



# FLY ASH IN PRE-CAST CONCRETE

## What is Pre-cast Concrete?

Pre-cast concrete, includes concrete components, such as bridge girders, which are manufactured in a controlled environment, typically a permanent manufacturing facility. While Pre-cast concrete can also be done on the construction site, this “field cast concrete” process is not addressed in this document.

- Improved resistance to aggressive chemicals
- Improved form surface finishes
- Ease of concrete placement
- Reduced equipment wear in machine cast products
- Reduced concrete water bleed

## Uses of Fly Ash Concrete in Pre-cast

Fly ash may be used to advantage in both *architectural* and *structural* Pre-cast concrete.

Fly Ash is ideal in applications where the concrete will be exposed to sulphates. Concrete which will be buried in sulphate soils or be in contact with sulphate bearing liquids are ideal applications for Pre-cast Fly Ash concrete. Specific examples of these types of applications are:

- Piles
- Service Vaults
- Retaining Wall Systems
- Parking Structure components
- Machine Bases (Transformer bases, cellular site bases, etc.)
- Pre-cast members in sewage/effluent treatment plants
- Pre-cast concrete for Pulp Mills

Other structural applications for Fly Ash in Pre-cast concrete are Marine Structure elements, including:

- Piles
- Decking
- Ramps
- Breakwaters

Power utility products, such as street light bases, utility vaults, barriers, etc. are also ideal Pre-cast applications as they are typically inventoried products.

Fly Ash in machine extruded concrete products, such as hollow core, is advantageous because it improves the lubricity of the concrete, allowing for easier extrusion.

## Benefits of Fly Ash in Pre-cast Concrete

When used in correct proportions and under the right technical conditions, the use of Fly Ash offers significant benefits:

- Sulphate resistance without the use of Type 50, (sulphate resistant cement)
- Improved resistance to chloride ion penetration
- Reduced instances and severity of AAR
- Reduced thermal cracking
- Improved long term abrasion resistance

## Technical Considerations

Fly Ash reduces the heat of hydration as concrete sets, resulting in delayed set times, low early strengths and prolonged “form cycle times”.

Accelerating the curing cycle offsets the prolonged “form cycle times” when Fly Ash is used in a concrete mix. Accelerated curing is achieved through one, or a combination of the following:

- Heating
- Lower water cement ratios
- Increased cement content

## Cost and Environmental Factors

Concrete utilizing Fly Ash produces a superior final product. Life cycle costs are lower, the concrete lasts longer, has greater strength and may have an initial lower cost than concrete using only Portland Cement.

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. Incorporating Fly Ash in a concrete mix design also enables cement and concrete producers to reduce GHG emissions.

## For more information

If you are interested in knowing more about Fly Ash in pre-cast concrete, consult with your Fly Ash supplier, your project engineer or CIRCA on how to use this product in your application.

## CIRCA

[www.circainfo.ca](http://www.circainfo.ca)

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