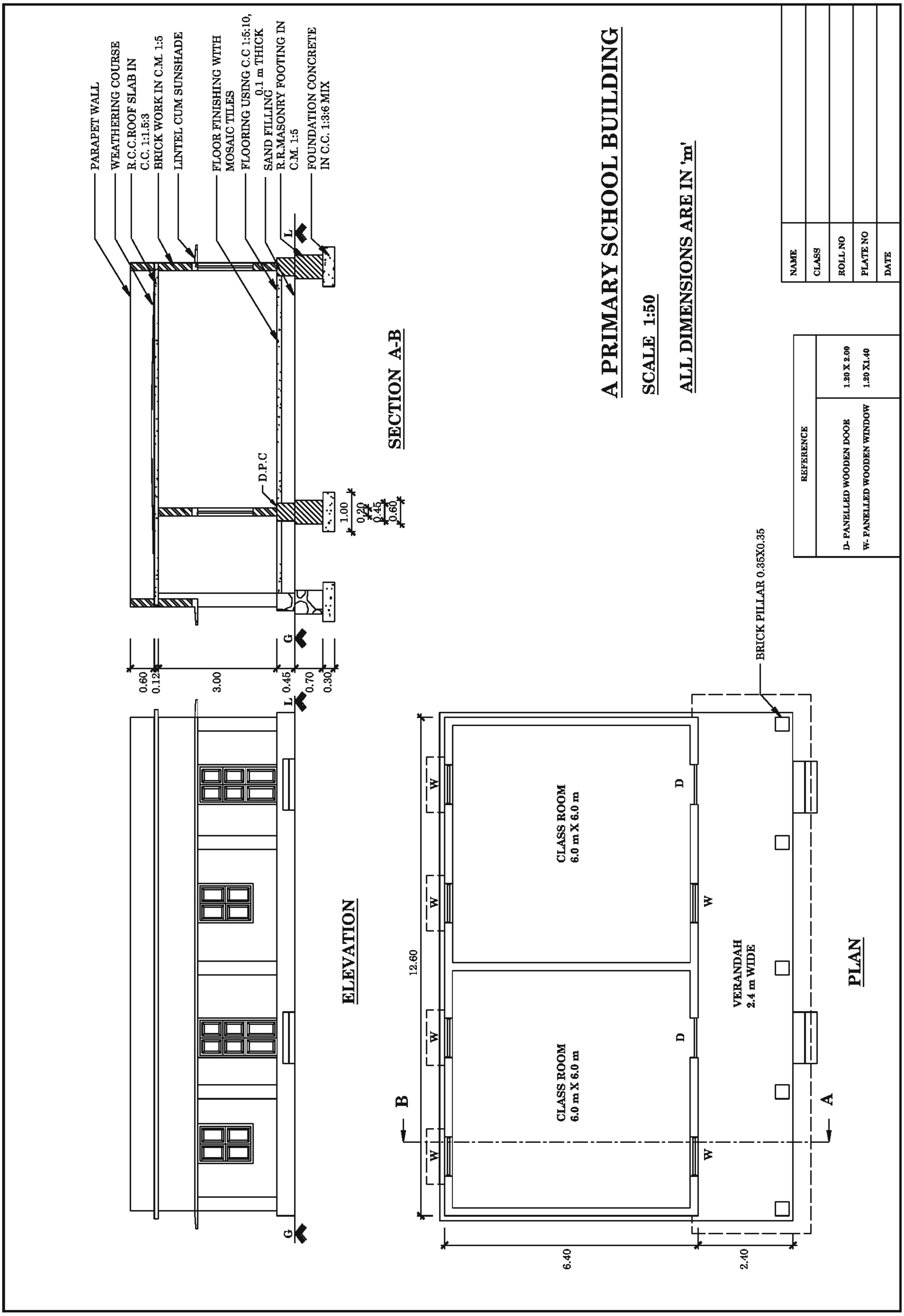

BRICK PILLAR 0.35X0.35
CLASS ROOM
6.0 m X 6.0 m
CLASS ROOM
6.0 m X 6.0 m
VERANDAH
2.4 m WIDE
PLAN
12.60
6.40
2.40
2.71m
3.06m
W
D
A
B


PARAPET WALL
WEATHERING COURSE
R.C.C.ROOF SLAB IN C.C. 1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH MOSAIC TILES
FLOORING USING C.C 1:5:10, 0.1 m THICK
SAND FILLING
R.R.MASONRY FOOTING IN C.M. 1:5
FOUNDATION CONCRETE IN C.C. 1:3:6 MIX
D.P.C
L
G
0.60
0.12
3.00
0.45
0.70
0.30
1.00
0.20
0.45
0.60

SECTION A-B



ELEVATION


A PRIMARY SCHOOL BUILDING
SCALE 1:50
ALL DIMENSIONS ARE IN 'm'
PARAPET WALL
WEATHERING COURSE
R.C.C.ROOF SLAB IN C.C. 1:1.5:3
BRICK WORK IN C.M. 1:5
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH MOSAIC TILES
FLOORING USING C.C 1:5:10, 0.1 m THICK
SAND FILLING
R.R.MASONRY FOOTING IN C.M. 1:5
FOUNDATION CONCRETE IN C.C. 1:3:6 MIX
D.P.C
L
G
0.60
0.12
3.00
0.45
0.70
0.30
1.00
0.20
0.45
0.60
SECTION A-B
ELEVATION
CLASS ROOM 6.0 m X 6.0 m
CLASS ROOM 6.0 m X 6.0 m
VERANDAH 2.4 m WIDE
BRICK PILLAR 0.35X0.35
W
D
A
B
12.60
6.40
2.40
PLAN
REFERENCE
D- PANELLED WOODEN DOOR 1.20 X 2.00
W- PANELLED WOODEN WINDOW 1.20 X1.40
NAME
CLASS
ROLL NO
PLATE NO
DATE

5) A SMALL INDUSTRIAL BUILDING

The following line sketch shows the internal dimensions of A SMALL INDUSTRIAL BUILDING Draw to a scale of 1:50, the following views:

A) Plan B) Section on AB C) Elevation

SPECIFICATIONS

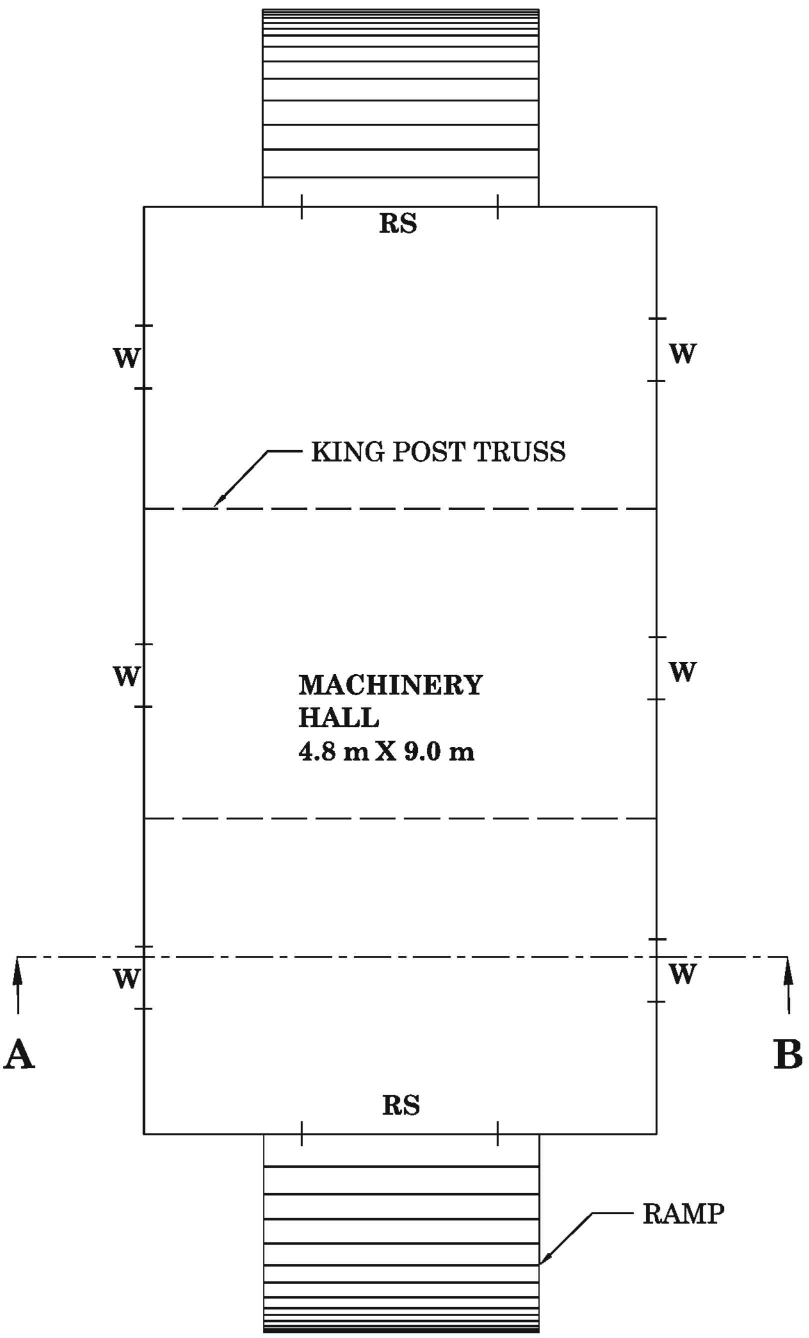
a)	FOUNDATION	:	Depth of foundation is 1.2m below ground level. The concrete base course is 0.9m wide and 0.3m thick in PCC 1:4:8.
b)	FOOTING	:	First footing of RR masonry in CM 1:5, having width 0.6m and depth 0.45m and second footing of RR masonry in CM 1:5, having width 0.45m and depth 0.45m will be provided over the base course layer.
c)	BASEMENT	:	The basement will be of CR masonry in CM 1:6 and of height 0.6m above the ground level. The thickness of plinth wall is 0.4m and damp proof course 0.02m thick in CM 1:3 which is mixed with 5% of crude oil will be provided all round the building.
d)	FLOORING	:	Over 0.480m depth of sand filling, flooring of 0.10m thick in CC 1:5:10 finished with CM 1:3, 0.02m thick is provided.
e)	SUPERSTRUCTURE	:	The thickness of walls above plinth level is 0.2m in brick work using CM 1:5. Lintel-cum-sunshade will be provided over the door and window openings. Thickness and bearing of RCC lintel in CC 1:1.5:3 will be 0.15m. The projection of sunshade will be 0.45m from the wall with RCC in CC 1:1.5:3 of thickness 0.08m at support and 0.05m at free end. Ceiling height will be 3.6m above the floor level.
f)	ROOFING	:	Roofing will be of AC sheet cable roof over king post truss at flat RCC in a spacing of 3m c/c. Rise of truss is 1.6m is provided.
g)	RAMP	:	Ramp will be of Cement Concrete 1:3:6, 3.0m wide and 2.4m length laid over of 0.15m thick PCC.

REFERENCE:

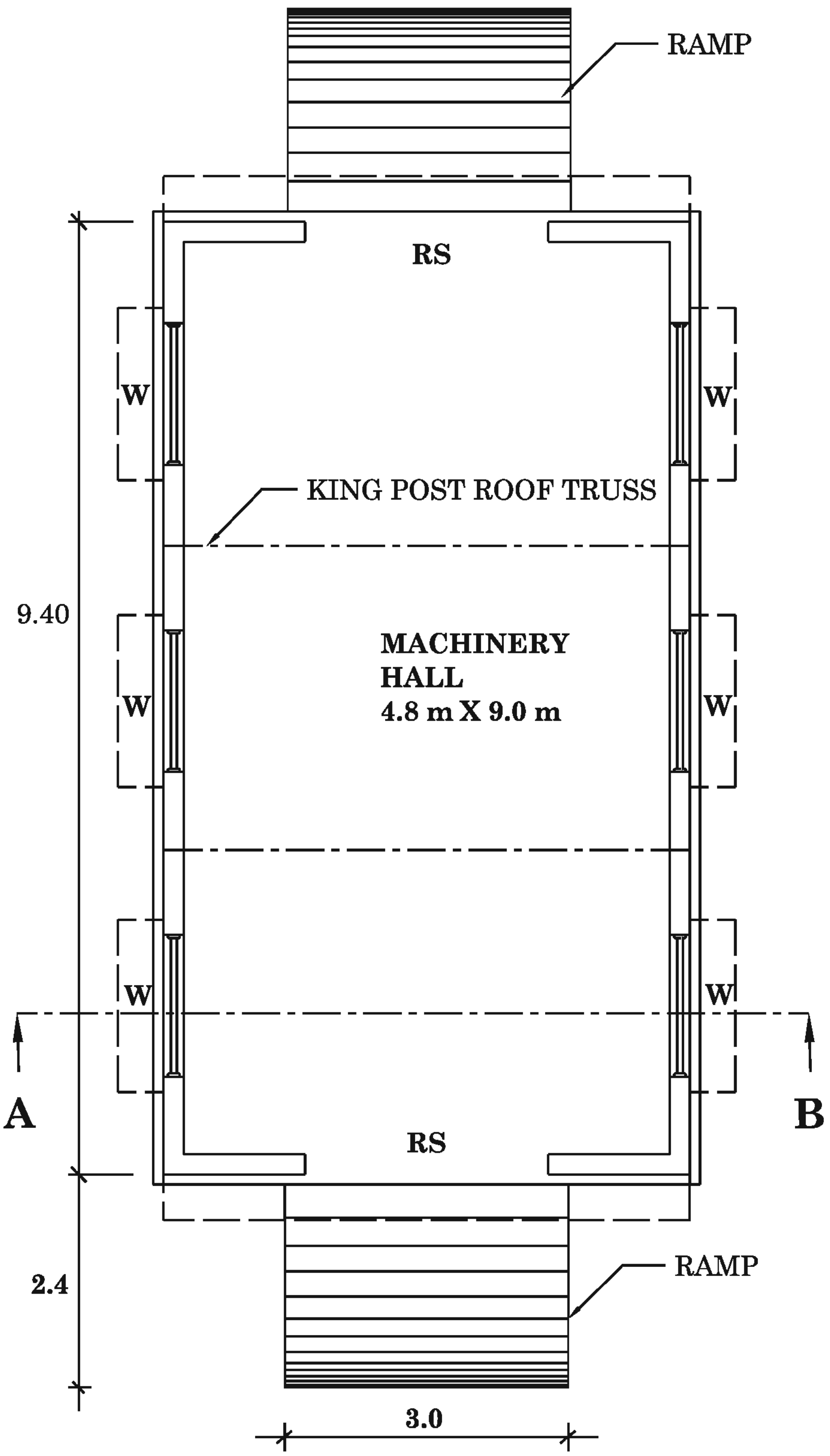
RS - Rolling Shutter - 2.4 m x 2.40 m

W - Steel Window - 1.4 m x 1.40 m

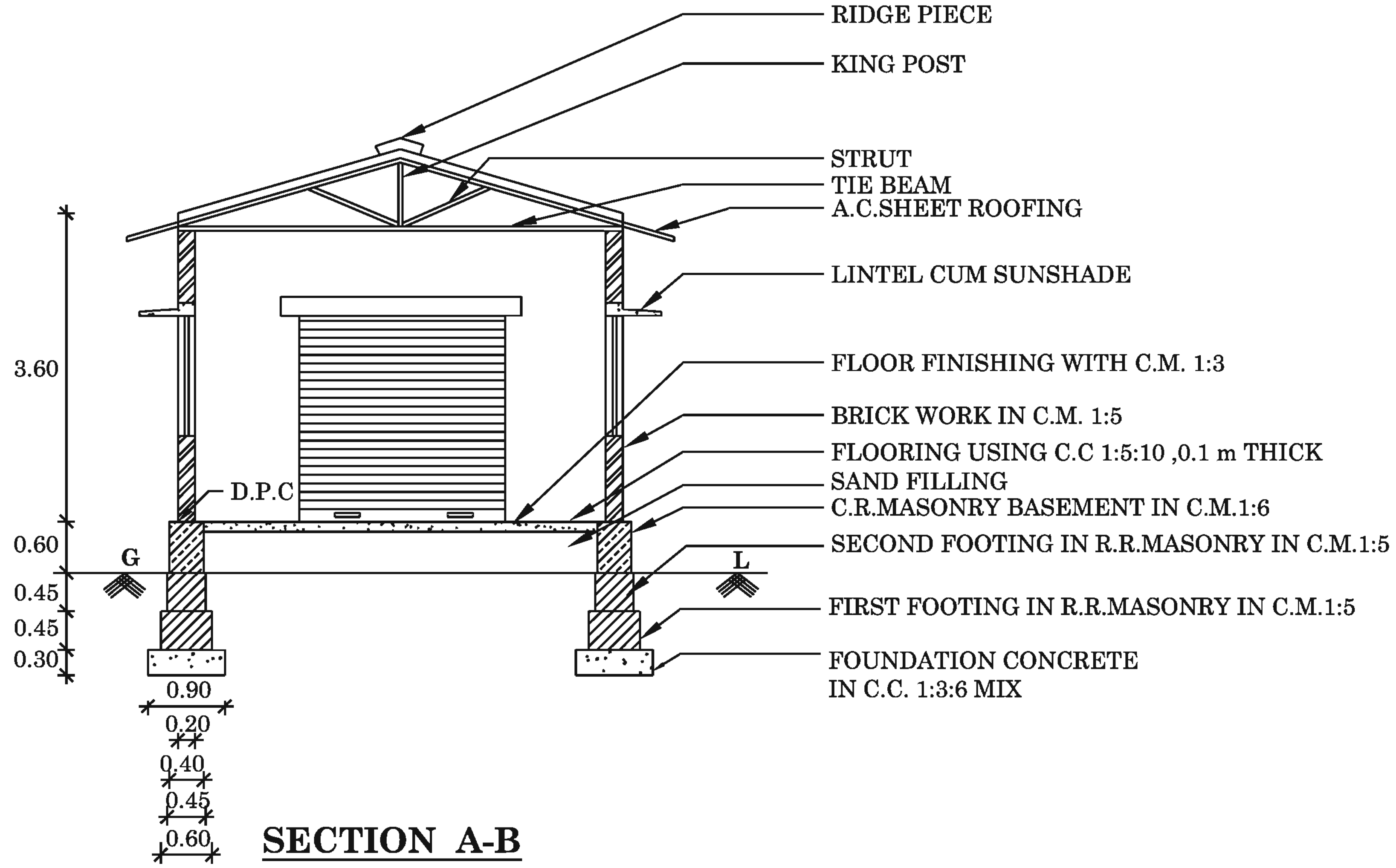
Assume any other data suitably, if necessary.



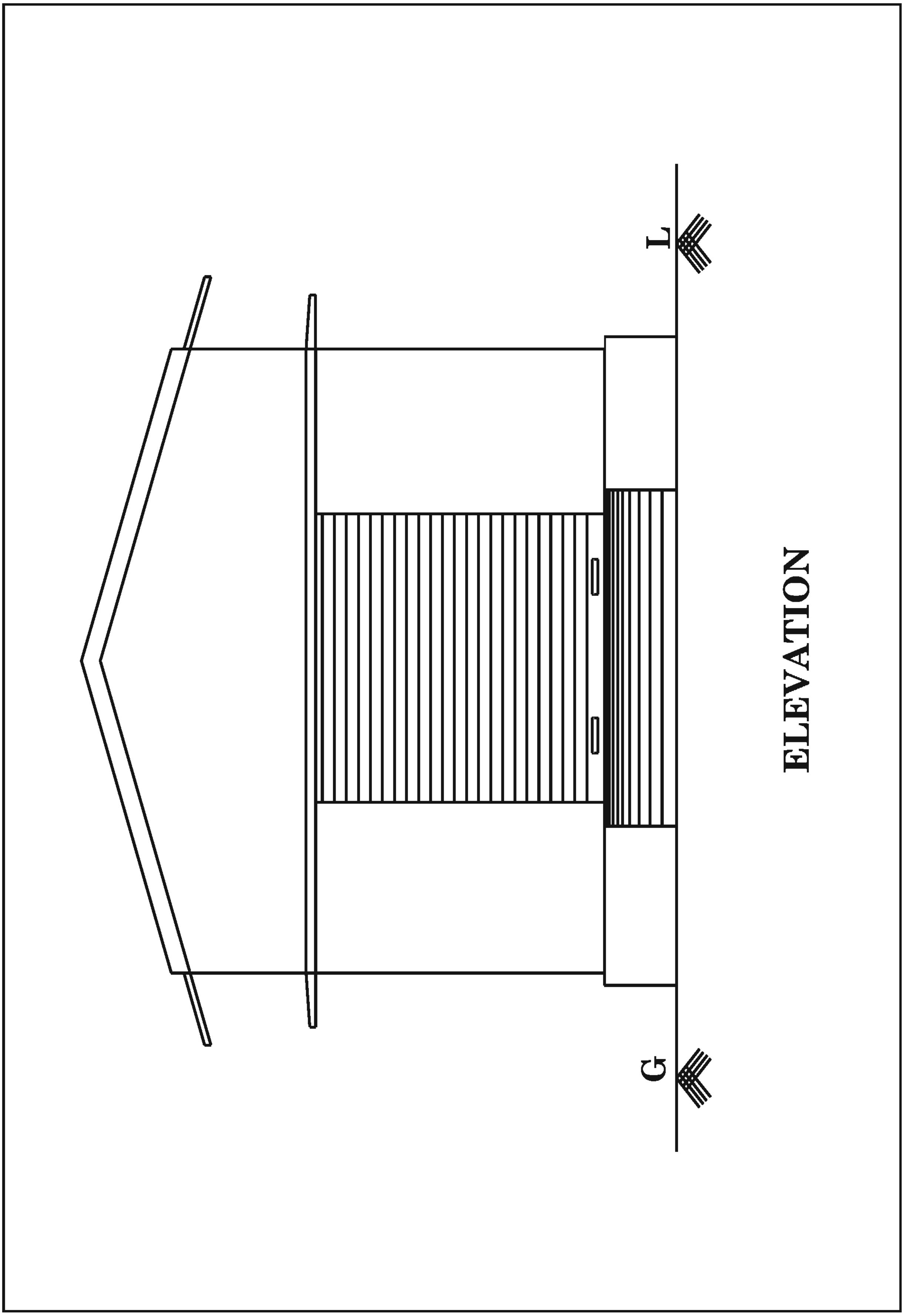
A SMALL INDUSTRIAL BUILDING

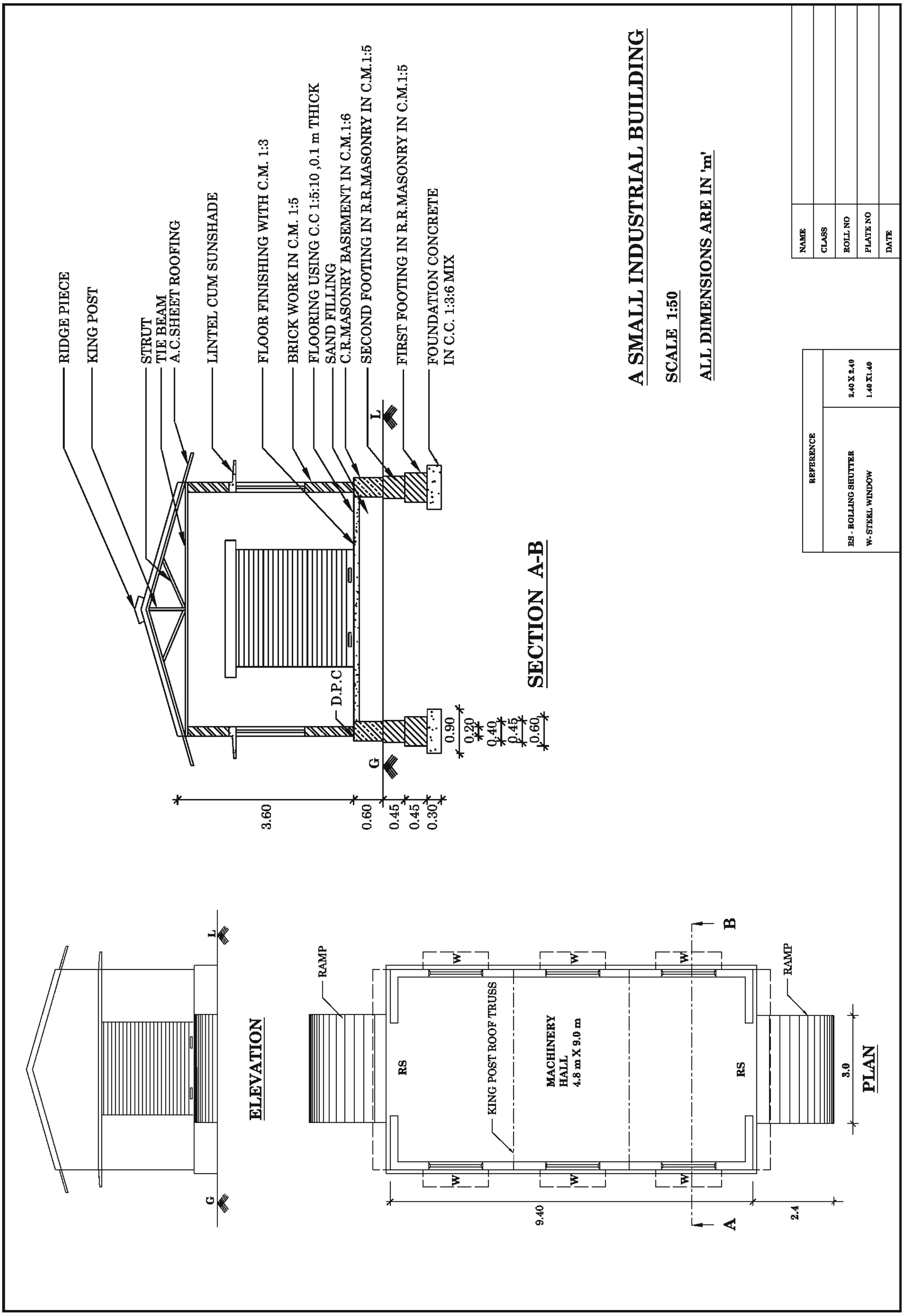

RAMP
RS
W
W
KING POST ROOF TRUSS
9.40
MACHINERY
HALL
4.8 m X 9.0 m
W
W
W
W
A
B
RS
RAMP
2.4
3.0

PLAN


RIDGE PIECE
KING POST
STRUT
TIE BEAM
A.C.SHEET ROOFING
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH C.M. 1:3
BRICK WORK IN C.M. 1:5
FLOORING USING C.C 1:5:10 ,0.1 m THICK
SAND FILLING
C.R.MASONRY BASEMENT IN C.M.1:6
SECOND FOOTING IN R.R.MASONRY IN C.M.1:5
FIRST FOOTING IN R.R.MASONRY IN C.M.1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
G
L
3.60
0.60
0.45
0.45
0.30
0.90
0.20
0.40
0.45
0.60

SECTION A-B


L
G
ELEVATION



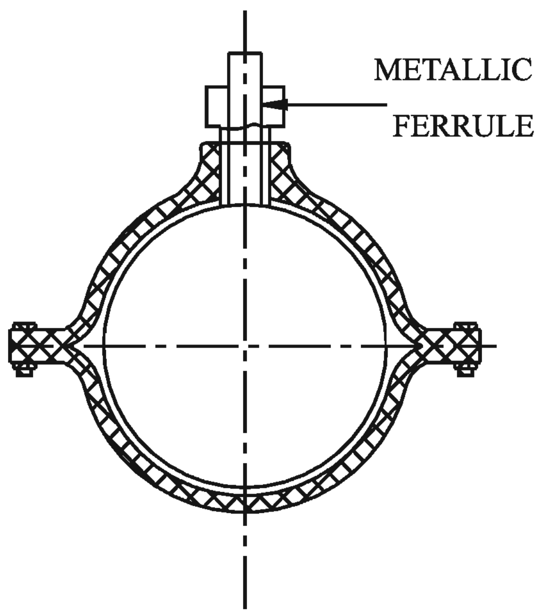
A SMALL INDUSTRIAL BUILDING
SCALE 1:50
ALL DIMENSIONS ARE IN 'm'
RIDGE PIECE
KING POST
STRUT
TIE BEAM
A.C.SHEET ROOFING
LINTEL CUM SUNSHADE
FLOOR FINISHING WITH C.M. 1:3
BRICK WORK IN C.M. 1:5
FLOORING USING C.C 1:5:10 ,0.1 m THICK
SAND FILLING
C.R.MASONRY BASEMENT IN C.M.1:6
SECOND FOOTING IN R.R.MASONRY IN C.M.1:5
FIRST FOOTING IN R.R.MASONRY IN C.M.1:5
FOUNDATION CONCRETE
IN C.C. 1:3:6 MIX
D.P.C
G
L
3.60
0.60
0.45
0.45
0.30
0.90
0.20
0.40
0.45
0.60
SECTION A-B
ELEVATION
RAMP
RS
W
KING POST ROOF TRUSS
MACHINERY
HALL
4.8 m X 9.0 m
A
B
9.40
2.4
3.0
PLAN
REFERENCE
RS - ROLLING SHUTTER 2.40 X 2.40
W- STEEL WINDOW 1.40 X1.40
NAME
CLASS
ROLL NO
PLATE NO
DATE

PRACTICAL-II

1. STUDY OF PIPE SPECIALS

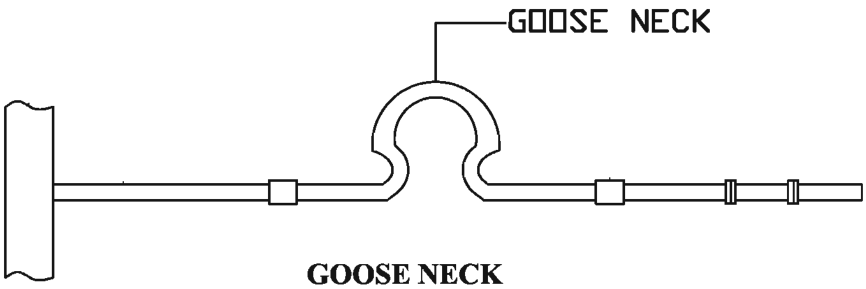
1. Ferrule
2. Goose neck
3. Stop cock
4. Tap
5. Water meter
6. Service pipe
7. Coupling
8. Elbow
9. Bend
10. Tee
11. Reduced elbow, Reduced coupling, Reduced Tee
12. Union
13. Nipple

1. Ferrule: It is made up of brass. It is inserted in the main pipe. The diameter varies from 10 mm to 50 mm. The flow of water through the main pipe can be controlled by rotating the handle at the top.



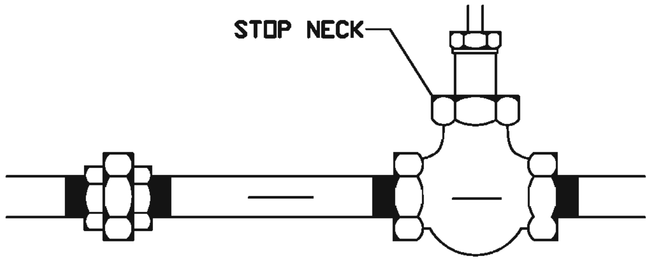
FERRULE

2. **Goose Neck:** It is made up of lead. The shape is a small curve like goose neck. It is an adjustable joint for 750 mm length main pipe and the pipe taking water to the house.



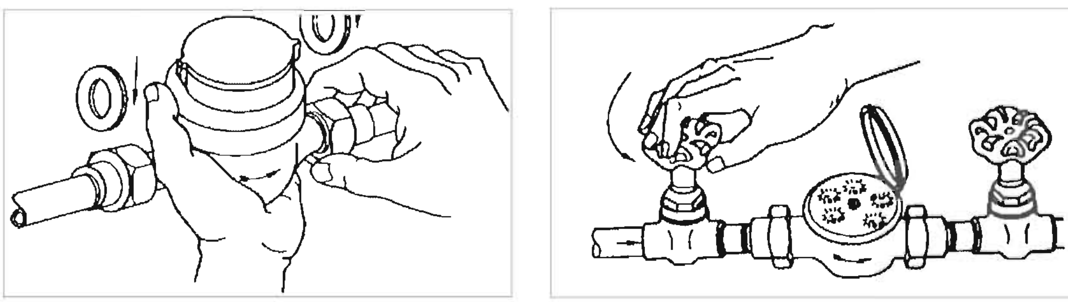
GOOSE NECK

3. **Stop cock:** This is placed in a brick chamber covered by a small door. It helps to control the flow the water.



Stop cock

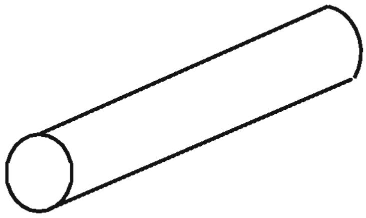
4. **Tap:** It helps to regulate the discharge of water from the service pipe for use.
5. **Water meter:** This is placed in a brick chamber like stop cock. It helps to know the quantity of water supplied to a house. The water charge is collected only on the basis of this water meter reading.



Water meter

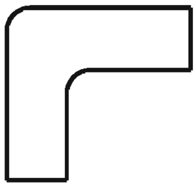
6. **Service Pipe:** Service pipes are generally made up of galvanized iron. To give connection to a house ¾ or ½ inch pipes are used. Service pipes are used to carry water between two points.

7. **Coupling :** Coupling is used to join two pipes of same diameter. It has threads inside.



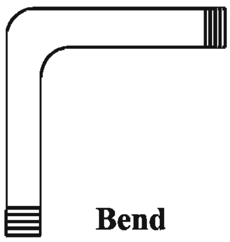
COUPLING

8. **Elbow:** It is a pipe special with thread inside. The change in angle is sudden. It helps to join two pipes of same diameter at 90^0.



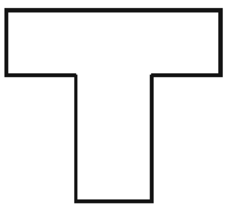
Elbow

9. **Bend:** It is a small length of bent pipe and has threads outside. It helps to join two pipes of same diameter at 90^0. Coupling is necessary to join the bend with the pipe. Its diameter is equal to the size of the pipe. The advantage of bend is that the water pressure will not get reduced.



Bend

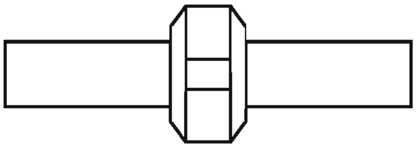
10. **Tee:** It has threads inside. It connects three pipes at a junction. It helps to branch and distribute the water at 90^0 from a pipe line.



Tee

11. **Reduced Elbow, Reduced Coupling, Reduced Tee:** These specials help serve the functions as that of Elbow, coupling & Tee, but to join pipes of different diameters.

12. **Union:** The pipes can be easily removed where the union is used. These fittings are made up of two parts, each part screwing onto the ends of the pipes to be joined. Both parts are held together by means of large nut and screw together. The joint is made sound either by the close fit of machined surfaces on each part and by the insertion of rubber rings in the space between the surfaces.



Union

13. **Nipple:** Both sides of the nipple have outside thread. It helps to join two pipes which have inside thread.

PIPE NIPPLE

2. CUTTING AND THREADING OF THE GIVEN G.I. PIPE

AIM:

To know the method of cutting the required length of G.I. Pipe and threading it.

NECESSITY :

1. When plumbing work is carried out in any building construction it is often necessary to cut the G.I. pipe to the required length.
2. Threading is necessary for the G.I. pipe to connect it.
3. The pipe is fixed in the pipe vice firmly to avoid shaking during cutting and threading.
4. Hacksaw blade is used to cut the G.I. Pipe.
5. Always threading is done on the outside of pipe. But the connecting pipe specials have thread inside it.

INSTRUMENTS REQUIRED:

1. Pipe vice
2. Die stock with Die-set
3. G.I. Pipe
4. Hacksaw frame
5. Brush
6. Tape.

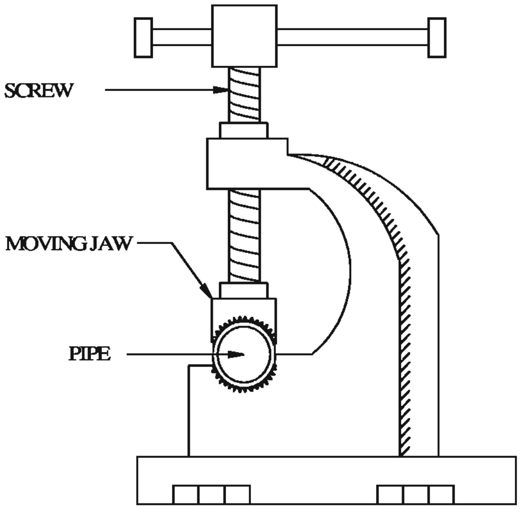
PROCEDURE:

1. Mark the required length of G.I. Pipe with the help of measuring tape.
2. Fix the pipe in the pipe vice to avoid the rotation of pipe.
3. Fix the blade in the hacksaw frame with teeth in forward direction to cut the pipe.
4. Pour little water to avoid the heating of blade while cutting the pipe.

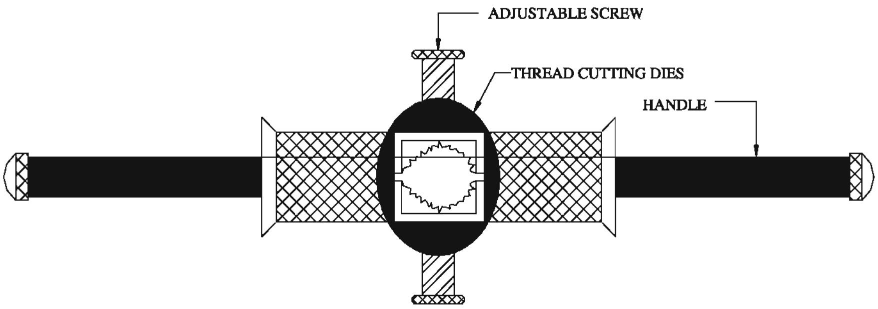
THREADING THE G.I. PIPE:

1. Fix the handles in the die frame.
2. Take the required two pieces of die set and fix it inside the frame by straightening the adjusting screw.
3. Fix the proper size of bush.
4. Fix the required size of G.I. pipe in the pipe vice.

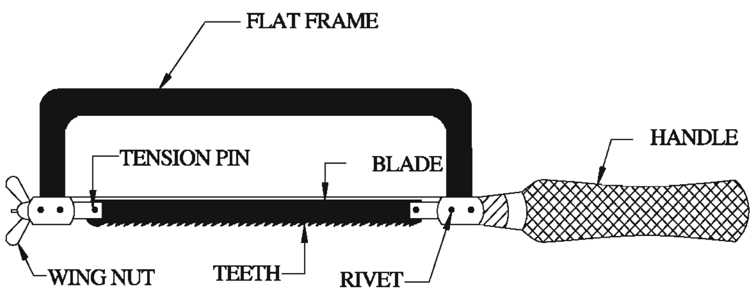
5. Rotate the adjusting screws by inserting the pipe in the die set through the bush.
6. Tighten the adjusting screw to avoid shaking of the G.I. Pipe.
7. Rotate the die set in the clockwise direction.
8. Apply the lubricating oil during threading. To bring the die set to the initial position rotate it in the anti-clockwise direction.
9. Tighten the adjusting screw and thread the pipe until the required depth is reached.
10. Use the brush and remove the G.I. scraps after the die set is removed.



PIPE - VICE



DIE STOCK



HACKSAW FRAME

3. TAP AND WATER METER

AIM:

To know about the given types of taps and water meters.

TAP:

It is also called as bibcock. It is fixed at the end of the pipe. It controls the discharge of water. While the handle of the tap is rotated/pressed (in the case of push taps), the flow of water can be reduced or increased.

Taps are available in following types.

1. Pillar Taps
2. Push Taps
3. Stop Taps
4. Mixer Taps

PILLAR TAPS: These are draw off taps that are fitted to sanitary appliances such as sinks and they have a long-threaded shank that allows them to be fitted into the appliances.

BIB TAPS: These are draw-off taps fitted above sanitary appliances to supply water for houses.

STOP TAPS: These are used to shut off the flow or control the rate of flow in the pipeline.

MIXER TAPS: These are basically a pair of draw-off pillar taps. In these hot and cold water are mixed together by a common or joint mixing chamber and delivery spout to provide mixed flow of hot and cold water. To get hot water and cold water according to the requirement, two handles are fixed.

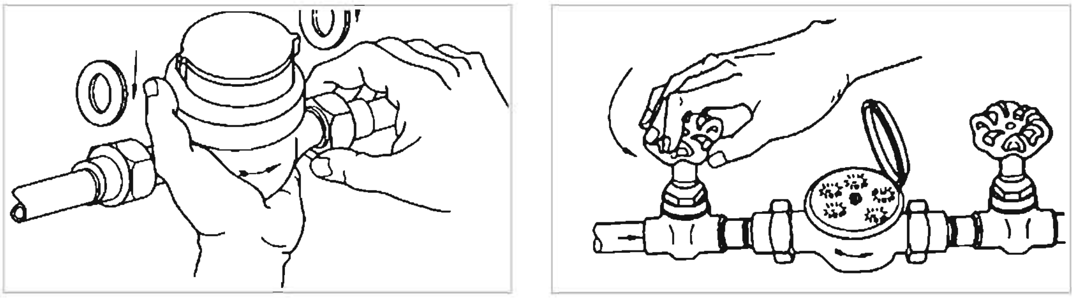
WATER METERS: These are the devices which are installed on the pipes to measure the quantity of water flowing at a particular point along the pipe. The readings obtained from the meters help in working out the quantity of water supplied and thus the consumers can be charged accordingly.

The water meters can be classified into the following two categories:

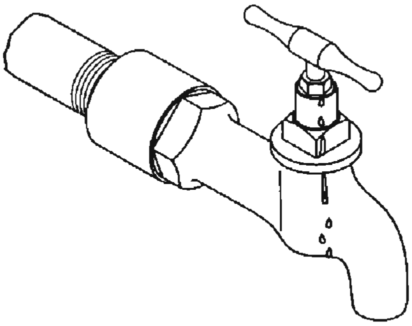
1. Positive displacement type meters.
2. Velocity meters.

Positive displacement type meters record the number of times a container of known volume is filled and emptied with water.

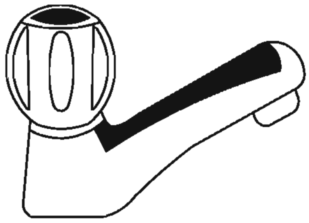
Velocity meter works on the principle of velocity of entering water.



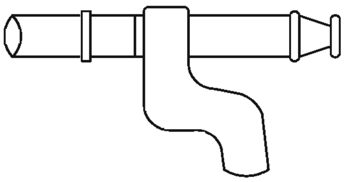
Water Meter



Bib cock



Pillar Cock



Push Cock

4. SERVICE CONNECTION FROM STREET MAIN PIPE LINE TO HOUSE

AIM:

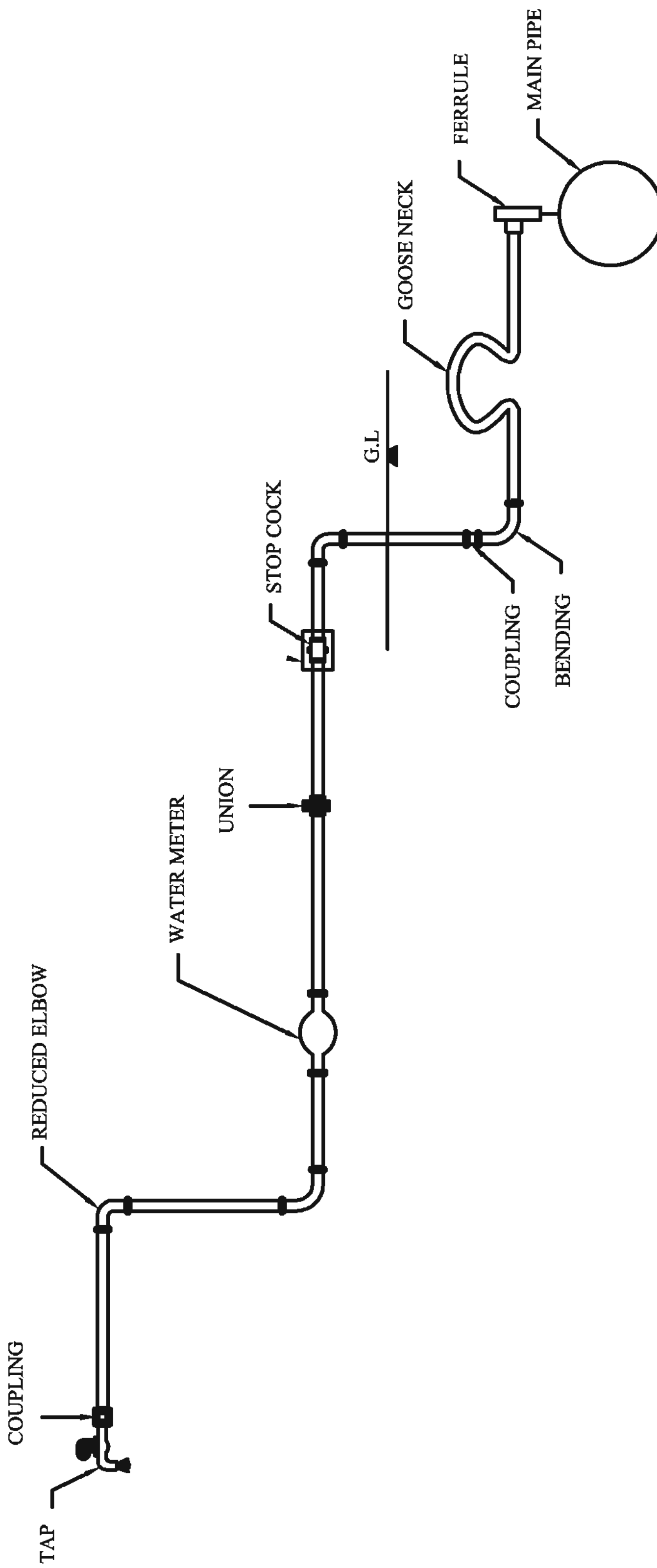
To give service connection from street main pipe line to house.

PIPE SPECIALS REQUIRED:

1. ¾ and ½ inch G.I. pipes.
2. Hacksaw frame with blade.
3. Die set
4. Pipe vice
5. Pipe wrench
6. Ferrule
7. Goose neck
8. Coupling
9. Bend
10. Elbow
11. Reduced elbow
12. Stop Cock
13. Union
14. Tap.

PROCEDURE:

1. Mark the points on the pipe where the pipe specials are to be connected in proper places as per the diagram in order to give proper connection from main pipe to house.
2. Cut the G.I. pipe and thread the two ends of the pipe to connect it to the pipe specials.
3. Disconnect the main pipe and dig the ground.
4. According to the diameter of the pipe make a hole on the ferrule and fix the pipe.
5. With the help of the sketch connect the suitable pipe specials and take care to avoid any leakage.
6. After confirming that there is no leakage of water, the pit should be closed.



HOUSE WATER CONNECTION FROM STREET MAIN PIPE

5. IDENTIFICATION OF THE GIVEN TYPE OF TRAP

AIM:

To identify the given type of trap.

TRAP:

It is an important fitting among all the sanitary fittings. Trap is a component in a water closet in which water stands always in the bend of trap. From the dip to crown where water stands in the vertical direction is called water seal.

PROPERTIES OF A GOOD TRAP:

1. Trap should be a simple structure.
2. Trap should be easy to clean.
3. Water should easily flow in a water seal.
4. Always required water seal should be there.
5. The inside surface of trap should be smooth.
6. It should have self cleaning property.
7. It should be easily fixable.
8. It should be made of non-absorbent material.

USES OF TRAP:

Trap avoids unnecessary fowl gases and germs entering the house.

TYPES:

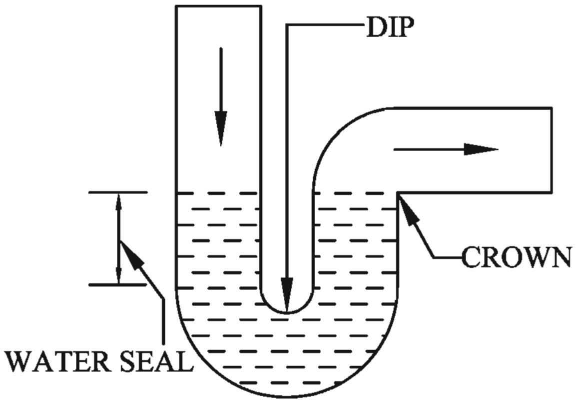
Depending upon their shapes, traps are classified as follows:

1. P-Trap
2. S-Trap
3. Q-trap

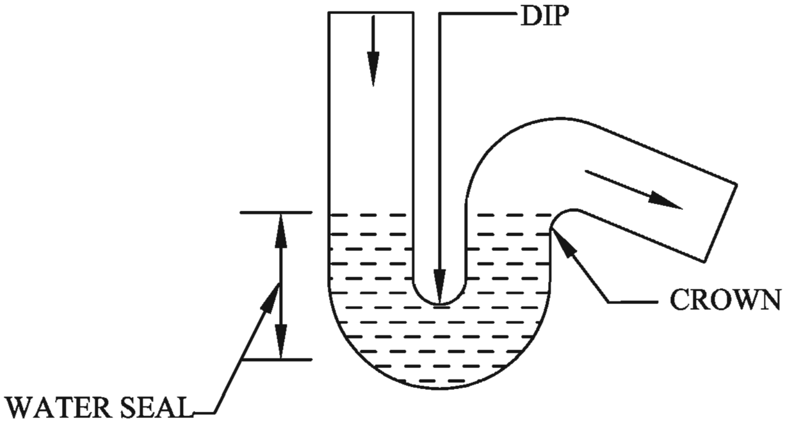
P-TRAP: It is like the English letter 'P'. The legs of P-trap are at right angles to each other.

S-TRAP: This trap has the shape of letter 'S'. The legs of S-trap are parallel.

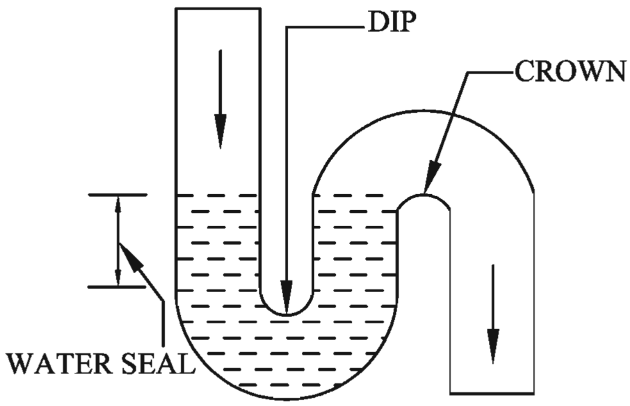
Q-TRAP: This trap is like the English letter 'Q'. The legs of Q-trap meet at an angle other than right angle.



P - TRAP



Q- TRAP



S- TRAP

6. CONNECTION OF AN INDIAN TYPE WATER CLOSET

AIM:

To connect an Indian Water Closet.

DEFINITION:

Indian Water Closet (I.W.C.) is commonly used and it is familiar. This is made separately as pan and trap. It is made up of porcelain material and also made up of vitreous China clay. The pan and trap are joined together.

THREE TYPES OF TRAPS USED WITH WATER CLOSETS ARE:

1. 'P' - Trap
2. 'Q' Trap
3. 'S' Trap

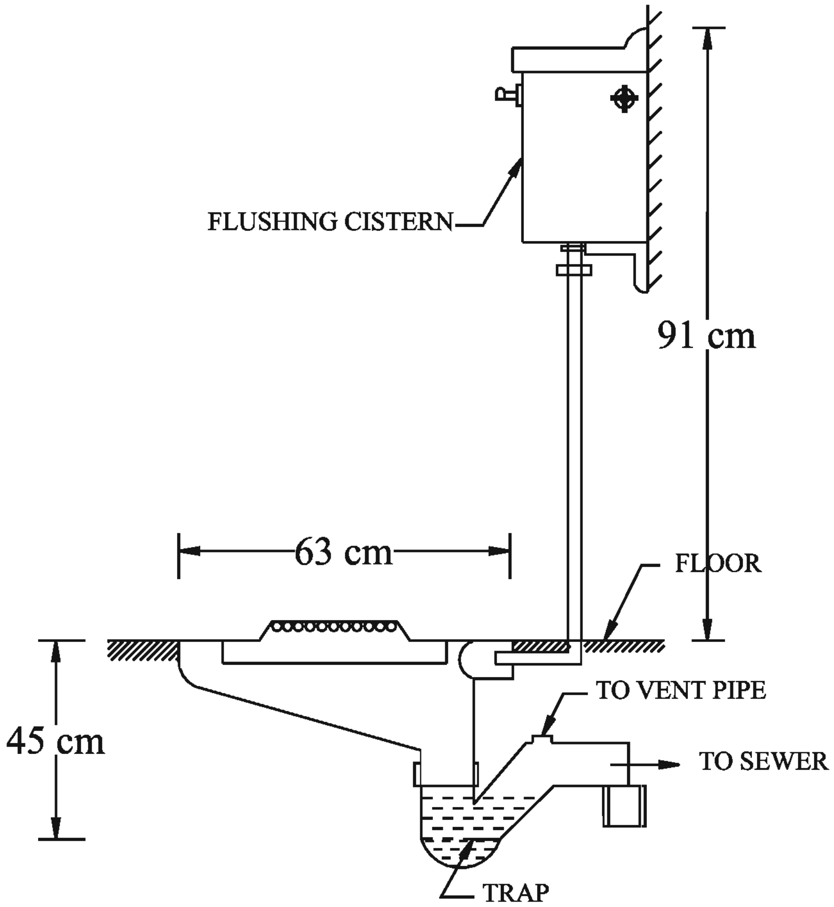
The length of the pan varies from 450 mm to 650 mm.The height of the pan varies from 450 mm to 500 mm. A flushing cistern of 10 litres capacity is used to flush the water.

REQUIRED MATERIALS:

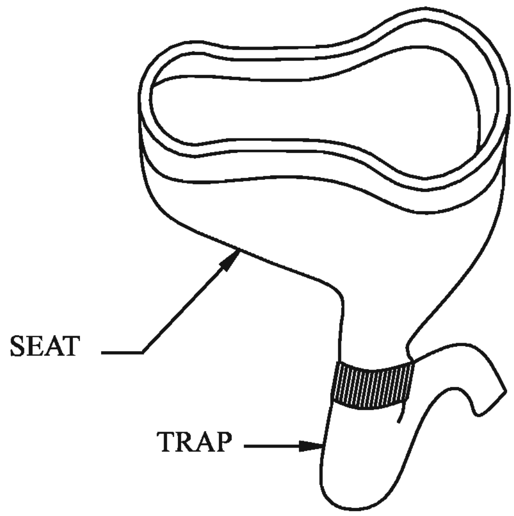
1. I.W.C.
2. Trap
3. Straight edge
4. Spirit level
5. Gunny cloth

PROCEDURE:

1. Fix the trap in the correct position.
2. Above this trap place the I.W.C. and it should be checked with the help of spirit level for its correct position.
3. To avoid any leakage of water, the joints are packed with gunny bag soaked in cement paste.
4. Also the joints are filled with C.M. 1:1 with 45^0 inclinations.



INDIAN TYPE WATER CLOSET



PICTORIAL VIEW OF INDIAN TYPE WATER CLOSET

7. CONNECTION OF AN EUROPEAN TYPE WATER CLOSET

AIM:

To make a connection to a European Water Closet.

DEFINITION:

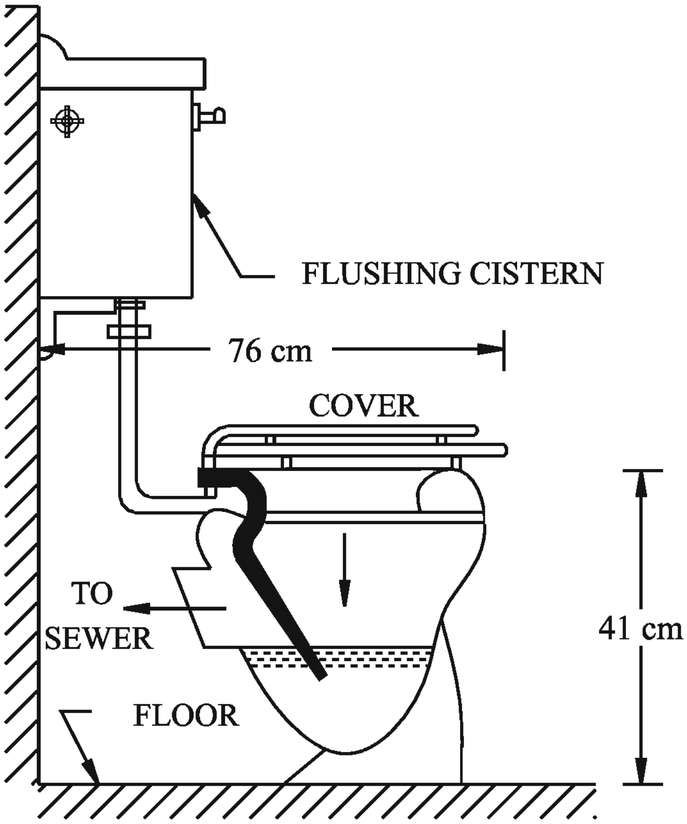
European Water Closet (E.W.C.) (wash down type w.c) is suitable for aged persons and patients. Fixing of this type W.C. is easy. It is usually made up of Porcelain. In this type pan & trap are not separate. The pan has a flushing rim to spread the water with high velocity. Normally cover is provided at its top. Overall length of E.W.C. varies from 500 mm to 600 mm and height varies from 350 mm to 400 mm.

REQUIRED MATERIALS:

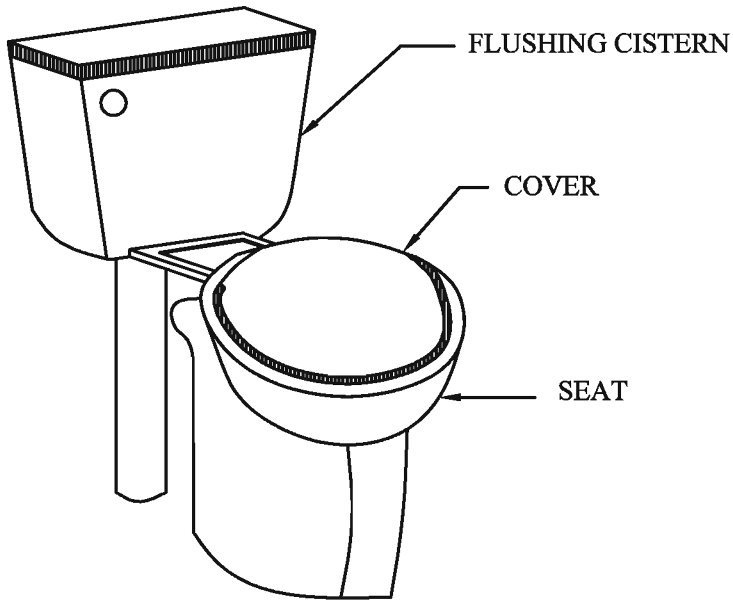
1. E.W.C. with flushing cistern
2. Spirit level
3. Cement Mortar
4. Gunny bag(gasket)
5. Bolt and nut arrangement

PROCEDURE:

1. The E.W.C. with trap is fixed inside the sewer pipe which is already fixed. The level of E.W.C. should be checked with spirit level.
2. The joints are covered by using gasket. Gasket is nothing but a cloth which is soaked with cement paste.
3. To avoid the dislocation of E.W.C, it is fixed with bolt and nut arrangement to the floor.
4. Now the cover of E.W.C. is fixed.
5. The pipe of the flushing cistern is connected for the supply of water to the flushing rim.



WATER CLOSET EUROPEAN TYPE



ISOMETRIC VIEW OF AN EUROPEAN TYPE WATER CLOSET

8. BASIC PIPE CONNECTION OF WASH BASIN

AIM:

To connect a pipe connection for wash basin.

REQUIRED MATERIALS:

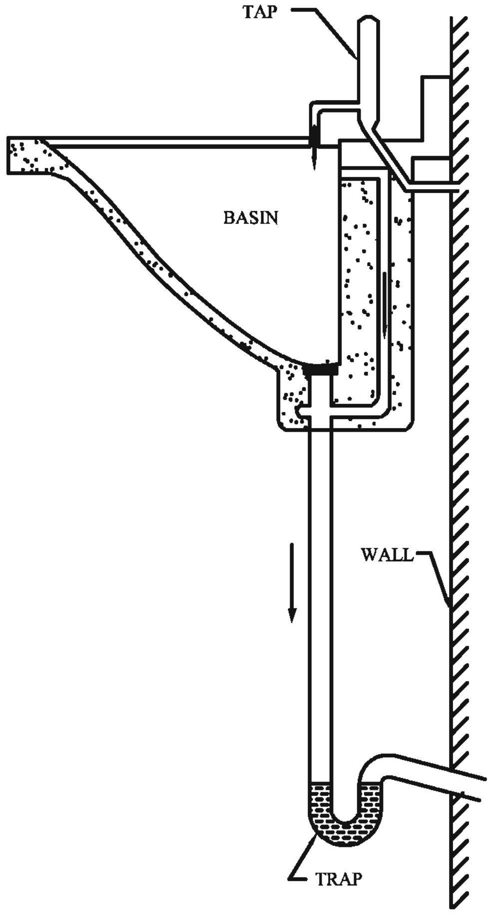
1. Wash basin
2. Cast iron brackets
3. Tap 2 Nos.
4. Outlet pipe
5. Waste pipe
6. Control valve
7. Bottle trap

DEFINITION:

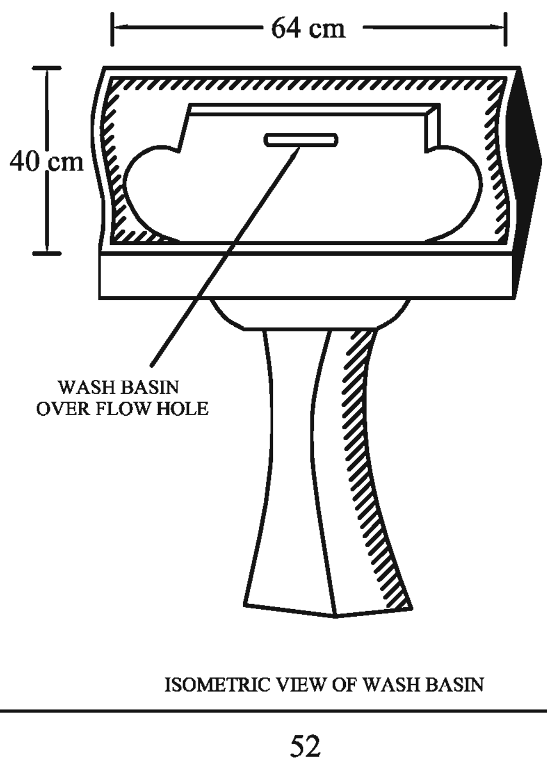
Wash basins are generally made up of white-glazed earthenware. It is available in different shapes and shades. It may be fixed with cast-iron brackets or may directly rests on wall. The pedestal type of wash basin rests independently on floor.

PROCEDURE:

1. Study the given diagram
2. Mark the positions of wash basin
3. First fix the cast iron brackets on the wall
4. Fix the wash basin on the brackets and screw it
5. Make the tee and elbow connections in the pipe line and connect it to the wash basin taps
6. Finally connect the bottle trap with wash basin to complete the setup



SECTIONAL VIEW OF WASH BASIN



ISOMETRIC VIEW OF WASH BASIN

9. CONNECTION OF A SHOWER AND TAP

AIM:

To give a connection to the shower and tap.

DEFINITION:

TAP: This is also called as Bib cock. This is fixed on the outlet of pipe. This controls the flow of water. They are generally available in the following two types.

1. Pillar Taps
2. Push Taps
3. Stop Taps
4. Mixer Taps

PILLAR TAPS: These are draw off taps that are fitted to sanitary appliances such as sinks and they have a long-threaded shank that allows them to be fitted into the appliances.

BIB TAPS: These are draw-off taps fitted above sanitary appliances to supply water for houses.

STOP TAPS: These are used to shut off the flow or control the rate of flow in the pipeline.

MIXER TAPS: These are basically a pair of draw-off pillar taps. In these, hot and cold water are mixed together by a common or joint mixing chamber and delivery spout to provide mixed flow of hot and cold water. To get hot water and cold water according to the requirement, two handles are fixed.

WATER METERS: These are the devices which are installed on the pipes to measure the quantity of water flowing at a particular point along the pipe. The readings obtained from the meters help in working out the quantity of water supplied and thus the consumers can be charged accordingly.

SHOWER:

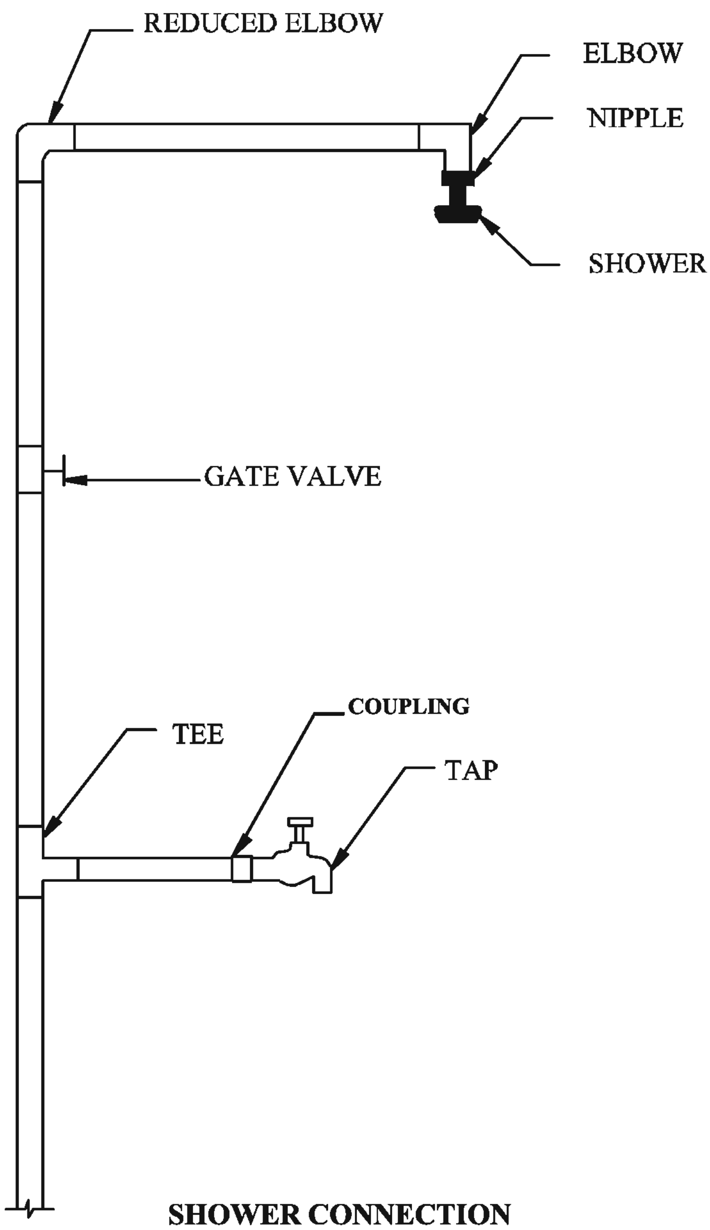
Shower is used in bath room to spray the water. For hot water flow the shower has to be connected to the heater which is fixed at a level above the shower.

REQUIRED MATERIALS:

1. Hacksaw frame with blade
2. Die set
3. Thread, Shellac
4. G.I. Pipe, Coupling, Tee, Elbows, Gate valve, Shower

PROCEDURE:

1. Prepare the sketch indicating the pipe specials.
2. Cut the G.I. pipe to the required length and thread at its ends approximately 2.5 cm length and check the thread.
3. Connect the pipe and pipe specials as per the sketch prepared and check the joints for leakage of water.



SHOWER CONNECTION

10. CONNECTION BETWEEN STONEWARE PIPES

AIM:

To make a connection of stoneware pipes.

DESCRIPTION :

Normally the diameter of the pipe is 10 cm. Its length varies from 60 cm to 90 cm. This pipe is manufactured using a special type of clay. The inner side of the pipe is smooth. This pipe is not erodible but easily breakable. So, proper care should be taken while handling and transporting this pipe.

REQUIRED MATERIALS:

1. Stoneware pipe - 3 Nos.
2. Cement mortar
3. Trowel
4. Gunny cloth.

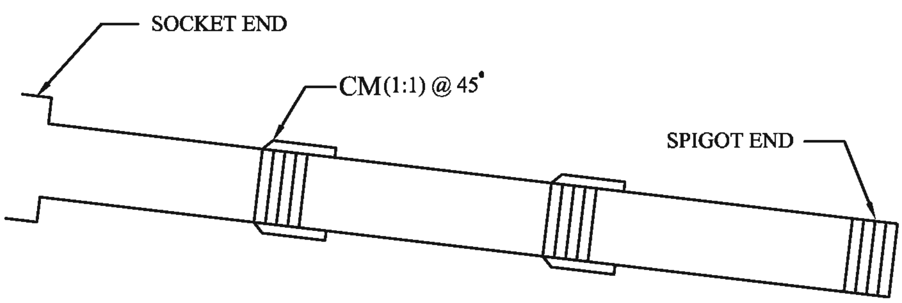
METHOD OF CONNECTION:

1. Start the connection of pipe from the downstream side.
2. Clean the inside of pipe and fix the spigot end at the down stream side and socket end at the upstream side.
3. In one socket end of a pipe the spigot end of other pipe is fixed.
4. Dip the gunny cloth in cement paste and place it at the connection of two pipes, apply the C.M. (1:1) according to the sketch.
5. Clean the inside of the pipe and check whether the pipe is in correct alignment or not.

NOTE:

Purpose of placing the gunny cloth which is dipped in cement paste is

1. To avoid dislocation and to keep the pipe in line.
2. To avoid leakage.



JOINTING OF STONE WARE PIPES

11. SINGLE ACTING RECIPROCATING PUMP

AIM:

To study about the structure and the working principle of single acting reciprocating pump

STRUCTURE:

A piston or a plunger moves to and fro(reciprocates)in a stationary cylinder, alternatively drawing in and pushing out liquid through valves. The suction and delivery pipes are connected to cylinder where the suction valve and delivery valve are connected respectively. Piston rod and connecting rod are connected to shaft through crank. The revolving crank with an eccentricity and the connecting rod completes the arrangement. The length of travel of the piston is known as the stroke, which should be equal to the diameter of the rotating crank wheel.

WORKING PRINCIPLE:

As the piston moves to the right, the pressure inside the cylinder drops below atmospheric. This causes the delivery valve to close and the suction valve to admit the liquid into the cylinder from the sump forced by the atmospheric pressure. It is the suction stroke. When the piston returns, the increased pressure closes the suction valve and opens the delivery valve to force the liquid out into the delivery pipe causing the delivery stroke. One rotation of the crank corresponds to one cycle of operation. The suction and delivery strokes are performed for every cycle and discharge. The speed of the crank shall have to be low so that the liquid does not lag behind the piston during the suction stroke. A pump is single acting if there is only one suction or delivery stroke per cycle.

AIR VESSEL:

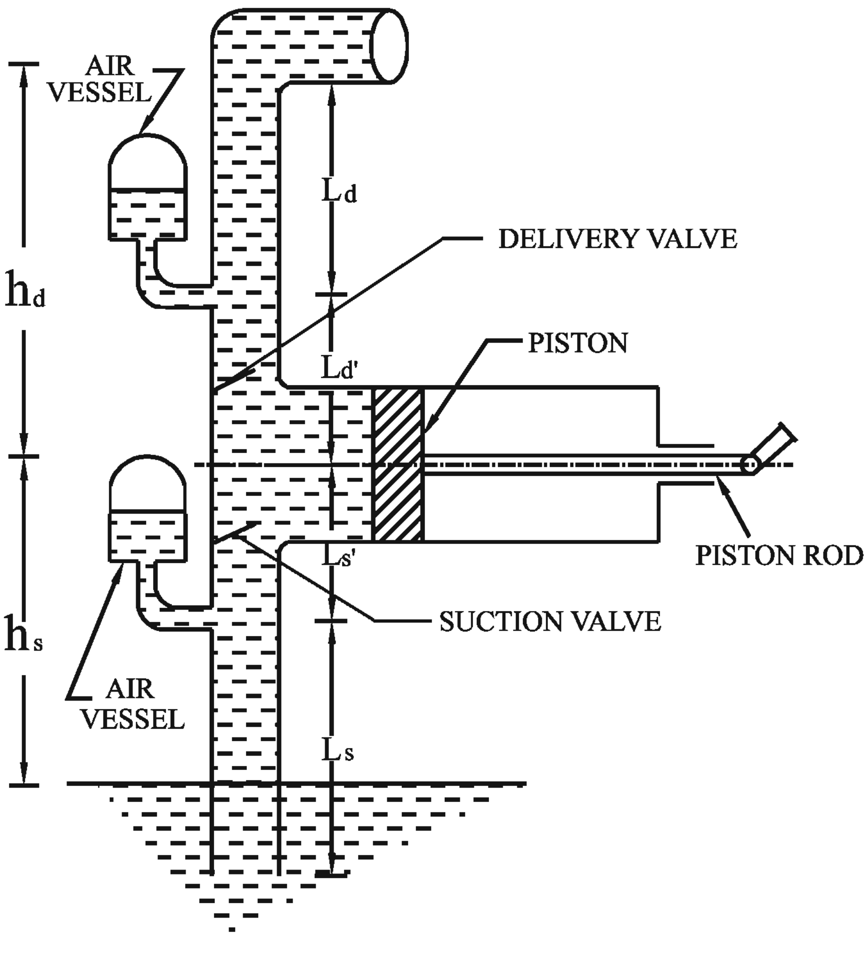
An air vessel is used to rectify the fluctuation in the flow of a reciprocating pump. An air vessel is fixed near the cylinder either in the suction pipe or delivery pipe or both. It is a chamber with full of air under pressure with an opening at the bottom. Water can enter either enter inside or exit outside the air vessel through the opening.

It is used to

(i) obtain a continuous supply of water at uniform rate.
(ii) save a considerable amount of work
(iii) run the pump at a high speed without separation.

WORKING PRINCIPLE OF AIR VESSELS:

When the air vessel is fitted to the delivery pipe, during the first half of delivery stroke, the piston moves with acceleration and forces the water into the delivery pipe with a velocity more than the mean velocity. The quantity of water in excess of the mean discharge will flow into the air vessel. During the second half of the delivery stroke the piston moves with retardation. The water already stored in the air vessel will start flowing into the delivery pipe and the velocity of flow in the delivery pipe beyond the point at which air vessel is fitted will be equal to the mean velocity. Hence the rate of flow of water in the delivery pipe will be uniform.



Single Acting Reciprocating pump with Air Vessel

12. CENTRIFUGAL PUMP

AIM:

To study the working principle of centrifugal pump.

DEFINITION:

A hydraualic machine which converts the mechanical energy into the pressure energy by means of centrifugal force is called centrifugal pump.

COMPONENT PARTS OF A CENTRIFUGAL PUMP:

1. Rotor (or) Impeller
2. Casing
3. Strainer
4. Suction pipe
5. Foot valve
6. Delivery pipe
7. Delivery valve
8. Prime mover.

1. **ROTOR (or) IMPELLER :** It is like the heart of the pump. It is a rotating device with so many vanes in its outer portion. It consists of series of curved vanes fitted between two circular discs.
2. **CASING:** The path of water around the impeller is called casing. Casing consists of air holes and priming funnel. Area of this casing starts narrow and enlarges continuously so that the area is not uniform.
3. **SUCTION PIPE:** The pipe whose lower end is dipped into sump or well is called suction pipe. This pipe goes up to the entrance of the pump from the well or the sump. Water is drawn into the pump from the sump or well through this suction pipe.
4. **STRAINER:** It is fitted at the lower end of suction pipe. It is useful in avoiding the entry of floating bodies/debris inside the pump.
5. **FOOT VALVE:** It is fitted on the upper part of the strainer. As it is a one way valve (or) non-return valve water can only enter and not allowed to move downwards. Priming is necessary only when leakage takes place in the foot valve.
6. **DELIVERY PIPE:** The pipe through which the water pumped from the well is delivered is called delivery pipe.

7. **DELIVERY VALVE:** The rate of water is regulated by a delivery valve fitted close to the pump on its delivery side.

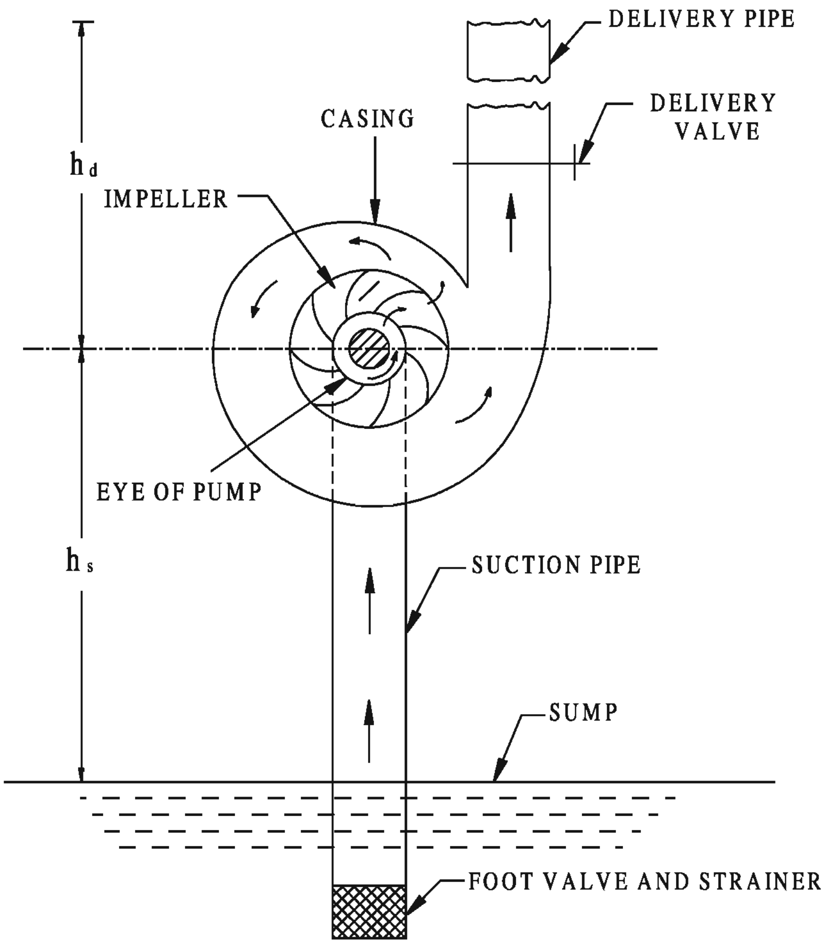
8. **PRIME MOVER:** It is an electric motor (or) oil Engine used to drive the pump.

PRIMING:

Priming of a centrifugal pump means the operation in which the suction pipe, casing of the pump and a portion of the delivery pipe up to the delivery valve is completely filled up from outside source with the liquid to be raised before starting the pump, thus the air from these parts of the pump is removed and filled with the liquid to be raised.

WORKING PRINCIPLE:

Before starting the pump, delivery valve should be closed. After the impeller gets its normal speed delivery valve is opened. As the impeller rotates continuously the stored water and entering water of the casing gets centrifugal head. So water is delivered with high pressure.



MAIN PARTS OF CENTRIFUGAL PUMP