



# THE BENEFITS OF USING FLY ASH IN CONCRETE

Engineers, architects, contractors and road builders requiring an exceptional concrete will realize significant advantages with fly ash concrete.

Fly Ash, besides providing the critical size of fines needed to manufacture superior concrete, brings other chemical benefits and advantages to the mix design of concrete.

## Advantages of using Fly Ash in plastic state concrete

### Improved workability

Because Fly Ash is spherical in shape it produces a paste with superior plasticity and reduces the amount of water needed in a mix.

### Reduced segregation

The improved cohesiveness of Fly Ash concrete provides added body to plastic state concrete which resists segregation.

### Reduces bleedwater

The lower water content required for workability in Fly Ash concrete reduces bleeding.

### Increased pumpability

The spherical shape of Fly Ash acts like tiny ball bearings, reducing internal friction, thereby producing a mix that is easier to pump.

### Reduces equipment wear

Fly Ash concrete reduces wear on delivery and plant equipment because of the reduction of friction attributed to the spherical nature of Fly Ash.

## Long term advantages of using Fly Ash in Concrete

### Increases concrete strengths

Studies have indicated that Fly Ash concrete will continue to gain strength past the age of 28 days. With improved workability and a reduction in water needed, Fly Ash concrete provides a lower water/cementitious ratio thereby producing superior strengths and longer life.

### Reduces drying shrinkage

By providing as much as a 10% water reduction in its plastic state, Fly Ash concrete maintains workability and reduces drying shrinkage.

### Reduced permeability

The packing effect of the spherical Fly Ash particles helps to reduce permeability. The chemical reaction between Fly Ash and lime forms additional (C-S-H) bonds that block bleed channels and fill pore spaces.

### Resistance to sulphate attack

Fly Ash combines with free calcium hydroxide making it unavailable to react with sulphates. In producing a less permeable structure there is increased resistance to aggressive soluble sulphate solutions resulting in longer life.

### Mitigates alkali aggregate

Fly Ash reacts with available alkalis in the hardened cement matrix making them less likely to react with the aggregate.

### Reduces heat of hydration

Large masses of concrete typically produce high internal temperatures and thermal cracking. Fly Ash concrete produces appreciably less heat than portland cement concrete.

### Cost Competitive

When used in appropriate applications Fly Ash concrete is cost competitive and may reduce project time with fast and easy placement of materials, less equipment and fewer people.

### Environmental Factors

Incorporating Fly Ash in a concrete mix design also enables cement and concrete producers to reduce the GHG emissions associated with the manufacture of Portland Cement and concrete. As Fly Ash use in concrete increases, it leads to greater environmental sustainability through both the avoidance of landfill and the reduction of natural resource consumption, saving precious resources for future use

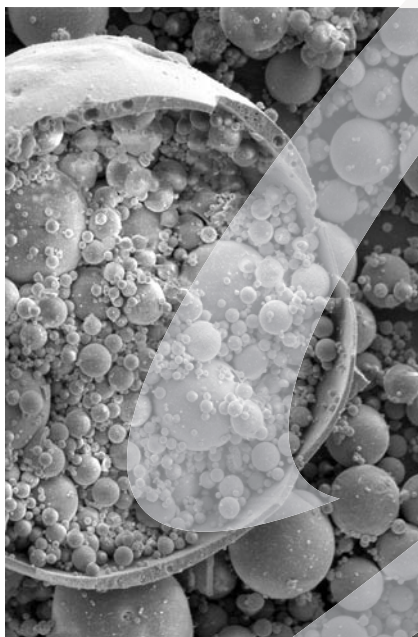


Photo courtesy of Natural Resources Canada



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