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FACULTY OF ENGINEERING AND
TECHNOLOGY (DEPARTMENT OF
CIVIL ENGINEERING)

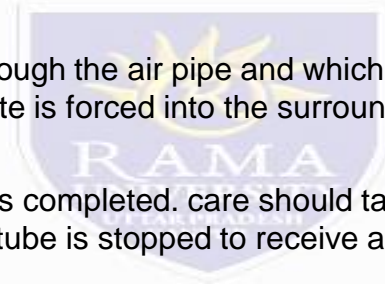
CONSTRUCTION TECHNOLOGY
B. Tech (IIInd YEAR/ IIIrd SEM)



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PRESSURE PILES

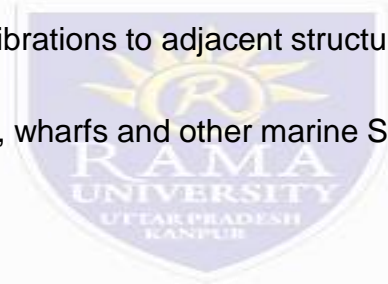
- These are formed with the help of a casing tube, boring auger and compressed air equipment. these piles are especially suitable for those congested sites where heavy vibrations and noise are not permissible.
- A hole is bored into the ground by means of an auger and as the boring proceeds, the hole is lined by a steel tube.
- When the tube reaches the required depth, the boring tool is withdrawn. the reinforcement, if any is then placed in the tube.
- In the second stage, a layer of concrete is laid and pressure cap is provided at the top of the tube.
- Compressed air is then admitted through the air pipe and which is applied to raise the tube. Thus, the pile is lifted slightly and at the same time concrete is forced into the surrounding ground by compressed air.
- The process is repeated till the pile is completed. care should be taken to see that some portion of concrete remains at the bottom of tube when lifting of tube is stopped to receive a new layer of concrete.



TYPES OF PILES (Classification based on Materials)

- **SHEET PILES**

- Sheet piles are thin piles, made of plates of concrete, timber or steel, driven into the ground for either separating members or for stopping seepage of water. They are not meant for carrying any vertical load. Therefore, sheet piles are also termed as non-load bearing piles.
- Sheet piles are used for the following purposes:
 - I. To isolate foundations from adjacent soils.
 - II. To prevent underground movement of water.
 - III. To prevent the transfer of machine vibrations to adjacent structures.
 - IV. To construct retaining walls in docks, wharfs and other marine Structures.
 - V. To protect river banks.
 - VI. To retain sides of foundations trenches.
 - VII. To work as cutoff walls under dams.
 - VIII. To confine the soil and thereby increase the bearing capacity of soil.
 - IX. To construct caissons for water-intake structures.



TYPES OF PILES (Classification based on Materials)

SHEET PILES

- Based on the material, types of sheet piles are:
 - I. Concrete sheet piles
 - II. Steel sheet piles
 - III. Timber sheet piles

CONCRETE SHEET PILES :

- Concrete sheet piles are reinforced, precast units. The width of each unit may vary from 50 cm to 60 cm and thickness varies from 2 cm to 6 cm.
- The reinforcement is in the form of vertical bars and hoops. For important works, Pre-stressed precast concrete piles are used.
- Pre-cast RCC sheet piles are used for permanent work such as bulk Heads, cut-off walls, retaining walls, wharf walls, etc. In order to make them water tight, they are placed in such a way that Grooved are formed and these grooves are then filled by cement mortar In proportion (1 : 3) under pressure.
- The feet of the piles are shaped obliquely and beveled so as To facilitate driving. Metal shoes are provided at the bottom of the piles, If they have to pass through hard strata.

TYPES OF PILES (Classification based on Materials)

STEEL SHEET PILE:

- Steel sheet piles are most commonly used. They are trough shaped and when the piles are interlocked with alternate once reversed. They are generally made from steel sheets 20 to 30 cm wide and 4 to 5
- Different types of steel sheet piles are:
 - I. Arch web steel sheet pile.
 - II. Built up steel sheet pile.
 - III. Z-type steel sheet pile.
 - IV. Corrugated steel sheet pile.
 - V. Deep arch web steel sheet pile.
 - VI. Universal joint steel sheet pile.
 - VII. Universal joint steel sheet piles consists of I-beams connected by standard clutches or lock bars. The clutch is also of I-beam. But its flanges are curved so as to accommodate the flanges of I-beams.



TYPES OF PILES (Classification based on Materials)

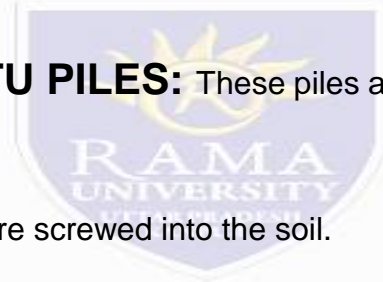
TIMBER SHEET PILES:

- Timber sheet piles are commonly used for temporary works Such as Cofferdams.
- The width of the sheet may Vary from 225 to 280 mm, while thickness should not be less than 50 mm. They may be jointed by either butt or V-joints. Their feet are beveled and sometimes Shod with sheet iron.



TYPES OF PILES (CLASSIFICATION OF SHEET PILES)

- Classification of piles based on method of installation: Based on the method of installation Piles may be classified as follows:
 - I. DRIVEN PILES:** These Piles are driven into the ground by applying blows with a heavy hammer on their tops. Timber, steel and precast concrete Piles are installed by driving. which may be driven into position either vertically or at an inclination.
 - II. DRIVEN AND CAST IN SITU PILES:** These Piles are formed by driving a casing with a closed bottom end into the soil. The casing is later filled with concrete. The casing may or may not be withdrawn. If casing is withdrawn, it is called uncased Pile, and if casing is not withdrawn, it is called cased Pile.
 - III. BORED AND CAST IN SITU PILES:** These piles are formed by excavating a hole into the ground and then filling it with concrete.
 - IV. SCREW PILES:** These piles are screwed into the soil.
 - V. JACKED PILES:** These piles are jacked into the ground by applying a downward force with the help of hydraulic jack.



UNDER REAMED PILES

UNDER REAMED PILES:

- These piles are successfully developed by C.B.R.I., Roorkee (U.P.) for serving as foundations for black cotton soils, filled up ground and other types of soils having poor bearing capacity.
- An under reamed is bored cast-in-situ concrete pile having one or more bulbs or under-reams in its lower portion. The bulbs or under-reams are formed by under reaming tool.
- The diameter of under reamed pile varies from 20cm to 50cm and that of bulb varies from 2 to 3 times the diameter of pile.
- The length of under reamed piles is about 3m to 8m. The spacing of piles may vary from 2m to 4m.
- The under reamed piles can be used for sandy soils with high water table.
- The load bearing capacity of under reamed piles can be increased by adopting piles of larger diameter or by extending the length of piles or by making more bulbs at the base.
- A single under reamed pile has only one bulb at the bottom. When two or more bulbs are provided at the base, it is known as multiple under reamed pile.
- The vertical spacing between two bulbs varies from 1.25 to 1.50 times the diameter of bulb.

UNDER REAMED PILES

- In case of black cotton soils, the bulbs, not only increase the bearing capacity, but also provide anchorage against uplift.
- The equipment required for the construction of pile are
 - I. auger boring guide,
 - II. spiral auger with extension rods,
 - III. under reamer with soil bucket,
 - IV. concreting funnel.



PILE SPACING

- The spacing of pile is the centre to centre distance between two successive piles.
- The factors to be considered while deciding the pile spacing are as follows:
 - I. The nature of soil through which the pile is driven
 - II. The obstruction during pile driving
 - III. The type of pile
 - IV. The depth of penetration
 - V. The area of cross section of the pile
 - VI. The centre to centre distance of piles in a group



GROUP OF PILES

- Sometimes the piles are arranged in close- spaced groups. When the piles are driven to the required depth, their tops are cutoff a same level and then the pile cap is provided.
- The piles forming the group of piles may be arranged in square, rectangular, triangular or circular as per the requirement.
- In case of single pile small pressure is developed in the surrounding soil. And in case of group piles, the pressure developed surrounding the individual piles will overlap laterally and the pressure in the overlapping zone will be sufficient to cause movement of the soil and consequently the pile will settle down.



THANK YOU

