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AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19CEB201 – CONSTRUCTION MATERIALS

II YEAR / III SEMESTER

Unit 3 : Concrete

Topic 11 : Other Types of Concrete



Prestressed Concrete



- Most of the mega concrete projects are carried out through prestressed concrete units.
- This is a special technique in which the bars or the tendons used in the concrete is stressed before the actual service load application.
- During the mixing and the placing of the concrete, these tensioned bars placed firmly and held from each end of the structural unit.
- Once the concrete sets and harden, the structural unit will be put in compression.
- This phenomenon of prestressing will make the lower section of the concrete member to be stronger against the tension.



Prestressed Concrete



- The process of prestressing will require heavy equipment and labor skill (jacks and equipment for tensioning).
- Hence the prestressing units are made at site and assembled at site. These are used in the application of bridges, heavy loaded structures, and roof with longer spans.



Lightweight Concrete

- Concrete that have a density lesser than 1920kg/m^3 will be categorized as lightweight concrete.
- The use of lightweight aggregates in concrete design will give us lightweight aggregates.
- Aggregates are the important element that contributes to the density of the concrete.
- The examples of light weight aggregates are the pumice, perlites, and scoria.
- The light weight concrete is applied for the protection of the steel structures and are also used for the construction of the long span bridge decks.
- These are also used for the construction of the building blocks.



High-Density Concrete

- The concretes that have densities ranging between 3000 to 4000 kg/m³ can be called as the heavyweight concrete. Here heavy weight aggregates are used.
- The crushed rocks are used as the coarse aggregates. The most commonly used heavy weight aggregates is Barytes.
- These types of aggregates are most commonly used in the construction of atomic power plants and for similar projects.
- The heavy weight aggregate will help the structure to resist all possible type of radiations.



Air Entrained Concrete

- These are concrete types into which air is intentionally entrained for an amount of 3 to 6% of the concrete.
- The air entrainment in the concrete is achieved by the addition of foams or gas - foaming agents.
- Some examples of air entraining agents are resins, alcohols, and fatty acids.



Ready Mix Concrete

- The concrete that mix and bathed in a central mixing plant is called as ready-mix concrete.
- The mixed concrete is brought to the site with the help of a truck-mounted transit mixer. This once reached in the site can be used directly without any further treatment.
- The ready-mix concrete is very precise and specialty concrete can be developed based on the specification with utmost quality.
- The manufacture of these concrete will require a centralized mixing plant. These plants will be located at an adjustable distance from the construction site.
- If the transportation is too long then it will result in setting of concrete. Such issues of time delay are cope up with the use retarding agents that delays the setting.



Polymer Concrete

- When compared with the conventional concrete, in polymer concrete the aggregates will be bound with the polymer instead of cement.
- The production of polymer concrete will help in the reduction of volume of voids in the aggregate.
- This will hence reduce the amount of polymer that is necessary to bind the aggregates used.
- Hence the aggregates are graded and mixed accordingly to achieve minimum voids hence maximum density. This type of concrete has different categories:
 - Polymer Impregnated Concrete
 - Polymer cement concrete
 - Partially Impregnated



High-Strength Concrete

- The concretes that have strength greater than 40MPa can be termed as high strength concrete. This increased strength is achieved by decreasing the water-cement ratio even lower than 0.35.
- The calcium hydroxide crystals that are the major concern product during hydration for the strength properties is reduced by the incorporation of silica fume.
- In terms of performance, the high strength concrete ought to be less performing in terms of workability which is an issue.



High-Performance Concrete



- These concretes conform to a particular standard but in no case, will be limited to strength.
- It has to be noted that all the high strength concrete can be high-performance type. But not all high-performance concrete (HPC) are high strength concrete. Standards that conform to the high-performance concrete are enlisted below:
 - Strength gain in early age
 - Easy placement of the concrete
 - Permeability and density factors
 - Heat of hydration
 - Long life and durability
 - Toughness and life term mechanical properties
 - Environmental concerns



Pervious Concrete

- Pervious or permeable concrete are concrete that are designed such a way that it allows the water to pass through it.
- These types of concrete will have 15 to 20% voids of the volume of the concrete when they are designed. The pervious concrete is created by unique mixing process, performance, application methods etc.
- These are used in the construction of pavements and driveways where storm water issues persist.
- The storm water will pass through these pervious concrete pavements and reach the groundwater. Hence most of the drainage issues is solved.



Vacuum Concrete

- Concrete with water content more than required quantity is poured into the formwork.
- The excess water is then removed out with the help of a vacuum pump without waiting for the concrete to undergo setting.
- Hence the concrete structure or the platform will be ready to use earlier when compared with normal construction technique.
- These concretes will attain their 28 days compressive strength within a period of 10 days and the crushing strength of these structure is 25 % greater compared with the conventional concrete types.



Thank You!!