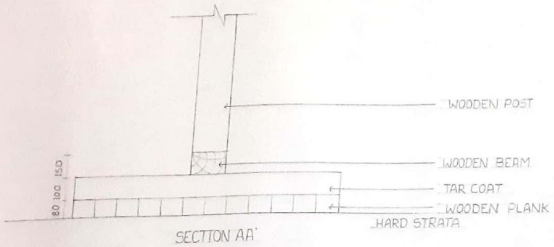


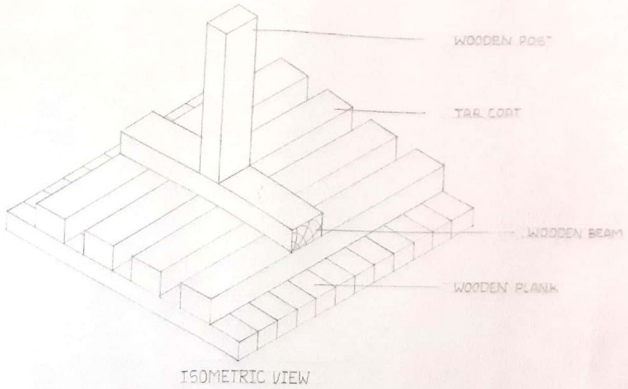


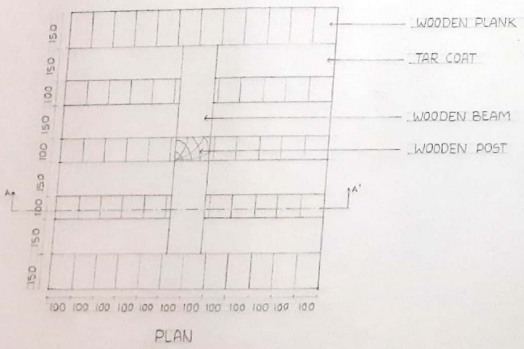


- TIMBER GRILLAGE FOUNDATION IS PROVIDED FOR HEAVY LOADED TIMBER COLUMN OR WALL.
- FOUNDATION USED TIMBER PLANK & TIMBER BEAM IN PLACE OF STEEL JOIST.
- FOUNDATION IS SPECIALLY USED IN WATER LOGGED IN BEARING CAPACITY OF SOIL IS VERY LOW WHERE STEET BEAMS MAY GET CORRODED DUE TO SUBSOIL WATER.
- IN THIS TYPE OF CONSTRUCTION, THE CONCRETE BLOCK USUALLY PROVIDE BELOW THE WALL FOOTING IS REPLACED BY TIMBER PLATFORM.
- IN THE LOWERMOST LAYERS, THE PLANKS ARE 5 CM TO 10CM THICK PERPENDING UPON LOADING AND SITE CONDITION.
- THE TWO LAYERS OF PLANKS ARE SEPERATED BY RECTANGULAR SECTIONS OF TIMBER SPACED AT NOT MORE THAN 38 CM. CENTER TO CENTER, THE DEPTH OF THE SECTIONS BEING 0.75 TIMES THE WIDTH.

NOTE:-
ALL DIMENSIONS ARE IN MM.

# TIMBER GRILLAGE FOUNDATION

| SIGN | DATE | A. B. COLLEGE OF ARCHITECTURE. | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV | | | |
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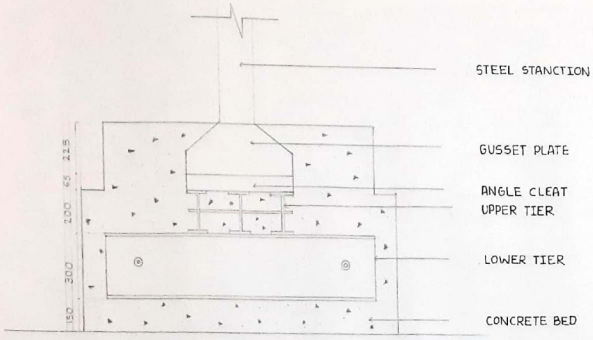
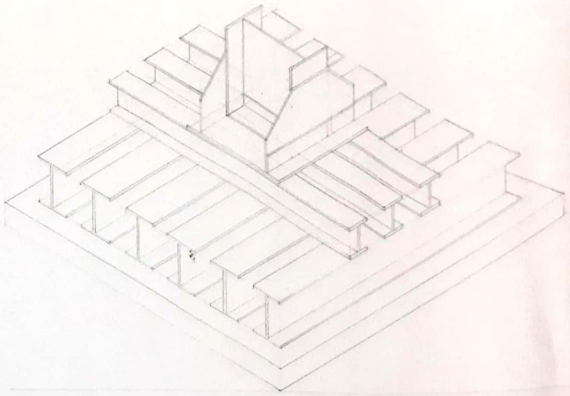
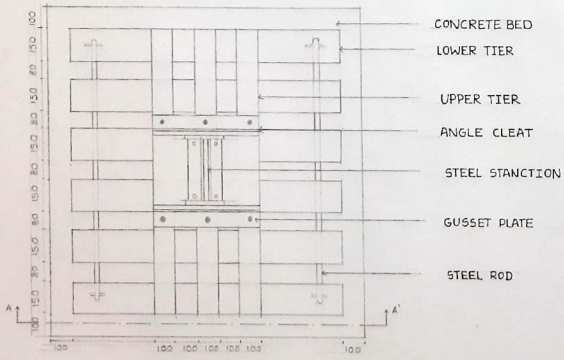
| | | SUB - B.T. CONSTRUCTION | | | |
| | | SCALE | ROLL NO. | SHEET NO. | MARKS. |
| | | 1:1 | 0-6 | | |




SECTION AA'



ISOMETRIC VIEW




PLAN

- GRILLAGE FOUNDATION IS USED WHEN HEAVY STRUCTURAL LOAD FROM COLUMNS PIERS OR STANCTIONS ARE REQUIRED TO TRANSFERED TO SOIL OF LOW BEARING CAPACITY.
- STEEL GRILLAGE FOUNDATION CONSIST OF STEEL BEAM KNOWN GRILLAGE BEAM.
- THE EXCAVATED TO THE DESIRE DEPTH GENERALLY DEPTH IS SHALLOW.
- THE BEAMS ARE SUITABLY SPACED SO AS PROVIDE FACILITY FOR PLACING AND COMPACTING OF CONCRETE BETWEEN THEM.
- A MINIMUM CLEARANCE OF 8CM IS CONSIDERED MOST SUITABLE.
- IF THE BEAMS ARE SPACED MORE DISTANCE APART, THERE IS A DANGER OF CONCRETE FILLING NOT ACTING MONOLITICALLY WITH THE BEAMS AND AS SUCH MAY RESULT IN THE FAILURE OF FOUNDATION.

NOTE:-
ALL DIMENSION ARE IN MM.

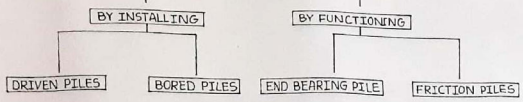
# STEEL GRILLAGE FOUNDATION

| SIGN | DATE | A. B. COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV | | | |
| | | STD - T.Y.B. ARCH DIV - A | | | |
| | | SUB - B.T. CONSTRUCTION | | | |
| | | SCALE | ROLL NO | SHEET NO | MARKS |
| | | 1:1 | 06 | | |

## WHAT IS PILE FOUNDATION ?

PILE FOUNDATION, A KIND OF DEEP FOUNDATION. IT ACTUALLY A SLENDER COLUMN OR LONG CYLINDER MADE OF MATERIAL SUCH AS CONCRETE, STEEL OR TIMBER WHICH ARE USED TO SUPPORT THE STRUCTURE & TRANSFER THE LOAD AT DESIRED DEPTH EITHER BY END BEARING.

### CLASSIFICATION OF PILE FOUNDATION




### A] DRIVEN PILES :-

THESE ARE PRECASTED AND PREFABRICATED PILES HAVING DETERMINED SHAPE AND SIZE THAT CAN BE DRIVEN INTO THE SOIL BY HAMMERING, VIBRATING OR RUSHING. IT INTO THE SOIL DRIVEN PILES ARE VERY ADAPTABLE.

### B] BORED PILES :-

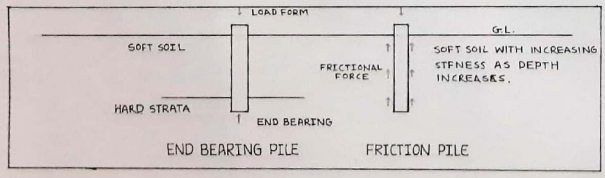
THESE ARE CYLINDRICAL BODIES MADE OF CONCRETE WHICH ARE INSTALLED INTO THE GROUND USING VARIETY OF METHOD THIER SIZE AND SHAPE CAN BE VARIED ACCORDING TO USE.

### C] END BEARING PILE :-

WHERE THE BOTTOM END OF PILES REST ON LAYER OF STRONG SOIL OR ROCK, THE LOAD OF STRUCTURE TRANSFERED THROUGH PILE STRONG LAYER THE KEY PRINCIPAL IS THAT BOTTOM END REST ON INTERSECTION OF STRONG AND WEAK LAYER.

### D] FRICTION PILES :-

HERE THE PILE TRANSFER THE LOAD OF BUILDING TO SOIL ACROSS THE FULL HEIGHT OF PILE, BY FRICTION. IN OTHER WORDS, THE ENTIRE SURFACE OF PILE WORK TO TRANSFER FORCE TO SOIL. THE AMOUNT OF LOAD OF PILE IS DIRECTLY PROPORTIONAL TO THE LENGTH.




## INSTALLATION PROCESS OF PILE FOUNDATION

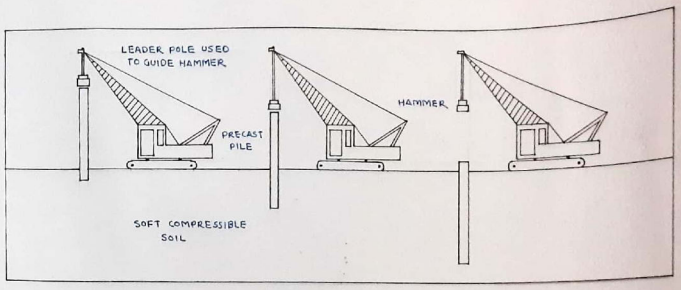
PILES ARE INSTALLED USING A DIFFERENT METHODS, EACH OF WHICH IS SELECTED ACCORDING TO NEED. THE VARIOUS FACTORS WHICH INFLUENCE THE TYPE AND METHOD FOR PILE INSTALLATION MAY INCLUDE.

1] DEPTH OF EXCAVATION.
2] MATERIAL OF PILES.
3] ENVIRONMENTAL ISSUES WHICH IMPACT LOCAL RESIDENCE, FLORA & FAUNA.

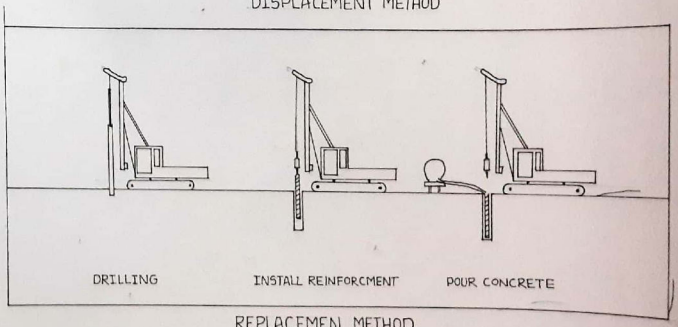
DPENDING ON OUR NEED, THERE ARE TWO COMMON PILE INSTALLATION METHOD,

A] DISPLACEMENT METHOD - IT REFFERS TO METHOD OF DRIVING PILES INTO THE GROUND WITHOUT FIRST REMOVING ANY OF SOLL OR MATERIAL.

B] REPLACEMENT METHOD - IT REFFERS TO METHOD OF FIRST DIGGING OUT A HOLE, INTO WHICH PILE IS THEN INSPIRED.




DISPLACEMENT METHOD




REPLACEMEN METHOD

# TERMINOLOGY OF PILE FOUNDATION

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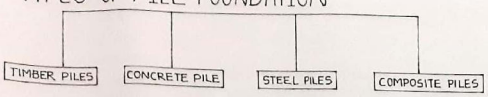
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |

# TYPES OF PILE FOUNDATION




A] TIMBER PILES- TIMBER PILES ARE PLACED UNDER THE WATER LEVEL THEY LAST FOR APPROXIMATLY ABOUT 30 YEARS CAN BE RECTANGULAR OR CICULAR IN SHAPE. THEIR DIAMETRE CAN VARY FROM 12 TO 16 INCHES FOR 15 TO 20 TONS. THEY ARE ECONOMICAL, EASY TO INSTALL.

B] CONCRETE PILES- THERE ARE TWO TYPES OF CONCRETE PILES · PRE-CAST PILE · CAST IN SITU PILE ARE MADE BY DRIVING A STEEL CASTING INTO PILES SOIL. THE PRECAST CONCRETE PILES MADE BY DRIVING PILE BED IN THE HORIZONTAL FORM IF THEY ARE RECTANGULAR IN SHAPE. AFTER THE PILES ARE CAST CURING IS DONE.

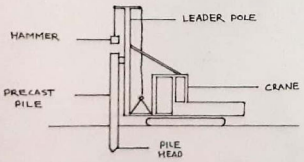
C] STEEL PILES- STEEL PILES MAY BE OF I-SECTION OR HOLLOW PIPE. THEY ARE 24 IN. TO 10 INCHES FILLED WITH CONCRETE. THE DIAMETER OF THICKNESS IS USUALLY 3/4 INCHES. THEY ARE MOSTLY USED FOR END BEARING PILES. COMMONLY USED STEEL PILES ARE · H PILES · BOX PILE · TUBE PILE

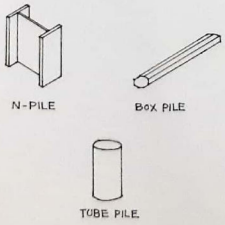
1] H PILE- THESE PILES ARE USUALLY OF WIDE FLANGE SECTION. THEREFOR THEY CAN BE EASILY DRIVEN IN SOIL USED AS LONG PILE WITH HIGH BEARING CAPACITY.

2] BOX PILE- THEY ARE RECTANGULAR AND OCTAGONAL IN FORM FILL WITH CONCRETE. THESE ARE USED WHEN NOT POSSIBLE TO DRIVE H-PILES INTO HARD STRATA.

3] TUBE PILE -
TUBES OR PILES OF STEEL ARE DRIVEN INTO THE GROUND CONCRETE IS FILLED INSIDE THE TUBE PILE.

D] COMPOSITE PILES- THIS IS TYPE OF CONSTRUCTION IN WHICH PILES OF TWO DIFFERENT MATERIALS ARE DRIVEN ONE OVER THE OTHER. THEY ACT TOGETHER TO PERFORM THE FUNCTION OF SINGLE PILE.
IN THIS PILE ADVANTAGE IS TAKEN OF DURABILITY OF CONCRETE PILES AND CHIPEST OF TIMBER PILE.



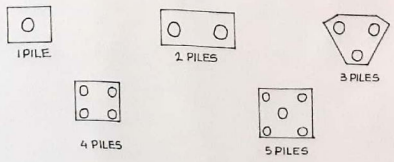

# PILE SPACING

THE SPACING OF PILE IS THE CENTRE TO CENTRE DISTANCE BETWEEN TWO SUCCESSIVE PILES.

THE FACTORS TO BE CONSIDERED WHILE DECIDING.

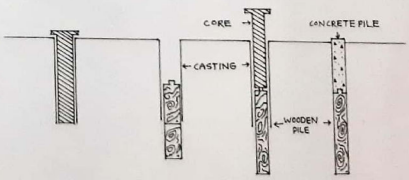
1] THE NATURE OF SOIL THROUGH WHICH THE PILE DRIVEN.
2] THE OBSTRUCTION DURING PILE DRIVING.
3] THE TYPE OF PILE.
4] THE DEPTH OF PENETRATION.
5] THE AREA OF ACROSS SECTION OF PILE.
6] THE CENTRE TO CENTRE DISTANCE OF PILES IN GROUP.

THE USUAL MINIMUM SPACING FOR PILE IS
1] FRICTION PILES- 1:100 OR NOT LESS THAN 3 WHENEVER IS GREATER.
2] BEARING PILES - 750 MM OR NOT LESS THAN 2 WHICHEVER IS GREATER.

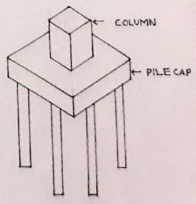



GROUP OF PILES- 1] SOMETIMES THE PILES ARE ARRANGED IN CLOSE SPACED GROUPS. WHEN THE PILES ARE DRIVEN TO REQUIRED DEPTH. THIER TOP ARE CUTOFF A SAME LEVEL AND THEM PILE CAP IS PROVIDED.

2] THE PILES FORMING THE GROUP OF PILES MAY BE ARRANGED IN SQUARE, RECTANGULAR, TRIANGULAR, OR CIRCULAR AS PER REQUIRMENT.




STAGES IN CONSTRUCTION OF COMPOSITE PILE




GROUP OF PILES

# TERMINOLOGY OF PILE FOUNDATION

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| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |

# STEEL CONNECTION

INTRODUCTION - CONNECTIONS ARE STRUCTURAL ELEMENT USED FOR JOINING DIFFERENT MEMBERS OF A STRUCTURAL STEEL FRAME WORK.
STEEL STRUCTURAL IS ASSEMBLE DIFFERENT MEMBER SUCH AS 'BEAM, COLUMN' WHICH ARE CONNECTED TO ONE OTHER USUALLY A MEMBER ENDS FASTNERS, SO THAT IT SHOWS A SINGLE COMPOSITE UNIT.

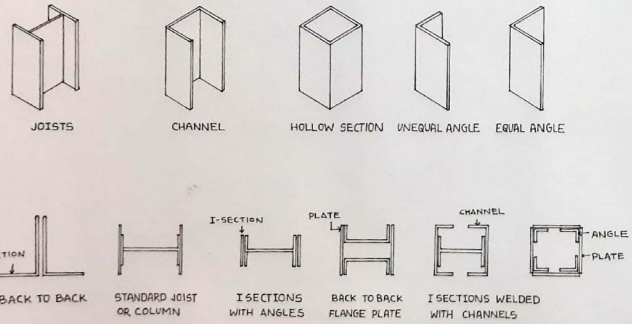
## STEEL CONNECTION BASIS OF CONNECTING MEDIUM -

1] RIVETED CONNECTION - IT IS USED FOR VERY LONG TIME. IT IS MADE UP OF ROUND, DUCTILE STEEL BAR CALLED SHANK AND HEAD WHICH MAY BE EITHER CONICAL OR HEMISPHERICAL.
THE PROCESS OF REVITNG CONSIST OF HEATING THE RIVET AND IT PLACED IN THE HOLE WHILE IT IS STILL HOT AND THEN THE SHANK END IS USPET BY HAMMER TO FORM SECTION END.

2] BOLDED CONNECTION - ONE END OF BOLT IS FORMED SOLID AND OTHER END OF SHANK THREADS ARE PROVIDED ON WHICH NUT MOVES.
WASHERS ARE FLAT DISCS OF IRON & THEY PLACED UNDER NUT TO PREVENT THE POSSIBLE INJURY BY NUT SURFACE WHEN NUT IS PROCEED.

3] WELDED CONNECTION - THE ART OF WELDING BECOME VERY POPULAR WITHIN PAST FEW YEAR AND IT IS BEING NOW APPLIED IN ALL TYPES OF STEELORK.
THERE ARE TWO METHODS OF HOLDING CONNECTION NAMELY
- PLASTIC WELDING
- FUSION WELDING

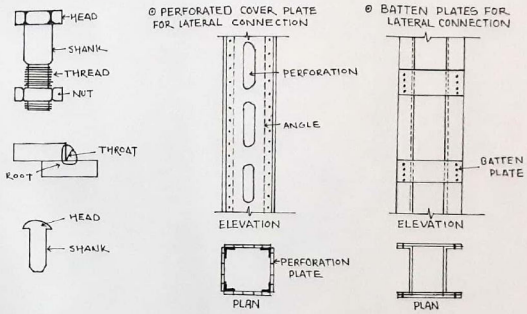
4] BOLTED - WELDED CONNECTION - MOST CONNECTIONS ARE SHOP WELDED AND AND FIELD BOLTED TYPES.
ITS MORE COST EFFECTIVE.



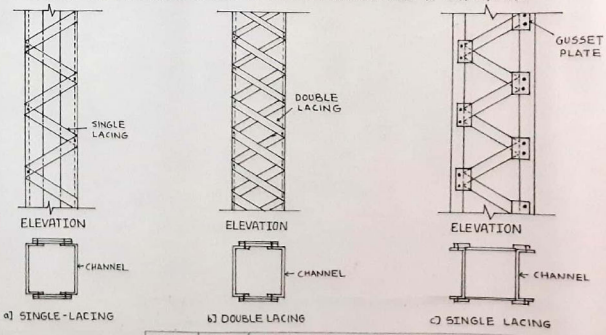

# LACING & BATTENING SYSTEM

LACING AND BATTEN PLATES ARE NOT DESIGNED TO CARRY ANY LOAD. THEIR PRIMARY FUNCTION IS TO HOLD THE MAIN COMPONENTS OF THE BUILT UP COLUMN IN THIER RELATIVE POSITION AND EQUALIZE THE STRESS DISTRIBUTION, BUT THEY MAY HAVE TO RESIST SHEAR ANY POINT IN MEMBER OF SHEAR AT ANY POINT LATERAL LOAD.

THE LACING SYSTEM SHOULD NOT BE VARIED THROUGHOUT THE LENGTH OF STRUT AS FAR PRACTICABLE LACING AND BATTENS SHOULD NOT BE PROVIDED ON OPPOSITE SIDES OF THE SAME MEMBER.




LACING OR LATTICING SYSTEM OF LATERAL CONNECTIONS OF STANCTIONS




a] SINGLE-LACING b] DOUBLE LACING c] SINGLE LACING

STEELCONNECTION

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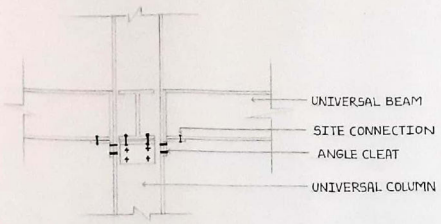
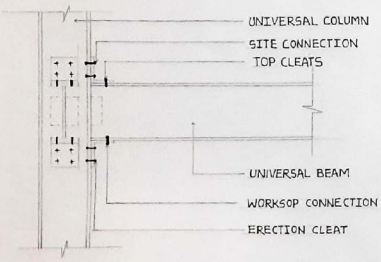
# TYPES OF STEEL CONNECTION

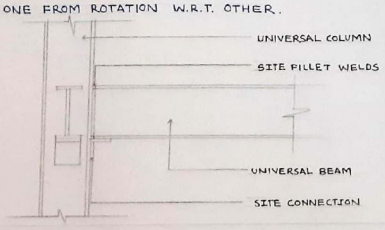
1. SIMPLE CONNECTION- IT IS DEFINED AS THOSE CONNECTIONS THAT TRANSMIT END SHEAR ONLY AND HAVE NEGLIGIBLE RESISTANCE TO ROTATION AND THEREFORE DONT TRNSFER SIGNIFICANT MOMENTS AT THE ULTIMATE LIMIT STATE.



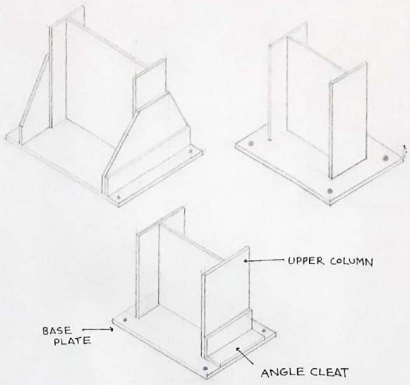

2. SEMI-RIGID CONNECTION- SEMI-RIGID CONNECIIONS ARE DESIGNED TO HAVE DEGREE OF ROTATION RESTRIT AND THEREFORE WILL ARRACT SOME MOMENTS.



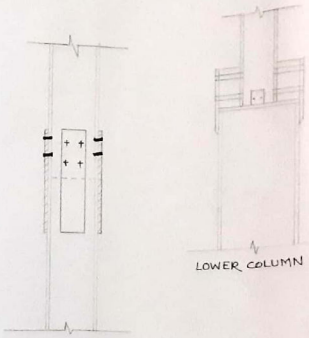

3. RIGID CONNECTION - RIGID CONNECTION BETWEEN TWO STRUCTUROUL MEMBER WHICH PREVENT ONE FROM ROTATION W.R.T. OTHER.



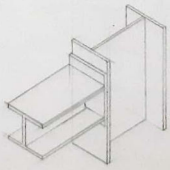

1. COLUMN BASE PLATE CONNECTION-
STEEL PLATES ARE PLACED IN THIS TYPE OF CONNECTION AT THE BOTTOM OF COLUMN. ITS FUNCTION IS TO TRNSMIT THE COLUMN LOAD ON CONCRETE PEDESTAL.



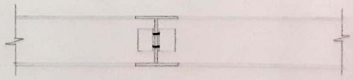

2. COLUMN TO COLUMN CONNECTION - COLUMN TO COLUMN CONNECTION ARE USUALLY ACCOMPLISHED WITH THE USE OF COLUMN SPLICE.




3. BEAM TO COLUMN CONNECION- BEAM TO COLUMN CONNECTION ARE MOST COMMON TYPE OF CONFIGURATION WITH COLUMN ACTING AS A SUPPORTING AND THE BEAM ACTING AS SUPPORTED AN ADJECENT ORIENTATION.



4. BEAM TO BEAM CONNECTION- FOR BEAM TO BEAM CONNECTION THERE ARE GENERALLY TWO TYPES, DEPENDING UPON BEAM GEOMETRY.



BEAM TO BEAM

## STEEL CONNECTION

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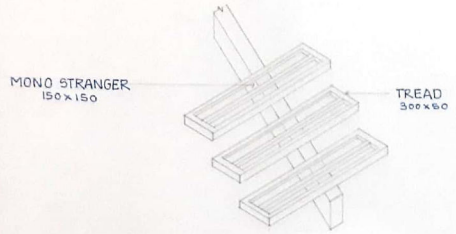
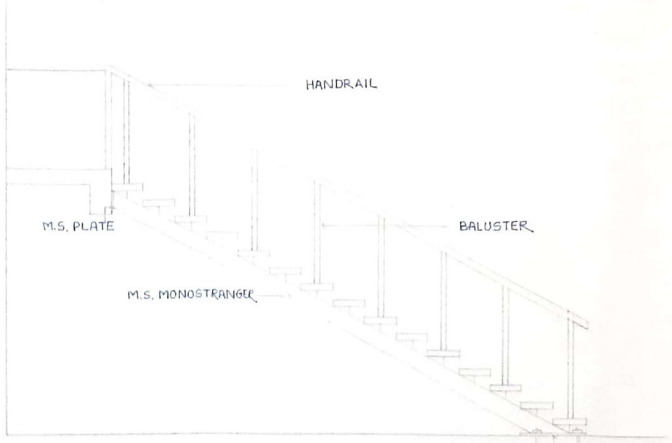
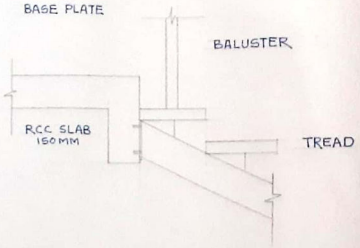


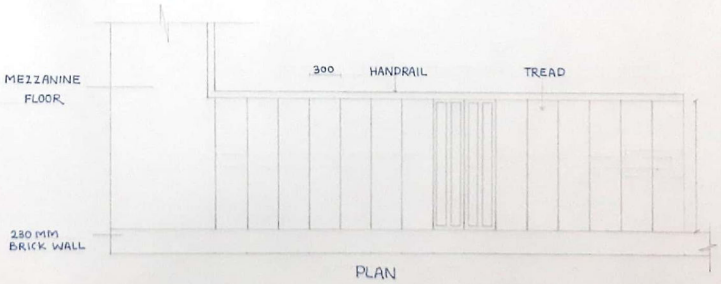

ISOMETRIC VIEW




SECTION



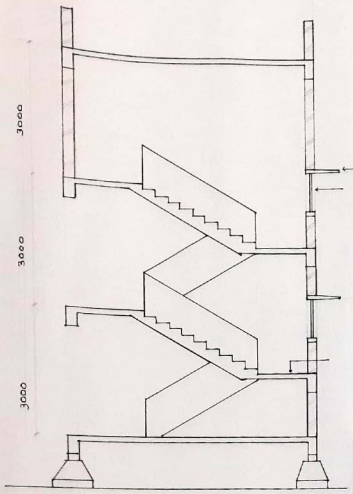

DETAIL



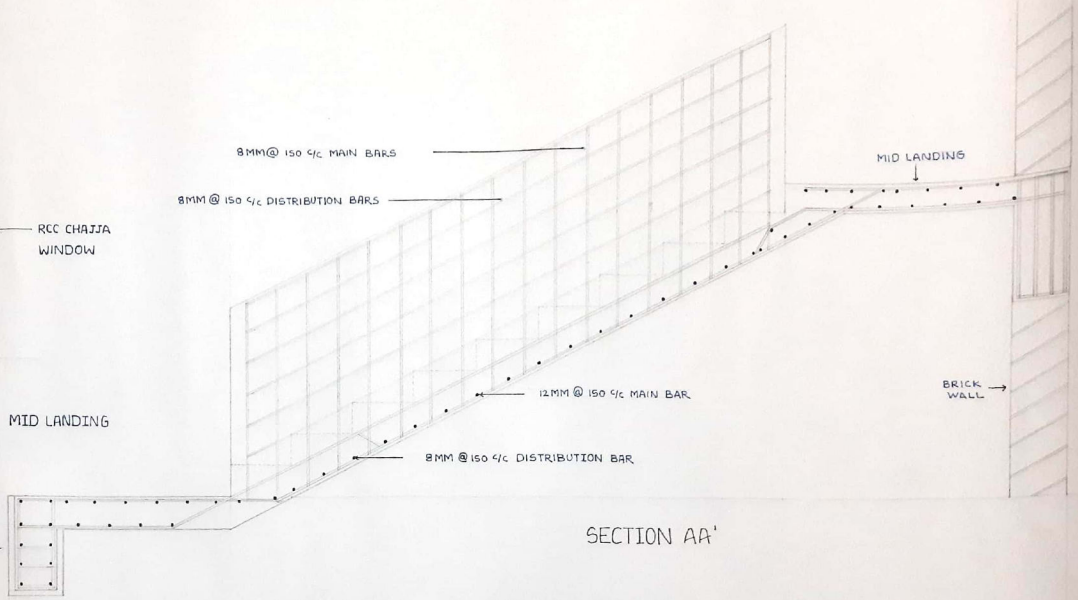

PLAN

# STEEL STAIRCASE

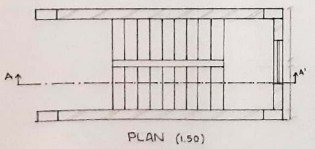
| DATE | SIGN | A. B. COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWR M. JADHAV. | | | |
| | | STD - T.Y. B. ARCH DIV - A | | | |
| | | SUB - B. T. CONSTRUCTION | | | |
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |



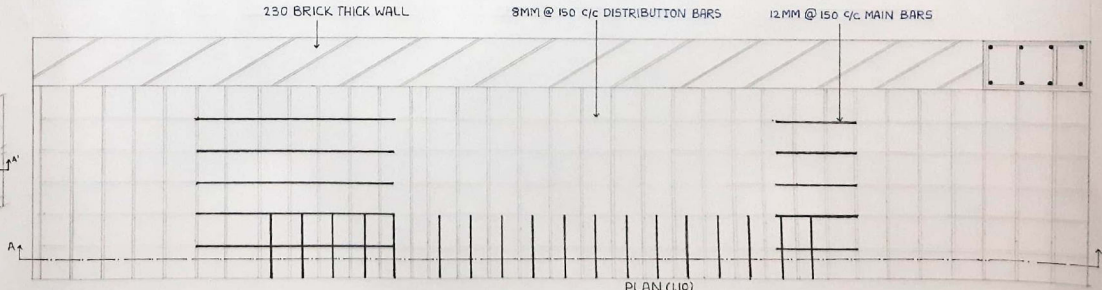

SECTION AA'




SECTION AA'



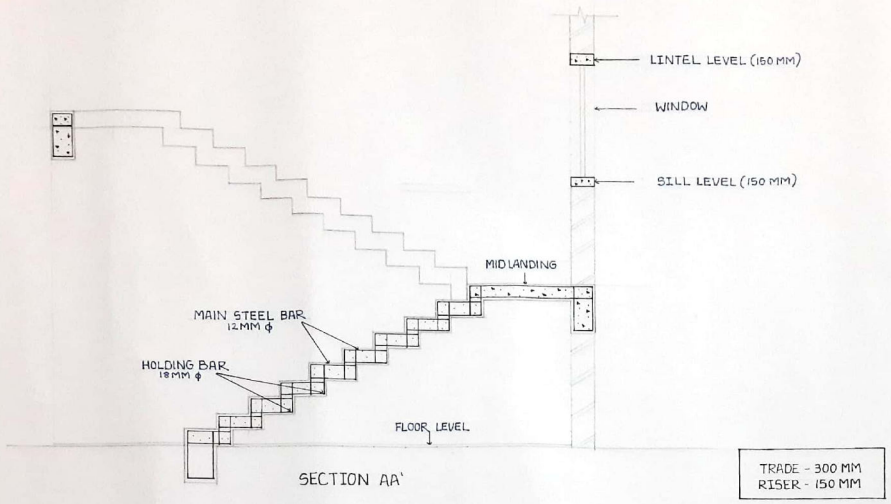

PLAN (1:50)




PLAN (1:10)

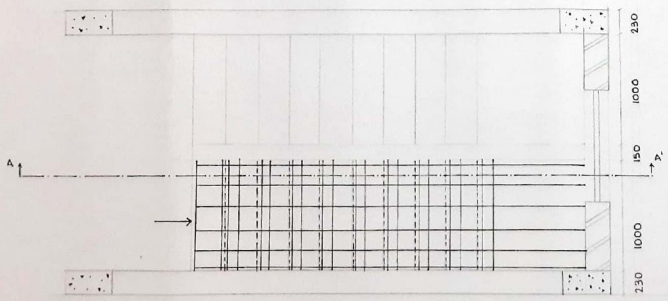
# RCC R STAIRCASE

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV. | | | |
| | | STD - T.Y.B.ARCH DIV - A | | | |
| | | SUB - B.T. CONSTRUCTION | | | |
| | | SCALE | ROLL NO | SHEET NO | MARKS |
| | | | 06 | | |

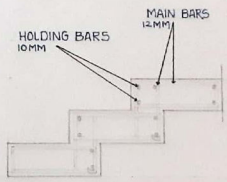



SECTION AA'

TRADE - 300 MM
RISER - 150 MM




PLAN (1:20)




DETAIL B' (1:10)

# FOLDED STAIRCASE

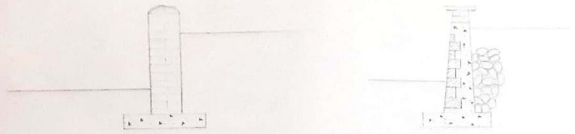
| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV. | | | |
| | | STD - T.Y.B.ARCH DIV - A | | | |
| | | SUB - B.T. CONSTRUCTION | | | |
| | | SCALE | ROLL NO | SHEET NO | MARKS |
| | | | 06 | | |

# TYPES OF RETAINING WALL

MASS RETAINING WALL -

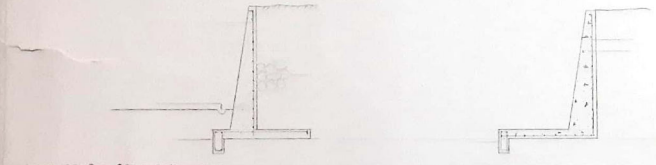
THESE ARE SOMTIMES CALLED GRAVITY WALLS AND REPLY UPON THEIR OWN MASS TOGEHER WITH THE FRICTION ON THE UNDERSIDE OF THE BASE TO OVERCOME THE TENDENCY TO SLIDE OR OVERTURN THEY ARE GENERALLY ECONOMIC ONLY UP TO A HEIGHT OF 1.8M. MASS WALL CANBE CONSTRUCTED OF SEMI-ENGINEERING QUALITY BRICKS BEDDED IN A 1:3 CEMENT MORTAR OR OF MASS CONCETE.

DOUBLE BULLNOSE BRIKE ON EDGE COURSE



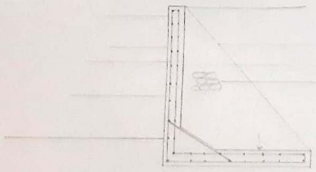
CANTILEVER WALLS -

THE TYPICAL SECTIONS AND PATTERNS OF REINFORCEMENT ENCOUNTERED WITH THESE BASIC FORMS OF CANTILEVER RETAINING WALL. THE MAIN STEEL OCCURS ON THE TENSION FACE OF THE WALL AND. NORMAL STEEL IS VERY OFTEN INCLUDED IN THE OPPOSITE FACE TO CONTROL THE SHRINAGE CRACKING THAT OCCURS IN IN-SITU CONCRETE WORK. REINFORCED CANTILEVER WALL HAVE AN ECOMIC HEIGHT HAVE BEEN ECONOMICALLY CONSTRUCTED USING PRESTRESSING TECNNIQUES.



COUNTERFORT RETAINING WALL -

THESE WALLS CAN BE CONSTRUCTED OR PRESTRESSED CONCRETE, AND ARE CONSIDERED SUITABLE CENTRES BEHIND THE STEM AND ABOVE THE BASE TO ENABLE THE STEM AND BASE TO ACT AS SLABS SPANNING HORIZONTALLY OVER OR UNDER THE COUNTERFORTS. IT IS SUITABLE IF THE HEIGHT IS OVER 4.5M. IF THE COUNTERFORTS ARE PLACED ON THE FACE OF THE STEM THEY ARE TERMMED AS BUTTRESSES AND THE WHOLE ARRANGMNT IS CALLED A BUTTRESS RETAINING WALL.

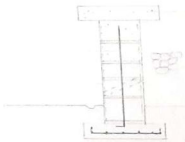


PRECASTE CONCRETE RETAINING WALL -

THESE ARE MANUFACTURED FROM HIGH-GRADE PRECAST ON THE CANTILEVER PRINCIPLE USE DUALLY TO A 600MM WIDE MODULE. OTHER ADVANAGES ARE A REDUCTION IN TIME ELIMINATING THE CURING PERIOD THAT IS REQUIRED FOR IN-SITU AND ELEMINATING THE NEED FOR COSTLY FORM WORK TOGETHER WITH THE REQUIRED TO ERECT AND DISMANTLE THE TEMPORARY FORMS.

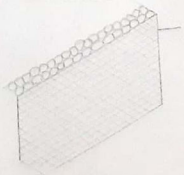
REINFORCED MASONRY RETAINING WALLS -

STEEL REINFORCEMENT MAY BE USED IN BRICK RETAINING WALLS TO RESIST TENSILE FORCES AND TO PREVENTS THE EFFECTS OF SHEAR WHEN THE BRICKWORK IS COMPLETED, THE VOIDS ARE FILLED WITH CONCRETE. CONCRETE BLOCK-WORK PROVEIDE FOR ECONOMICAL AND FUNCITONAL CONSTRUCTION.



GABIONS

AGABIONS WALL IS A RETAINING WALL MADE OF STACKED STONE-FILLED CAGIONS TIED TOGETHER USUALLY BATTERED OR STEPPED BACK WITH THE SLOPE, RATHER THAN STACKED VERTICALLY GALVANISED STEE WIRE IS MOST COMMON BUT PVC-COATED AND STAINLESS-STEEL WIRE ARE ALSO USED.



SHEET PILES -

SHEET PILE WALLS ARE RETAINING WALLS CONSTRUCTED TO RETAIN WATER OR ANY OTHER FILL MATERIAL. THESE WALLS ARE THINNER IN SECTION AS COMPARED TO MASONRY WALL THEY PROVIDE HIGHER RESTANCE TO DRIVING STRESSES THEY HAVE ALL OVERALL LIGHTER HEIGHT.

TYPES OF RETAINING WALL

| DATE | SIGN | A.B. COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME: DNYANESHWAR M. JADHAV. | | | |
| | | STD: T.Y. B.ARCH | DIV: A | | |
| | | SUB: B.T. | | | |
| | | SCALE | ROLL NO. | SHEET NO. | MARKS |
| | | | | 06 | |

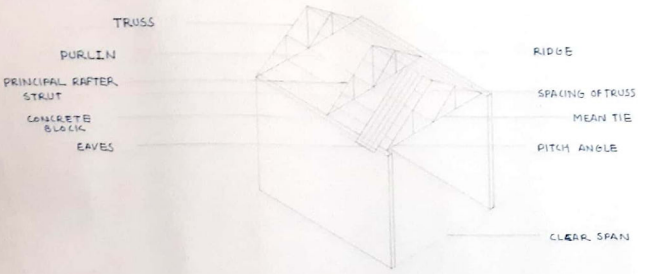
# STEEL ROOF TRUSSES

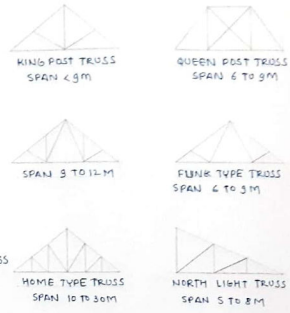
WHEN THE SPAN EXCEEDS 10M. TIMBER BECOME HEAVY AND UNCONDITIONAL STEEL TRUSSES ARE MODE ECONOMICAL FOR LARGER SPAN HOWEVER, STEEL TRUSSES ARE MORE COMMONLY USED THESE DAYS. FOR ALL SPAN SMALL OR LARGE, SINCE THEY ARE i] MORE ECONOMICAL ii] EASY TO CONSTRUCT OR FABRICATE iii] FIRE PROOF iv] MORE RIGID v] PERMANANT.

TRUSSES ARE PLACED ON PARALLEL ROWS ON WALLS OR COLUMNS AT CERTAIN INTERVAL OVER THE PURLINS ROOF COVERING CORRUGATED A.C OR G.I SHEET ARE DIRECTLY FIXED WITH NUTS AND SCREW

| SPACING OF ROOF TRUSS | TYPES OF STEEL SECTION |
|---|---|
| SMALL (3M TO 4M) | ANGLE |
| MEDIUM (4M TO 50M) | CHANNELS |
| LARGE (>50 M) | I. SECTIONS |

PITCH OF TRUSS- $\frac{\text{RISE}}{\text{SPAN}}$




ADVANTAGES-

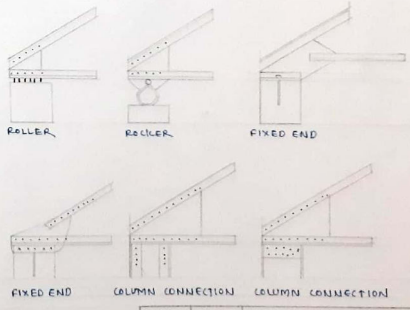
1] THESE ARE FIRE PROOF
2] THESE ARE TERMITE PROOF
3] THESE ARE RESISTANT TO OTHER ENVIRONMENTAL AGENCIES.
4] THESE ARE LIGHT IN WEIGHT AND CAN BE FABRICATED IN ANY SHAPE.
5] STEEL STRUSSES ARE STRONGER AND RIGID IN COMPARISON TO TIMBE TRUSSES.

DISADVANTAGES-

1] SKILLED LABOUR IS REQUIRED TO INSTALL METAL ROOF TRUSS.
2] THEY ARE NOT ENERGY EFFICIENT SINCE THEY ALLOW MORE HEAT TO ESCAPE FROM STRUCTURE.
3] METAL ROOF TRUSSES ALLOW SOUND TO BE MORE EASILY TRANSMITTED.
4] TEMERATURE FLUCTATIONS ALLOW THEM TO MOVE MORE
5] WHEN THE METAL IS CUT, DRILLED, SCRITCHED OR WELDED RUST CAN BECOME A PROBLEM

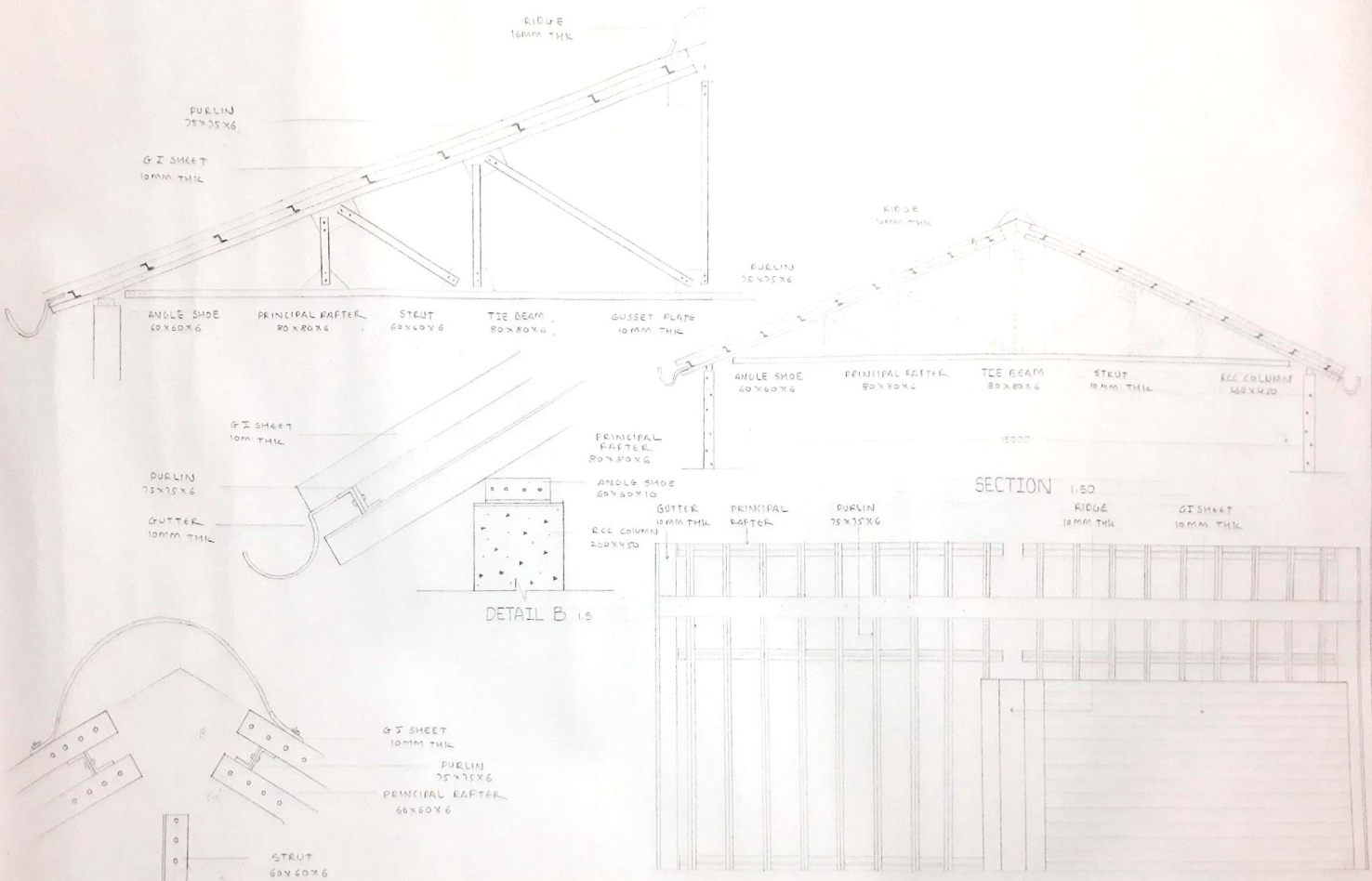
SPAN - IT IS THE CLEAR DISTANCE BETWEEN THE SUPPORTS OF AN ARCH, BEAM OR ROOF TRUSS
RISE - IT IS VERTICAL DISTANCE BETWEEN THE TOP OF RIDGE AND THE WALL PLATE.
PITCH - IT IS THE INCLINATION OF SIDES OF A ROOF TO HORIZONTAL PLANE. IT IS EXPRESSED EITHER IN TERMS OF DEGREES.
RIDGE - IT IS DEFINED AS THE APEX LINE OF SLOPING ROOF. IT IS THE APEX OF THE OF ANGLE FORMED BY TERMINATION OF THE INCLINED SURFACE AT TOP
EAVES - THE LOWER EDGE OF INCLINED ROOF SURFACE CALLED EAVES. FROM THE LOWER EDGE, THE REIN WATER FROM ROOF SURFACE DROPS DOWN.
PURLINS - THESE ARE HORIZONTAL STEEL MEMBERS, USED TO SUPPORT COMMON RAFTERS OF ROOF WHEN SPAN IS LARGE. PURLINS ARE SUPPORTED ON TRUSSES OR WALLS.
CLEATS - THESE ARE SHORT SECTIONS OF STEEL, WHICH ARE FIXED ON THE PRINCIPAL RAFTERS OF TRUSSES TO SUPPORT THE PURLINS.
SPACING OF TRUSS - DISTANCE BETWEEN TWO CONSECUTIVE TRUSSES.

| SPAN | SPACING |
|---|---|
| <15M | 3M TO 4.5M |
| 15M-30M | 4.5M TO 6.0M |
| >30M | 12M TO 15M |



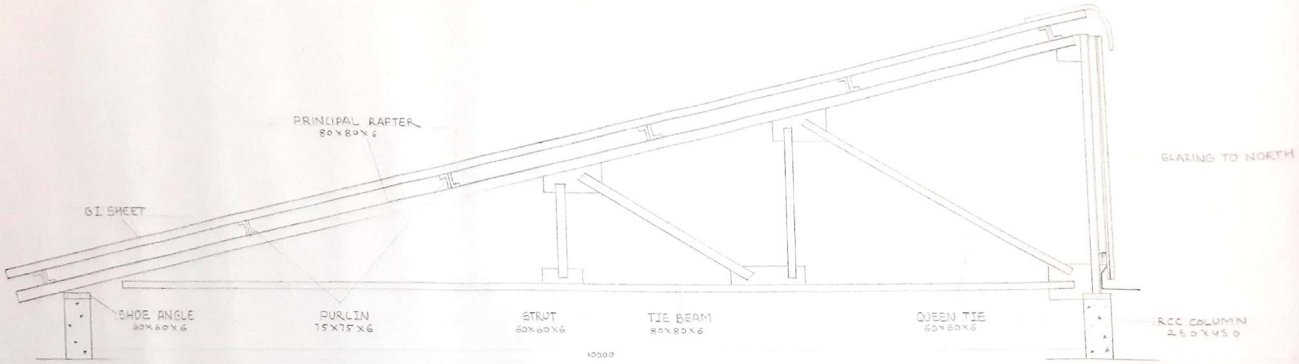

## STEEL ROOF TRUSS

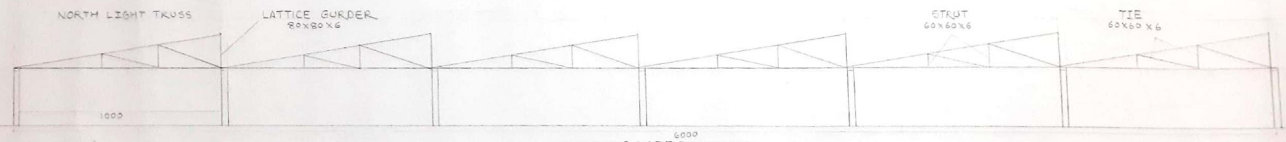
| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M JADHAV | | | |
| | | SUB- B.T. CON | | | |
| | | CLASS- T.Y. B. ARCH | | | |
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |



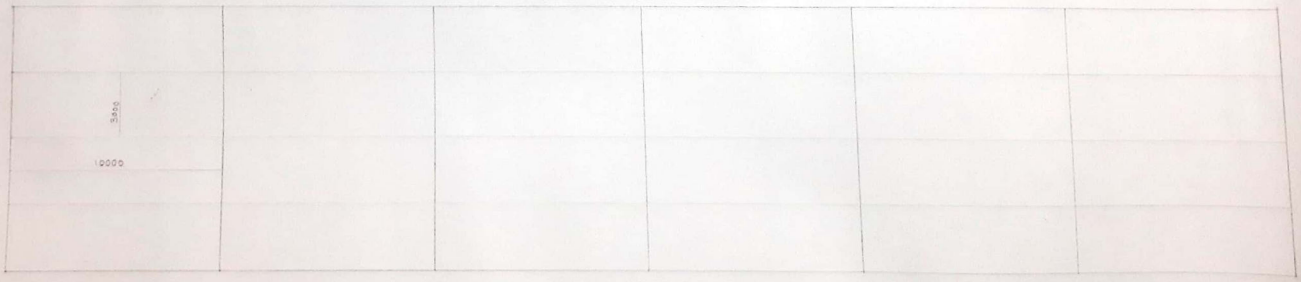

M S TRUSS

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME DNYANESHWAR M. JADHAV | | | |
| | | STD - T.Y. B ARCH. | | | |
| | | SUB - B.T CONSTRUCTION | | | |
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |



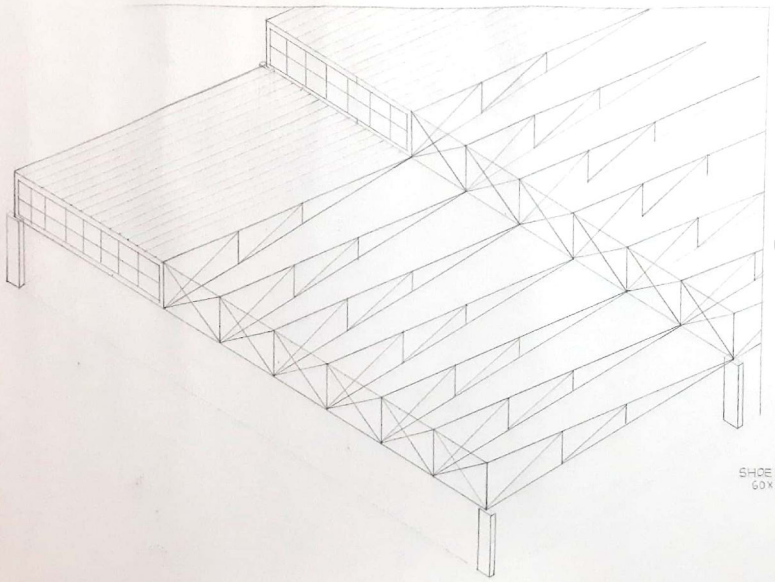

SECTION



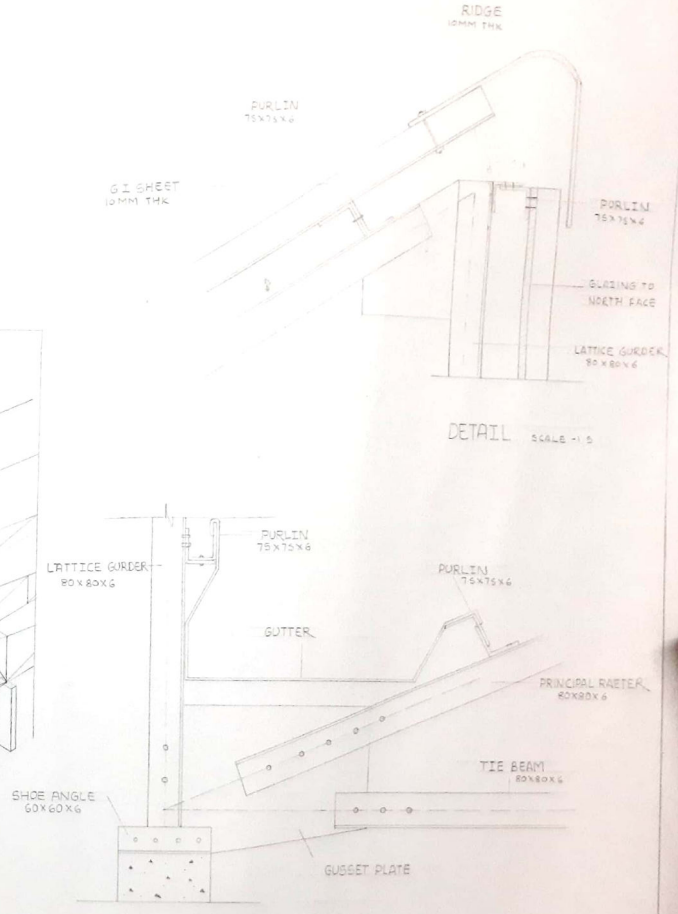

PLAN 1:10

NORTH LIGHT TRUSS

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME DNYANESHWAR M. JADHAV | | | |
| | | STD - I T B.ARCH | | | |
| | | SUB - B.T | | | |
| | | SCALE | ROLL NO | SHEET NO. | MARKS |
| | | | 06 | | |



ISOMETRIC VIEW SCALE:- 1:75




DETAIL SCALE 1:5

DETAIL AT B 1:5

MULTI-BAY NORTH LIGHT TRUSS.

| DATE | SIGN | A. B. COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME:- DNYANESHWAR M. JADHAV | | | |
| | | STD - T.Y.B.ARCH | | | |
| | | SUB - B.T CONSTRUCTION | | | |
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |

# PRE CAST STAIRCASE

TOP

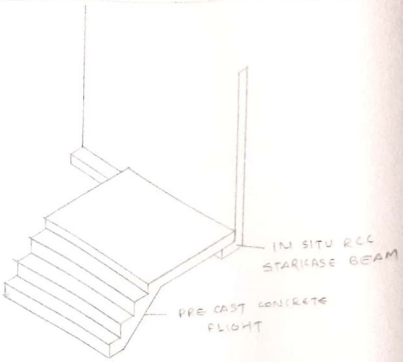
IN SITU CONCRETE STAIRCASE THE STAIRCASE ARE SUPPORTED ON SOFT PADS OF DISCRETE POINTS A JOINT SEPERATE WALL AND STAIR

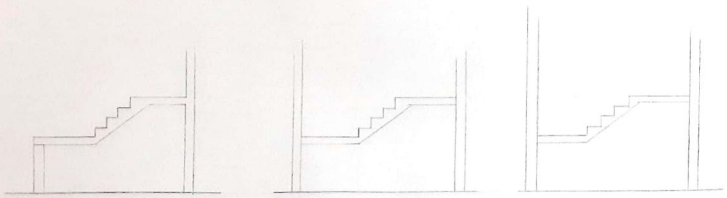
MIDDLE

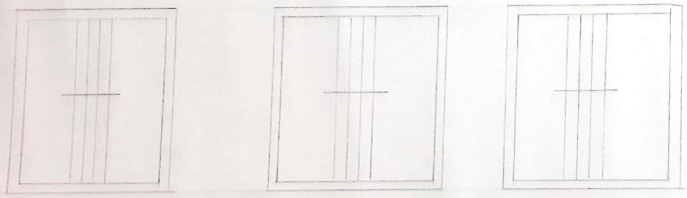
CAST IN PLACE CONCRETE STAIR SHAFT WITH ITERRATED STAIR FLIGHT. THE BOTTOM & TOP SUPPORT FOR FLIGHT INCLIN SOUND INSULATION OF LANDING ARE LITERALLY SUPPORTED.

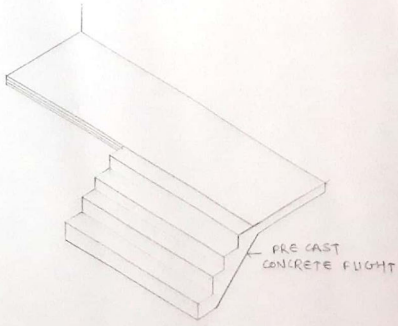
BOTTOM

STAIRCASE MADE COMPLETELY OF PERFACATED ELEMEN FLIGHT ARE EXTENDED LANDIN SUPPORT POINT SOUND INSULATION LAYER STAIR IS SUPPORTED FROM THE WALL ELEMENT.




PRE-CAST CONCRETE STAIRCASE FLIGHT STAIRS

## PRE CAST COMPONENTS

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV | | | |
| | | STD - T Y B ARCH | | | |
| | | SUB - B.T CON | | | |
| | | SCALE | SHEET | ROLL No 06 | MARKS |

# CAST IN SITU CONCRETE

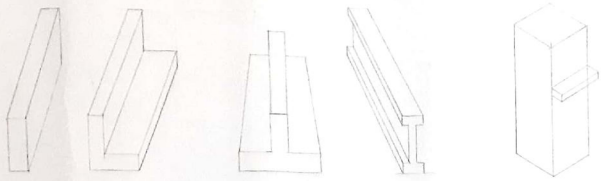
IT IS SYSTEM OF CONSTRUCTION OF BUILDING IN WIDTH WALLS, GLASS, BEAMS ETC CAST AT THE SITE IN THE FORMWORK.

PRECAST CONCRETE THE SYSTEM IN WHICH ALL THE BUILDING ELEMENTS ARE MNUFACTURE IN THE FACTORY MOULDS AND TRANS PORTED ON SITE FOR ERECTION.

## PRE CAST BUILDING COMPONENTS

1) BEAMS - BEAMS CAN VARY IN THEIR COMPLEXITY OF DESIGN AND REPLACEMENT FROM VERY SIMPLE TO THE MOST COMMON BEAMS WHICH TRAUSFER THEIR LOADIN TO COLUMNS.

2) COLUMNS - A COLUMNS IS A VERTICAL MEMBER CARVING THE BEAM & FLOOR LOADING IS THE FOUNDATION.



RECTANGULAR BEAM | L-SHAPED BEAM | INVERTED TIE BEAM | AASHTO BEAM

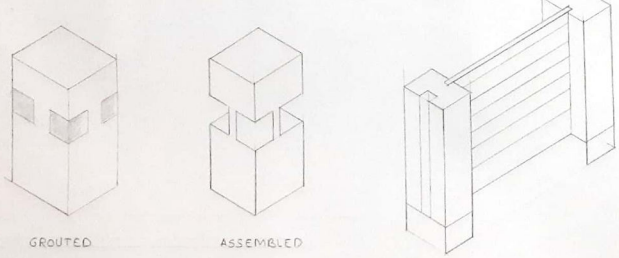
1) A PRE-CASTING CONCRETE WHICH IS CAST ON TO COLUMN WITH A LOADING NOWEL OR STOP BOLD TO FIX BEAM.
2) A PROJECTING CORBELL TO THE COLUMN AND BEAM IS BOLTED TO THE CORELL
3) COLUMN AND BEAM REINFORCEMENT, GENERALLY IN FORM OF HOOKS ARE LEFT EXPOSED THE TWO MEMBERS ARE HOOKED COVERED WITH IN-SITU CONCRETE TO COMPLETE JOINT.



SOLID FIAT SLAB | HALLOW CORE SLAB | DOUBLE TEE

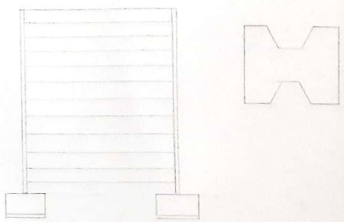
## PRE CAST COMPONENTS CONNECTIONS

1) COLUMN TO COLUMN CONNECTION - PRE CAST CONCRETE COLUMNS CONNECTED TOGETHER THROUGH BOLTING THE TOP LOWER FIGURE COLUMN THREADES BOLTS PROJECTING OUT WHILE BOTTOM OF UPPER FLOOR COLUMNS BASE PLATE CONTAINING HOLES TO ENGAGE BOLTS THE BOLTS THE BLOCK-OUTS IN THE COLUMNS ABOVE THE HOLES ARE FILLED WITH ENGAGE AFTER THE CONNECTIONS HAS BEEN MADE.



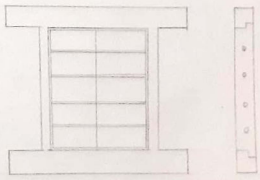
GROUTED | ASSEMBLED

PRE CAST COMPOUND WALL



ADVANTAGE
1) SAVE CONSTRUCTION TIME
2) QUALITY ASSUARANT
3) COST EFFECTIVE
4) DURABLE

DISADVANTAGE
1) SKILLED LABOUR REQUIRED
2) TRANSPORT ISSUE
3) MATERIAL STACKING
4) DIFFICULT IN HANDLING



ELEVATION | SECTION

# PRE CAST COMPONENTS

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M. JADHAV. | | | |
| | | STD - TY BARCH | | | |
| | | SUB - B T CONSTRUCTION | | | |
| | | SCALE | ROLL NO | SHEET NO | MARKS |
| | | | 06 | | |

# SLIDING FOLDING DOOR

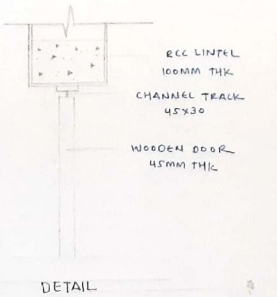
WOODEN SLIDE AND DOOR ARE USED MAINLY IN LARGE OPEN AREAS TO APPEAR LIKE A THE POOR IS A COLLECTION OF FRAMES WHICH FIXED OR MOVING FRAMES. THESE DOOR CAN BE OPEN INSIDE AS WELL AS ON THE OUTSIDE.

## ADVANTAGES -

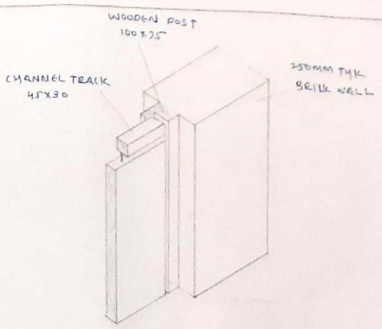
SLIDING FOLDING DOOR CAN SAVE A SURPRISING AMOUNT OF ENERGY BECAUSE THEY ALLOW MORE NATURAL LIGHT. YOU WILL NEED LESS ELECTRICITY FOR LIGHTING.

## USE -

1. SLIDING DOOR ARE COMMONLY FOUND AS A STORE HOTEL AND OFFICE ENTRANCE ELEVATORS, PATIOS DOORS, CLOSET DOORS AND ROOM DIVIDERS.
2. TRANSPORT INDUSTRIES ALSO USE SLIDING FLODING DOOR IN VANS, TRAINS AND METRO.

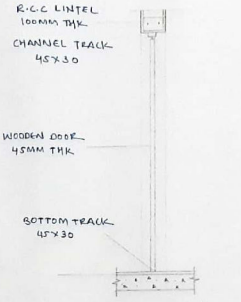



DETAIL

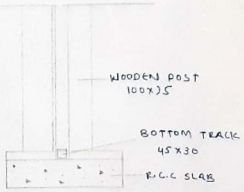



ISOMETRIC VIEW


ELEVATION 1:50




SECTION AA' 1:20

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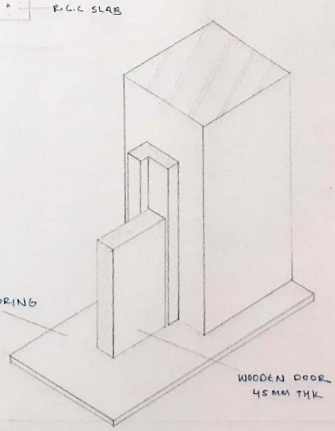
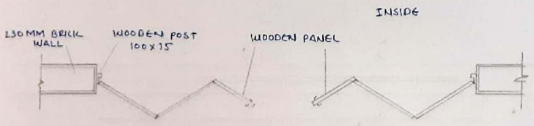
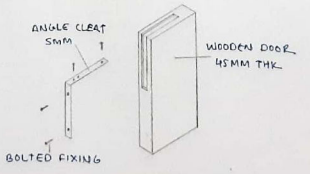



ISOMETRIC VIEW 1:5



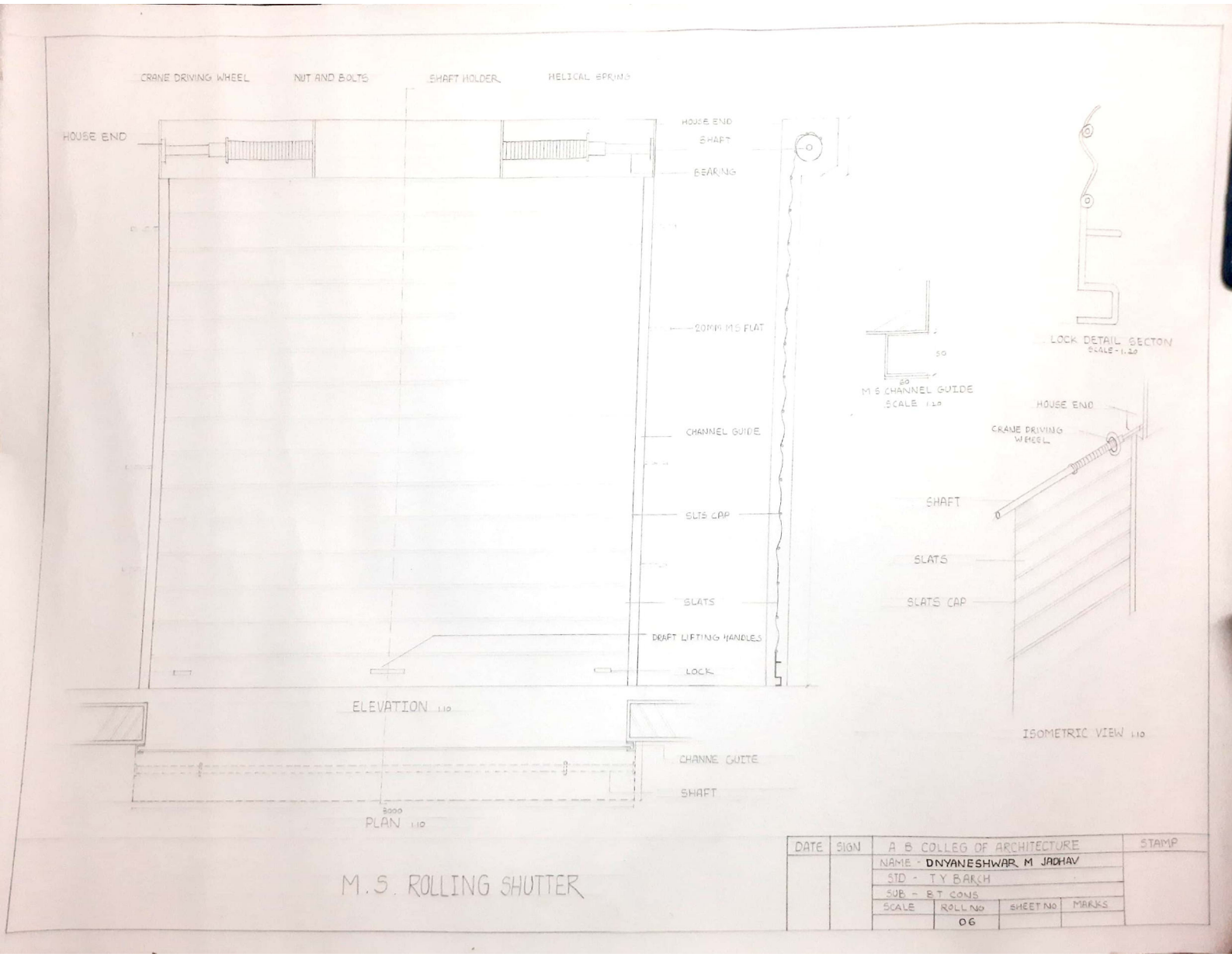

PLAN 1:20




ISOMETRIC VIEW 1:5

# SLIDING FOLDING DOOR

| DATE | SIGN | A B COLLEGE OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M JADHAV | | | |
| | | DIV - A | STD - T.Y. B.ARCH | | |
| | | SUB - BT CON | | | |
| | | SCALE | ROLL NO 06 | SHEET NO | MARKS |




# M.S. ROLLING SHUTTER

| DATE | SIGN | A. B. COLLEG OF ARCHITECTURE | | | STAMP |
|---|---|---|---|---|---|
| | | NAME - DNYANESHWAR M JADHAV | | | |
| | | STD - T.Y BARCH | | | |
| | | SUB - B.T CONS | | | |
| | | SCALE | ROLL NO | SHEET NO | MARKS |
| | | | 06 | | |

Name :- Dnyashwar M. Jadhav.

Roll No :- 06

# Pre-cost Construction Components.

Q. What is pre-cost or prefabrication?

Ans :- • Prefobrication is the practice of assembling components of a structure in a factory or other manufacturing site, and transporting complete assemblies or sub-assemblies to the construction site where the structure is to be located.

• It is combination of good degign with modern high performance components & quality controlled manufacturing procedures.

• Prefabricated section are produced in large quantities in a factory & then shipped to various construction sites.

• This processure may allow work to continue despite poor wheather conditions & should reduce any waste in time and material at the site.

• Precast concrete units are cast & hardened before being used for construction.

• This technique permits the speedy erection of structure.

• The Prebrication as defined will be done in two stages manufacturing at factory condition & erection of components at the required location.

• This requires certain stage of preparation. They are

1. Casting
2. Curing
3. Transportion and erection.

Q. Pre-Cast Bulding Components

Ans :- 1. Coloumns :-

A columns is a vertical member carrying the beam & floor loadings to the foundation.

2. Beams :-

Beams can vary in their complexity of design & reinforcement from the very simple beam formed over an isolated opening

to the more common encountered in frames where the beams transfer their loading to the column.

Method of Connecting beams & Coloumns

- A precasting concrete haunch is cast on to the column with a locating dowel or stud bolt to fix the beam.
- A projecting metal corbel is fixed to the column & the beam is bolted to the corbel.
- Column and beam reinforcement, generally in the form of hooks are left exposed. The two members are hooked together & covered with insitu. Concrete to complete the joint.

Precast Concrete Slabs

- Used for floor & roof decks
- Deeper elements (towards the right below) Span further than those that are shallower. (towards the left).
- Right : Hollow core slabs stacked at the precasting cast.

Slab to Beam Connection.

- Top :-

In situ concrete staircase, the stair are supported on soft pads at discrete points, a joint separate wall & stair.

- Middle :-

Cast in place concrete stair shaft with prefabricated stairs flights, the bottom & top support for the flight include sound insulation, the landing are laterally supported on soft pads, flight separated from wall by a joint.

- Bottom :-

Staircase made completely of prefabricated element, the flights are extended to including landing, support point with sound insulation layer. Stair is separated from wall element.

Dewatering -

- Dewatering is used to describe the artificial means of removing groundwater or surface water for favorable condition of any construction
- Normally, dewatering process is done by pumping or evaporation.
- It is usually done prior to excavation for footing or to lower water table that might be causing problems during excavation.

Need of dewatering.

- As we all know that for working at a construction site. it should be completely dry and the work will be under heaps of soil
- In excavation of mines and Roads dewatering is must will lead to accidents and work will be safely of the safety of the people working.

Purpose -

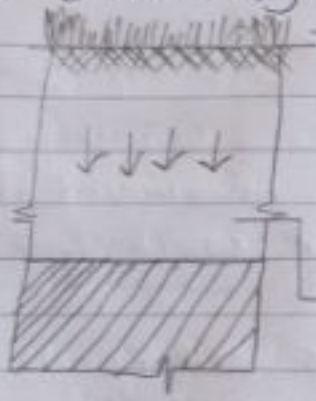
Reduce or eliminate uplift pressure on Bottom slabs and permit economies from the Reduction of slab thickness from basements, buried structures, canal

Gning, spillways, dry docks etc.

* Methods of Dewatering.

1) pumping method
   a) sump pumping
   b) well point
   c) deep well
   d) vacuum
   e) Electro osmosis
2) Exclusion method
   a) ground freezing method
   b) Grouted cut-offs.

* Dewatering of trenches



→ surface water - Run off from earth surface 10% of water falling into surface but on hard paved area run of usually 98% to 90%.

→ Ground water - water held in the subsoil is usually percolating down towards water table

water table - upper level of water held in the soil which varies wet & dry period.

subsoil water - water held in the ground level below the water level.

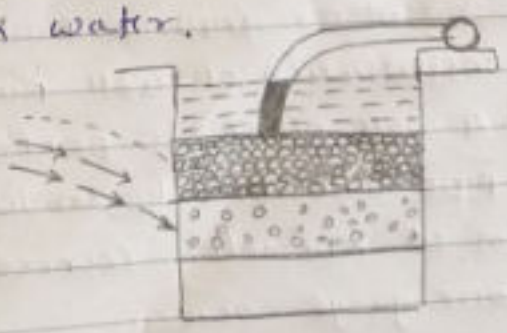
* Problems of water in the soil:

1) A high water table could cause flooding during wet period
2) Subsoil water can cause flooding during excavation works by the excavation activities
3) It can cause an accepted humidity level ground finished Building of structures.

a) Sump pump method -

Sump pumping is the simplest form of ground water control by pumping in its basic form it involve allowing groundwater to seep into excavation and directing the ground-water to localised low points (called sumps) in the excavation.

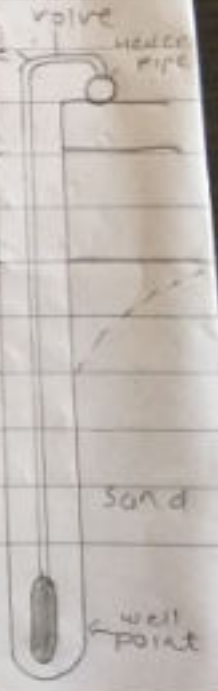
Water collects in this sumps, which are equipped with 'sump-pumps' - Robust pumps with capacity to handle some solids in water.



* Advantages
1) Widely used method
2) most economical method for installation and maintinance.
3) Can be applied for most soil and Rock Conditions
4) most appropriate method in situation where boulders or massive constructions are met within ground. Greatest depth to which water table can be lowered by this method is about 8m below the pump.

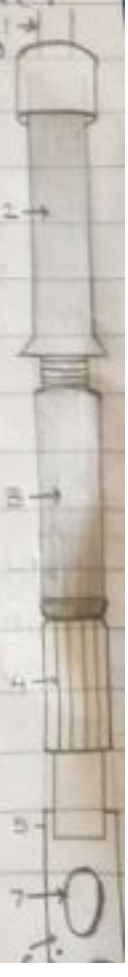
* Disadvantages
1) Ground water flows toward excavation with the high head or a steep slope and hence there is a risk of collapse of sides
2) In open or timbered excavations there is Risk of ~~soil~~ instability of base due to upward.

B) well point system
1) A more complicated dewatering based on gravity flow is the installation of well points
2) A well point is perforated pipe about 1/2 to 1m long and 5 to 8 cm in diameter covered by cylindrical wire guage screen.



3) A conical steel drive point is attached to lower end of pipe with neoprene ball valve fitted in the point to allow cleaning of water to pass through it for driving it.

4) When operating on suction, the ball is in position shown and the soil enters outer screen, through the mesh and down the flutes of inner tube. Holes near the bottom of the latter and just above the shoe admit water to the inside where. It is down up riser, along the header to the pump for discharge through the pipes to a drawn.

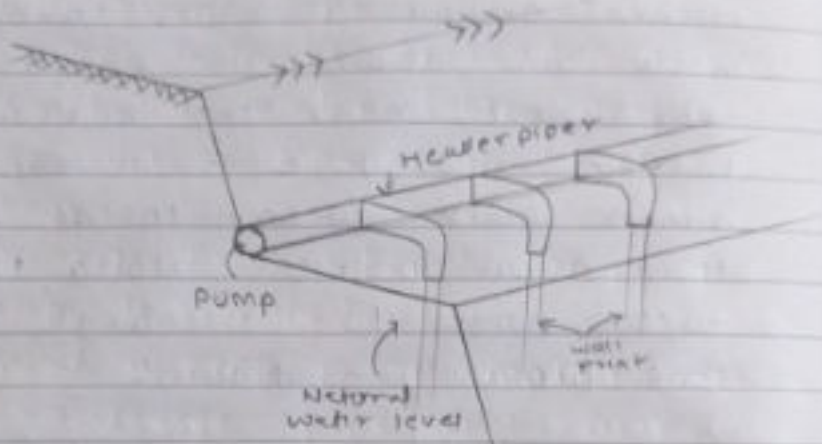



Considerations of well point system-

a) Physical conditions of site to be dewatered
b) The physical layout
c) Adjacent areas
d) soil conditions
e) permibiality of soil
f) amount of water to pumped.
g) Depth to imperviousness.

The suction pipe is used in well point system has a capacity of bringing water to surface from max depth 6m.

- In multi stage of well points system the ground is first stripped to natural water level where first stage of well points is installed.




- After excavating about 5m, second stage is installed to further lower the water table for advancing excavations
- The outer stages are put succesively upto a max depth of 16m is reached.
- In well point system, round the clock pumping shedule is essential as the interrupting in pumping can have catashopic consequences Hence, One pump for each two pumps in use should always be available.

* Advantages -

1) Effective in sandy soil
2) Provide drawndown upto 5.6m in sand and 4m in silty soil
3) Relatively cheap and flexible
4) Rapid installation
5) water is filtered and carries little or no soil particles.
6) There is less danger of subsidence of the surrounding ground than with open sump pomping.

* Disadvantages -

1) Not effective beyond 4-6m of drawndown
2) Might require of well installation.

* Deep well system

1) Deep well system consist of one or more individual wells, each of which has its own submersible pump at the bottom of well shaft.
2) Such systems are particularly suitable where large volumes of water from surroundings area exist

3) The range of permiability which the deep well system is applicable

4) A typical deep well consist of drilled hole with which is lower screened casing which admits water to pump an upper casing which prevents soil from reaching pump and within the casing the pump and it discharge pipe.

5) When the depth of excaunction is more than 16 m below water table, deep well drainage system may be used with advantage.

6) Th discharge pipe support the pomp to which it attathed.

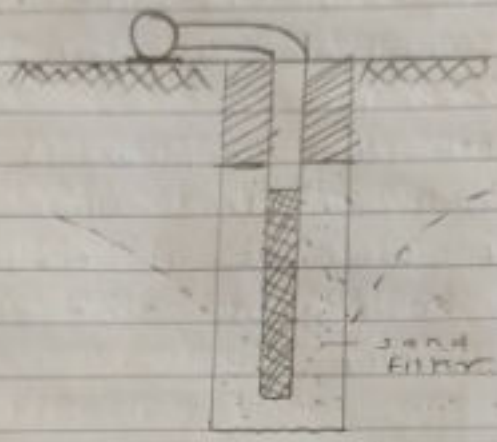
7) Electrical wiring pump motors runs betn discharge pipe and casing.

8) Space Between drilled holed and casing Normally packed with filler material from soil surrounding the well.

9) Spacing of deep well point system Normally, individual wells are spaced an approximate distance of 15m apart.

10) Dewatering capacity are from 21 to 3000 gallons / min and with total systems capacities can be as high as 60,000 gallons

(4) The top portion is then sealed up
(5) The header pipe is connected to vaccum pumps
(6) The vaccum pump create a vaccume inside the sand surrounding so that the atmospheric pressure squeezes the water out thus marking the Soil STIFF FOR work

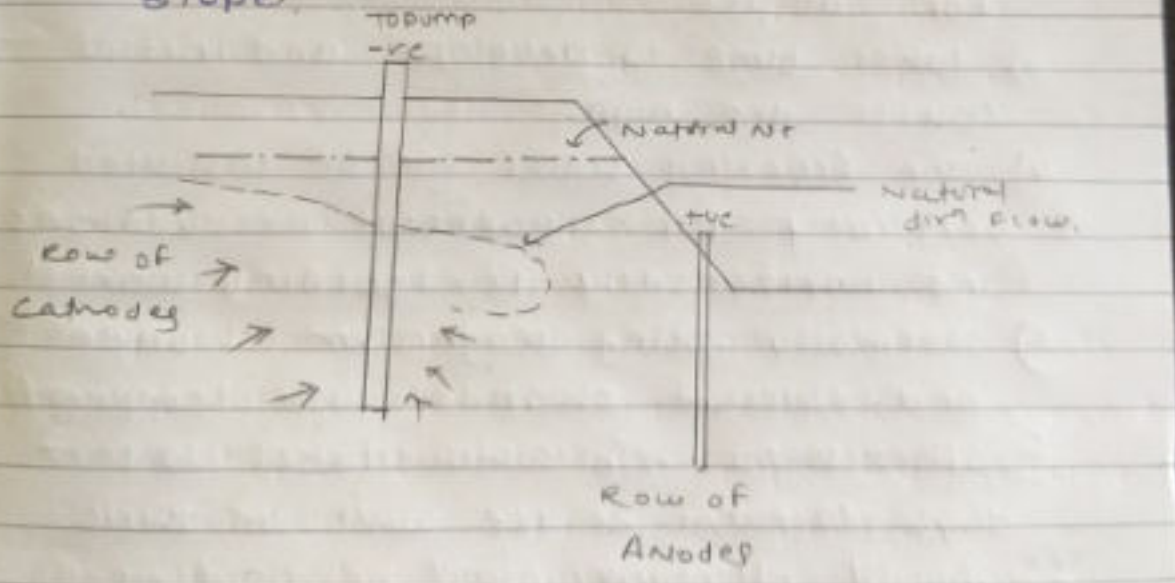



* Electro-osmosic method -
(1) This method is used for fine grained cohesive soils, which can be drained or stabilized using electric current.
(2) The method was developed by L.J casagrande
(3) IF direct curren is passed between two electrodes driven into natural soil mass, the soil water will travel from positive electrode

to negative electrode.

4) The cathode is made in form of well point or metal tube for pumping out seeping from of well point or metal tube for pumping out seeping water. A steel rod, pipe or steel piling of excavation can serve as cathode.

5) The arrangement of electrode is done in such a way that natural direction of flow of water is reversed away from excavation, thereby increasing the strength of soil and stability of slope.



* Ground freezing method.

principle - to change the water in the soil into a solid wall of ice. seepage into excavation or shaft can be prevented by freezing the surrounding soil. However, freezing is expensive & requires expert design, installation & operation.

1) Suitable for all types of saturated soils and rock and for soil with moisture content in excess of 8% of voids.
2) the basis principle is insert into ground of series of freezing tubes to form an ice.
3) takes time to develope and initial coasts are high.
4) The freezing tubes can be installed vertically for convertial excavations and horizontally for turning works
5) Normally using magnesium chloride and calcium chloride with temperature of -15 to -25°c which takes 10 to 17 days to form an ice wall 1m thick
6) liquid Nitrogen could be used as freezing medium to Reduce initial freezing period if the extra cost can be justified.


formation of frozen earth barrier in different soils.

* Advantages -
1) Ground freezing is an extremly versatile method for temporary ground improvement
2) Applicable to entire range of soils
3) Applicable to different ground conditions including large Bubble & cobbles.

* Disadvantages -
1) Ground freezing is highly energy intensive process requiring refrigeration of massive qty of soil over extended periods of time.
2) Requires plenty of monitoring bore temperature, soil temperature, deflection of adjecent nerby structures, heaving and settlement at ground surface.

ground water, salinity, pressure, frozen wall, thickness, dimensions, of possible window within the frozen wall etc.

* Grouting method

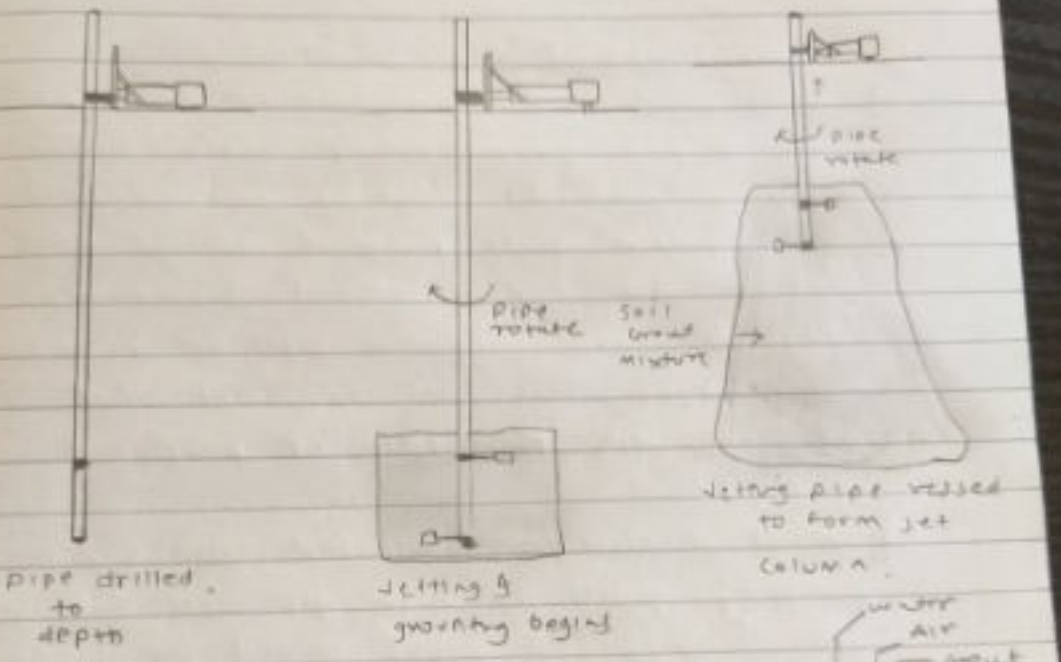
1) It is used to form curtain or cut off wall in high permiability soils where pumping method could be uneconomic.
2) Be curtain wall formed by grouting method are non-structural therefore, adequate earth support will be required some cases this will be a distance at least 4m from face of proposed excavation.
3) Grout mixture are injected soil by pumping grout at high pressure through special injection pipes inbted the ground.
4) The pattern and spacing the injection pipe will depend on grout type and soil conditions.

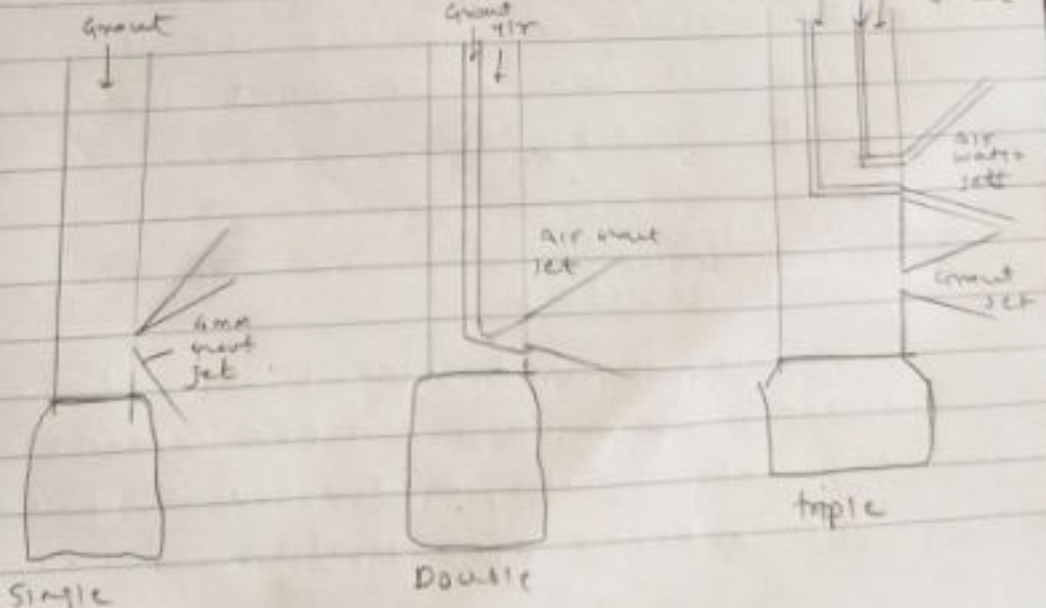
Grout type

a) coment groute -

mixture of neat cement of water, coment, sand upto 1:4 per cement to 1:1 ratio suitable for coarse, gained soils & fixed rock strata

b) Chemicel grout - coarse sand
c) Resin grout - weak in silty fine sand.




Basic jetting system

# CLADDING

# *WHAT IS CLADDING ???*

- **Cladding** is typically **made** from wood, metal, plastic (vinyl), masonry or an increasing range of composite materials. It can be attached directly to the frame or to an intermediate layer of battens or spacers to prevent condensation and allow water vapour to escape.

# TYPES OF CLADDING

- STONE CLADDING
- TIMBER CLADDING
- METAL CLADDING

# STONE CLADDING

- Stone cladding is a Stone veneer, or simulated stone, applied to a building or other structure made of a material other than stone. Stone cladding is sometimes applied to concrete and steel buildings as part of their original architectural design.

# TIMBER CLADDING

- **Timber cladding** is a widely-used, common exterior finish for buildings; '**cladding**' refers to a covering for a structure, as well as all the components attached to achieve this. ... But the natural aesthetic appeal of **wooden cladding** has made it a timeless, popular choice that will never go out of fashion.

# *METAL CLADDING ???*

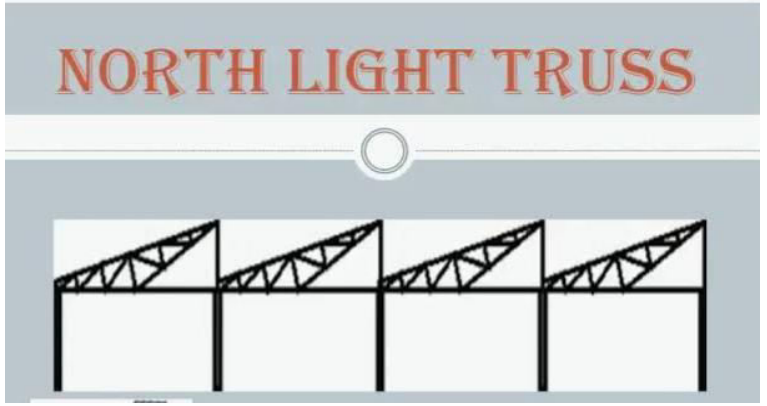
- Metal cladding is a type of protective coating, where the protective material such as metal powder or foil is bonded to a substrate by applying heat and/or pressure. The study of metal cladding is significant because this method of corrosion protection and wear protection is generally very reliable and cost-effective.

# NORTH LIGHT ROOF TRUSS

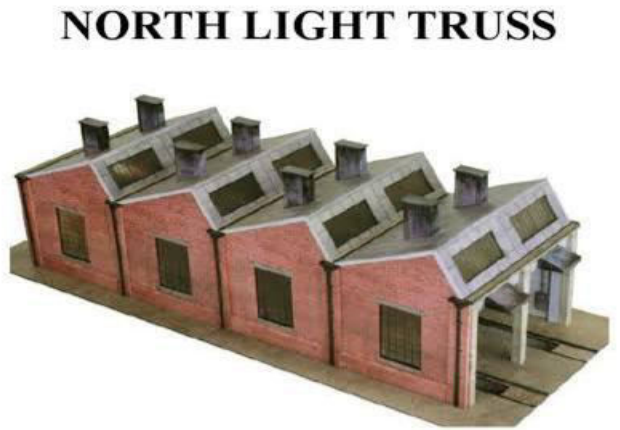
GROUP MEMBERS-
1.APURVA BHANDARE
2.APEKSHA BHOSALE
3.MANSI DESHPANDE
4.SUMEDHA GADKAR
5.ASHUTOSH GHORPADE
6.DNYANESHWAR JADHAV

# INTRODUCTION

- This roof consists of a series of trusses fixed to girders. The short vertical side of the truss is glazed so that when the roof is used in the Northern Hemisphere, the glazed portion faces North for the best light.




- They allow maximum benefit to be gained from natural lighting by the use of glazing on the steeper pitch which generally faces north or north-east to reduce solar gain.

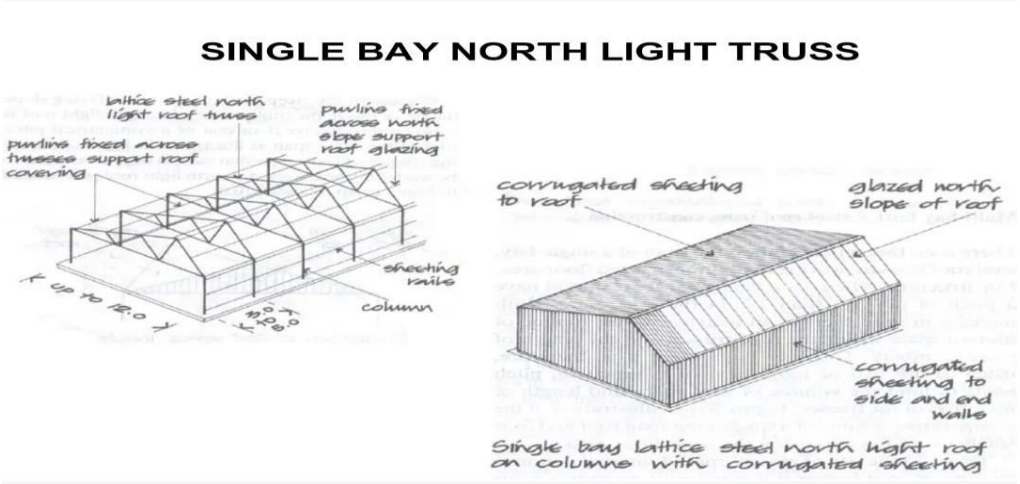



- It can be used for spans from 15-30m.

**There are two types of North light roof truss –**

- **Single Bay North Light Truss –**

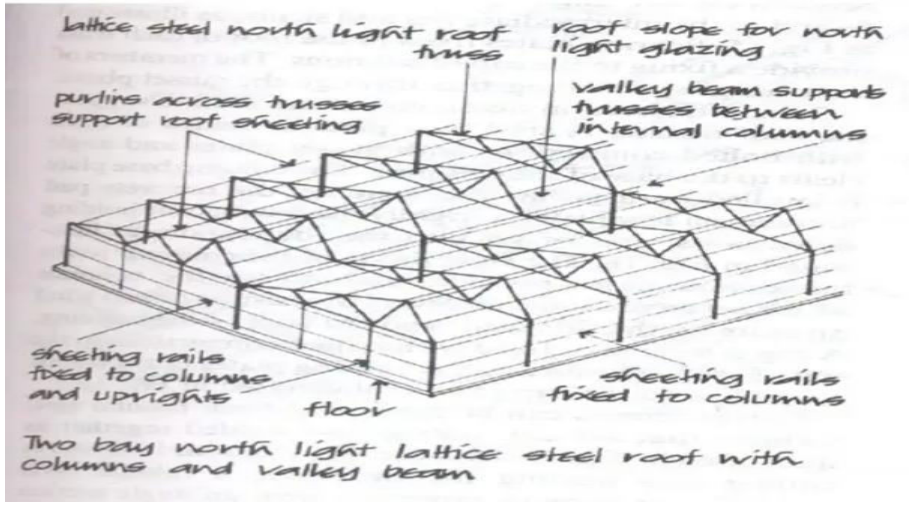
This type of truss system is used in industrial construction where manufacturing activities take place on a large scale.




- **Multi Bay North Light Truss -**

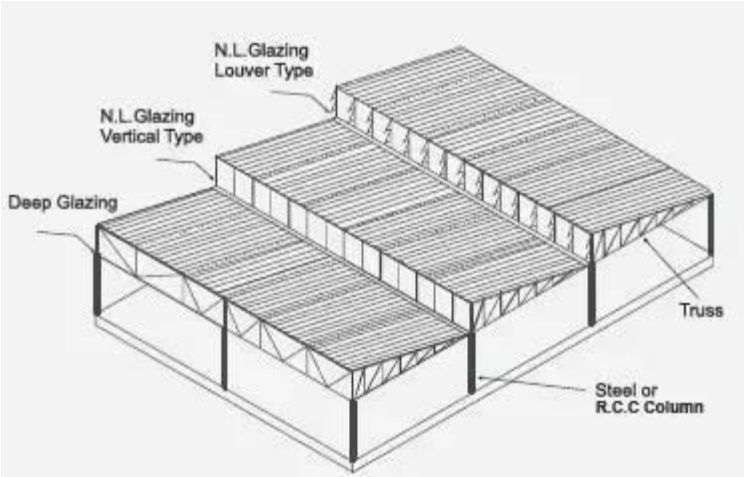
A saw-tooth roof is a roof comprising a series of ridges with dual pitches either side.

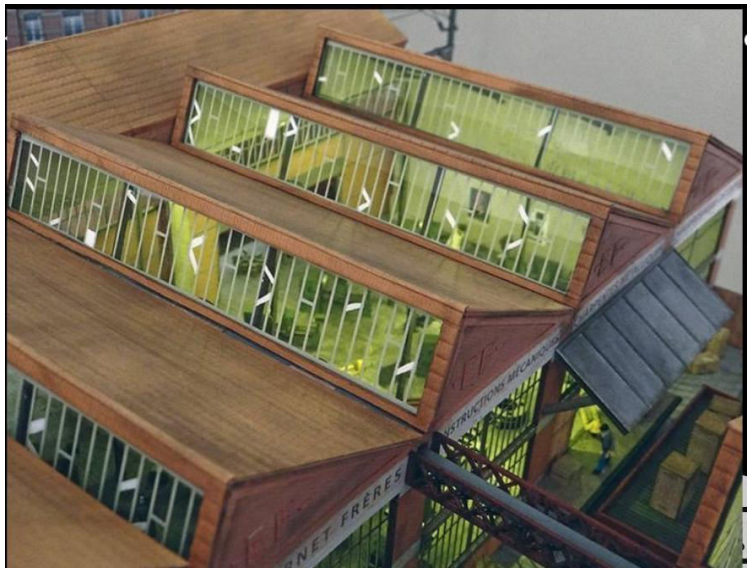
This kind of roof admits natural light into a deep plan building or factory.



## METHOD OF CONSTRUCTION -

- North light truss has assymetrical profile.
- South facing slope at 17 degree .
- The north facing slope at from 60 degree to vertical.
- The whole of the south slope is covered with profiled sheets .
- The whole north facing slope with glass or translucent plastic sheet.
- Because of the steel pitch of the north facing slope the space inside the roof trusses of a north roof is considerably greater than that of a symmetrical pitch roof of the same span.



# ADVANTAGES

- The truss are used for large span constructions such as factories, industry work sheds, shopping malls, huge exhibition center, multiplexes etc.
- They are generally used for spans as large as 25-30m.
- •30% to 40% less surface area than that of an equivalent rolled steel shape. Therefore, the cost of maintenance, cost of painting or protective coatings reduce considerably.
- The moisture and dirt do not collect on the smooth external surface of the tubes

  therefore, the possibility of corrosion also reduces
- The ends of tubes are sealed.
- As the result the interior surface is not subjected to corrosion. The interior surface do not need any protective treatment
- •They have more torsional resistance than other section of the equal weight

# NAME:DNYANESHWAR M. JADHAV

T.Y.B.ARCH

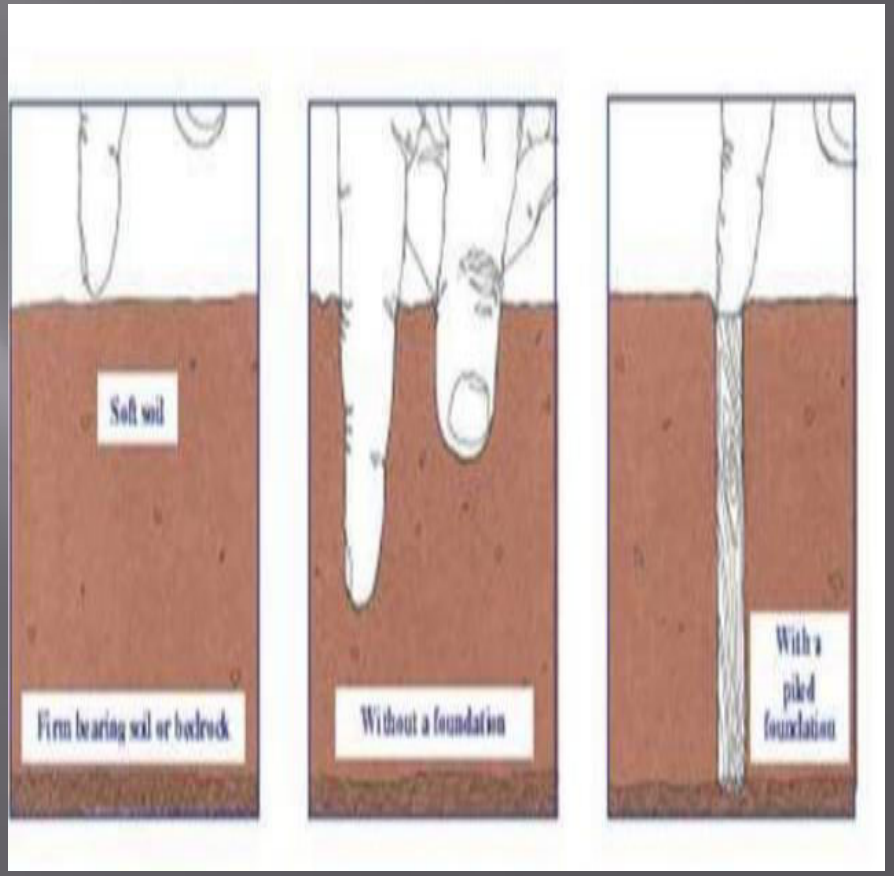
DIV – A

ROLL NO. -6

# ACCESSORIES REQUIRED FOR DRIVING PILE FOUNDATION

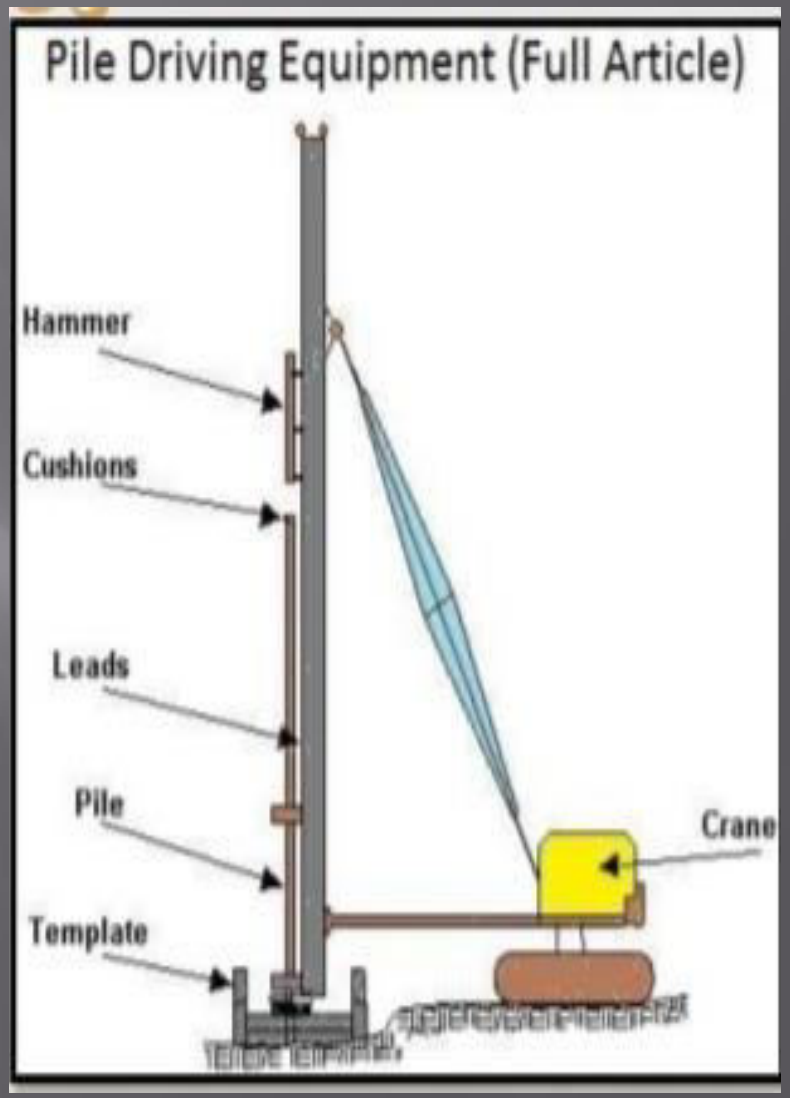
# PILE FOUNDATION

A pile is a long slender foundation member, made either of timber, structural steel or concrete which might be cast-in- situ or driven and acts as a structural member to transfer the load of the structure.



# Pile driving

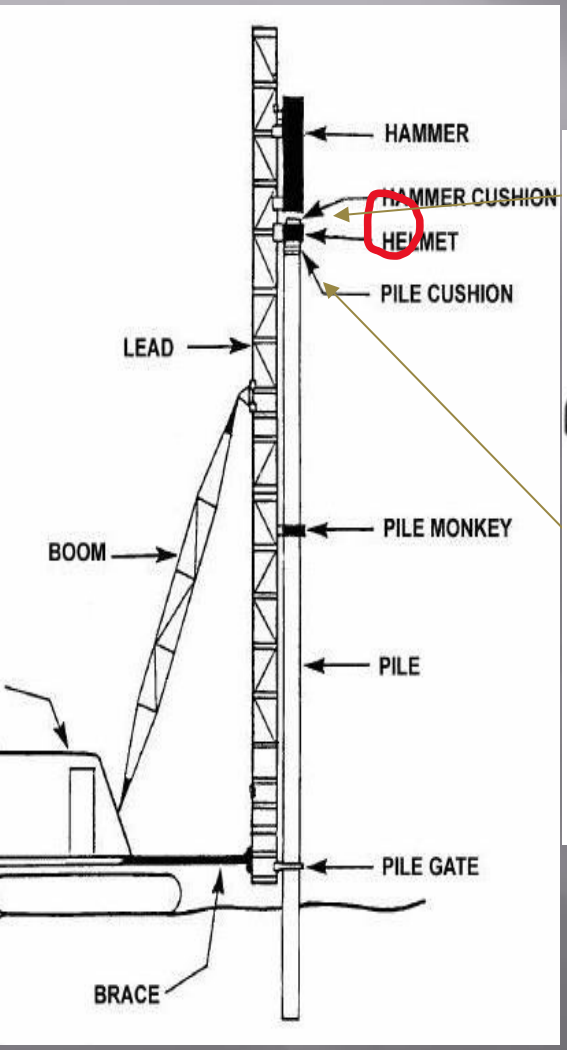
The operation of forcing a pile into the ground is known as pile driving.

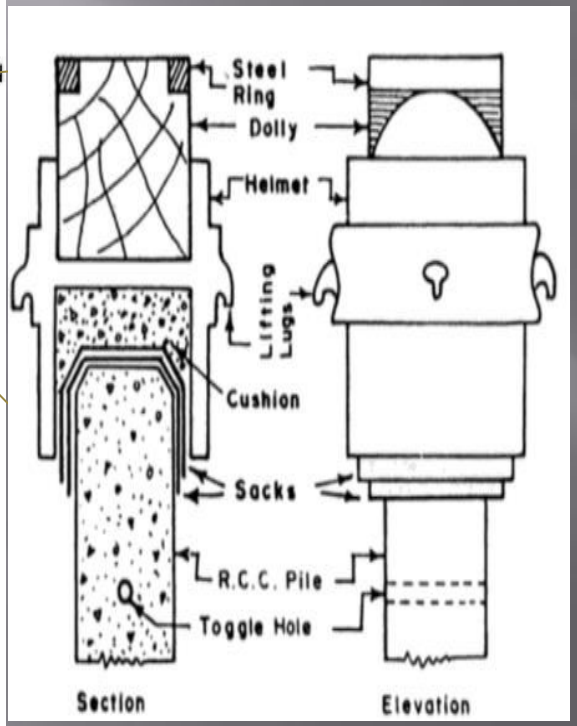


# TYPES OF PILE DRIVERS

- DROP HAMMER
- SINGLE ACTING STEAM OR COMPRESSED AIR HAMMER
- DOUBLE ACTING STEAM OR COMPRESSED AIR HAMMER
- DIESEL HAMMER
- VIBRATORY HAMMER
- HYDRAULIC IMPACT HAMMER

# DRIVE CAP OR HELMET

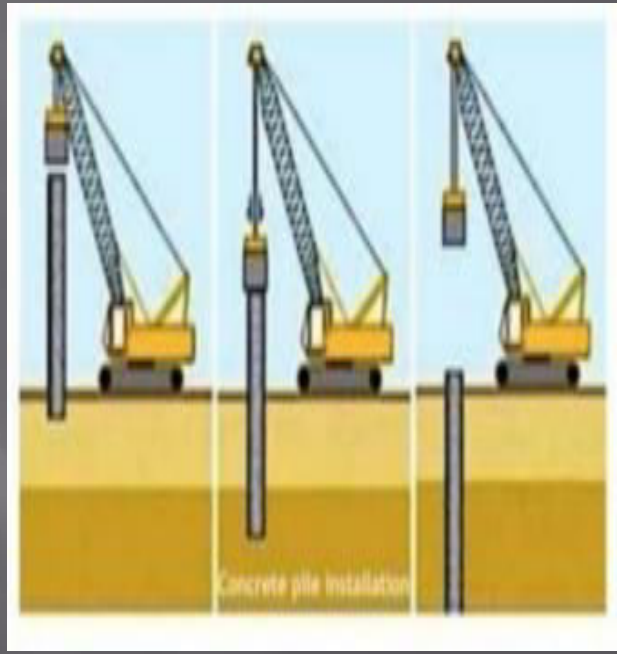



- During pile driving , heads helmets or caps are placed on the top of pile to receive the blows of hammer and to prevent damage to head of the pile .
- It is made out of cast steel .
- It also helps to maintain the axis of the pile in line with the axis of hammer.
- The helmet is placed with a timber stub dolly at its top . A cushion or pad of resilient , material , saw dust ,

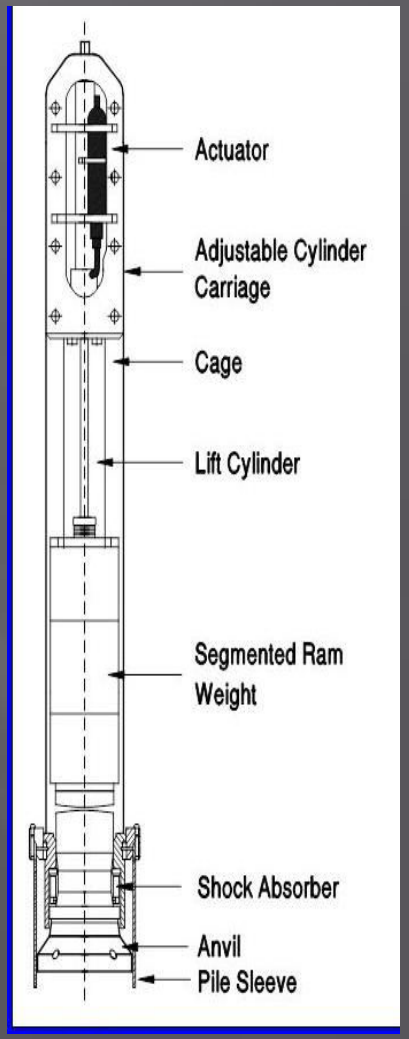
# 1. DROP HAMMER

- Drop hammer is a heavy metal weight that is lifted by a hoist line, then released and allowed to fall onto the top of pile.
- Because of high dynamic force, a pile cap id positioned between the hammer and pile head.
- Standard drop hammer weight -500-3000Ib
- Suitable for driving piles on remote project that requires only a few piles and for which time of completion is not important factor.
- A drop hammer can deliver 4-8 blows per minute.



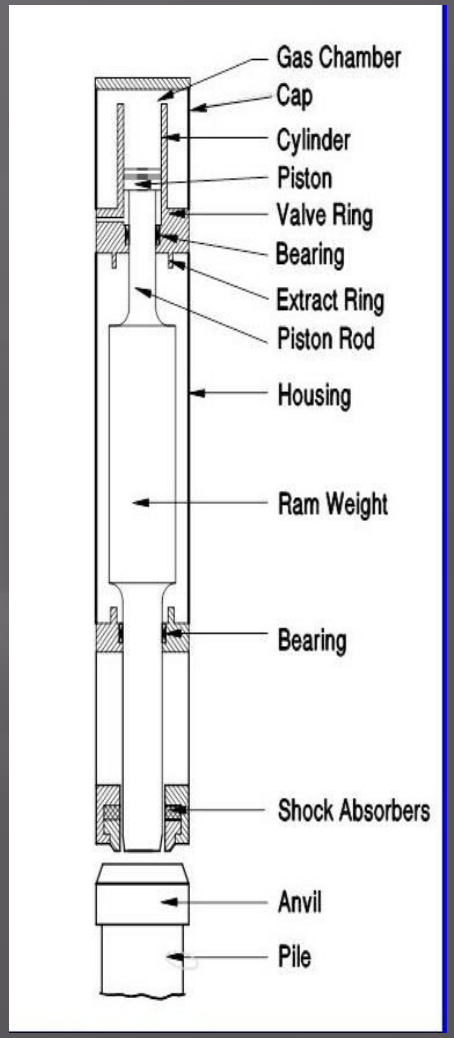
# 2 SINGLE ACTING STEAM OR COMPRESSED AIR -

- It has freely falling weight called a ram. that is lifted by steam or compressed air.
- When the piston reaches the top of stock, the steam or air pressure is released and the ram falls freely to strick the top of the pole.
- These hammer rely solely on gravity acting on the striking weight.
- The heavy weight strikes with low velocity due to short fall distance.
- Hammer are available in sizes varying from about 7,000-1,800,000ft-Ib of energy per blow.
- 40-60 blows per minute.

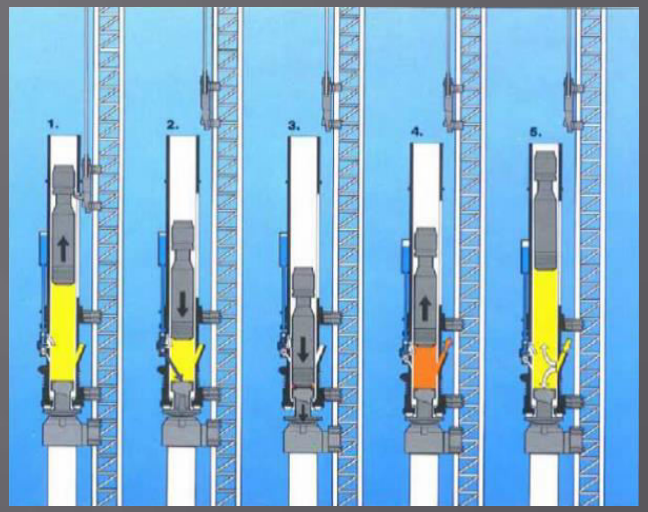


# 3 DOUBLE ACTING STEAM OR COMPRESSED AIR-

- The striking ram is driven by compressed air or steam both when rising and when falling.
- Double acting hammer commonly delivers 95-300 blow per minutes.
- Lower blow counts are for larger hammer and higher counts for smaller bammers.
- In comparison with single acting hammer,the ram of double acting is only 10-20%, 90% of its energy is delivered by action of air or steam.
- Advantage when driving light to medium weight piles into soil having normal friction resistance.



# 4 DIESEL HAMMER-



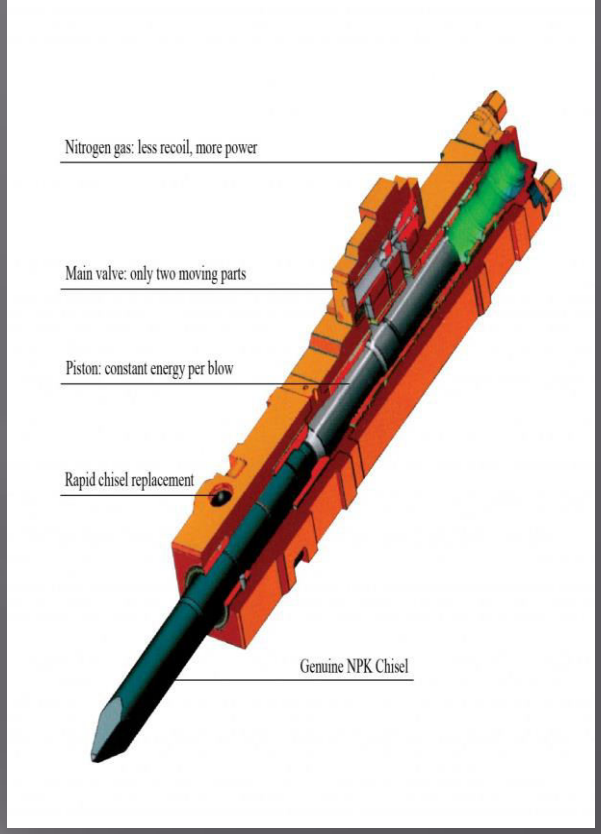

- It is a self contained driving unit that does not require an external source of energy such as air compressor or steam boiler.
- It is simple and more easily moved from one location to another than steam hammer.
- Open end diesel hammer deliver 40-55 blows per minute and closed end middle operate at 75-85 blows per minute.
- It works well in cohesive or very dense soil layers.
- The hammer may not operate when driving piles into soft grounds.

# 5 HYDRAULIC -IMPACT HAMMER

- They are reported to have an efficiency of 90% or better in delivering energy to piles.
- More efficient than steam, air or diesel hammer.
- It operates on differential pressure of hydraulic fluid instead of compressed air or steam.
- Hydraulic drop hammer -ram is lifted by hydraulic pressure to preset height and allowed to free fall.
- Double acting hydraulic hammer - ram is lifted by hydraulic pressure and is also driven hydraulically on its downward stroke.

# 6 HYDRAULIC DRIVERS-

- Press in hydraulic pile drivers, which can be used for thrusting and extracting steel H piles and steel sheet piles.
- The pile driver grips the pile and then pushes the pile down approx. 3 ft.
- At the end of down stroke, the pile is released and the gripper slides up the pole 3 ft to begin the process of another push.
- It develops 140 tons of pressing or extracting force.
- Are compact, make minimal noise and cause very little vibration.
- Suited for driving pile in areas where there is restricted overhead space.




# 7 VIBRATORY DRIVERS

- Effective when piles are driven into water saturated non cohesive soil.
- The drivers may experience difficulty in driving piles into dry sand or similar material or into non cohesive soils thst do not respond to vibrations.
- The vibration  are transmitted to pile because it is rigidly connected to driver.
- From pile the vibrations are transmitted to adjacent soil.
- The agitation of  the soil materially reduces skin friction between the soil and pile.
- It is powered either electrically or hydraulically,therefore a generator or hydraulic power pack is needed.