3.1Concrete:

Concrete has been used as a building material for thousands of years. The main ingredients have been the same, but new admixture technologies allow designers and engineers to finely tune the final properties of the fully set concrete.

Four Main Ingredients

Concrete is made up of four main ingredients: water, Portland cement, aggregates, and air. The ratio of the ingredients changes the properties of the final product, which allows the engineer to design concrete that meets their specific needs. Admixtures are added to adjust the concrete mixture for specific performance criteria.

Concrete ingredients:

1. Water
2. Cement
3. Aggregate
    a. fine aggregate
    b. coarse aggregate
4. Air

1.Water

The water in the concrete mix should be clean and free of impurities. The amount of water relative to the amount of cement changes how easily the concrete flows, but also affects the final strength of the concrete. More water makes for easier flowing concrete, but also makes for lower strength concrete upon curing.

2. Portland Cement

Cement hardens when mixed with water, which binds all of the ingredients together. Portland cement is the most common cement used and is composed of alumina, silica, lime, iron, and gypsum. Small amounts of other ingredients are also included.

Function:

- Filling up voids existing in fine aggregate
- It binds the aggregate

- Imparts strength to concrete.

3. Aggregates

The majority of a concrete mixture is made up of both coarse and fine aggregates, which help increase the strength of the concrete beyond what cement can provide on its own. Sand, gravel, and crushed stone are used as aggregates. Recycled materials, including blast furnace slag, glass (mostly for decorative purposes), and ground-up concrete are starting to be used as concrete aggregates.

1).Fine aggregate:

- It is formed by decomposition under the effect of weathering agencies.
- It may be natural or artificial sand
- It consits silica content

Characteristic:

- Clean.sharp,angular
- Highly siliceous and free from impurities such as clay,dust and organic matter
- hard strong and durable

Function:

- It fill the voids present in coarse aggregate
- Minimize shrinkage and cracking
- It helps to prepare concrete economically

2)Coarse aggregate:

- It act as a main filler and forms the main bulk of concrete
- Size more than 4.75mm
- Broken stone,broken brick,gravel are used

Characteristic:

- Hard and tough
- angular in shape
- Sound,fire resistance and durable
- Free from chemical and organic matter

Function:

- Solid and hard mass
- Increase crushing strength

4. Air

The fourth main ingredient of concrete is entrained air. While it usually isn't considered an ingredient, the fact is that a concrete mix includes anywhere from 1% to 9% entrained air. Higher quantities of air should be included when the concrete will be exposed to very cold or freezing conditions.

5. Admixtures

Admixtures accomplish a variety of goals. This can be as simple as adding a pigment to colour the concrete. Other admixtures are used for faster curing times in cold weather, creating extremely high-strength concrete, or for increasing the flow able nature of concrete without compromising the strength. Unfortunately, admixtures can generate unwanted results such as poor adhesion of finish-flooring. For this reason, many structural engineers and architects are hesitant to use admixtures. We have an article that covers a number of different admixtures