ECOMATERIAL TECHNOLOGIES
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TECHNICAL BULLETIN

Fly Ash

In Pervious Concrete

Pervious concrete is a zero-slump, no-fines, open graded material consisting of portland cement, fly ash, coarse aggregate, admixtures and water. The right configuration of these materials produces a product that allows water to pass though it at the rate of 12-18 gallons per minute per square foot. The void structure of pervious concrete is typically between 18% -25%.

Pervious concrete has the same structural integrity as conventional concrete, but is, by far, the lowest initial cost solution. It is also the lowest life cycle cost option available for paving because it can last over 30 years with minimal maintenance, does not require extensive grading before placing, and no storm water system tie-ins are required.

Including fly ash in pervious concrete creates a better quality alternative to basic parking lot technology, and provides economic and environmental benefits to the community.

Pervious concrete has been around for over 50 years, but has only recently been put into use because of its environmental benefits and because of U.S. EPA recommendations. With today's movement towards sustainable and reclaimed building products, fly ash and pervious concrete pavement parking lots are a match made in green heaven.

GREEN BUILDING ALTERNATIVE

Pervious concrete is considered a sustainable building alternative for concrete and/or asphalt pavement parking lots because it provides pollution mitigation and storm water management. Pervious concrete acts as a filtration device for storm water and turns the entire parking area, pathway, or other paved surface into a retention treatment basin. Storm water can flow through the pavement to the subgrade underneath, taking with it pollutants that would typically end up in municipal storm water systems. Naturally occurring soil microbes then store and break down the pollutants, preventing aquifer pollution.

California's first pervious concrete parking lot was

Revision Date: 8-28-26

completed in January 2003 near Fair Oaks Park in Sacramento. This project demonstrates the effectiveness of pervious concrete parking lots for urban heat island effect mitigation and storm water runoff. Through its Cool Community Program (a spin-off of the Heat Island Reduction Initiative), the U.S. Department of Energy has shown that cities with hot climates experience 3-10 degrees hotter temperatures due to heat absorption of typical black asphalt. The high reflectivity of pervious concrete reduces urban heat island effect and provides better air and water quality. Its lower density reduces its heat storing capacity and allows the porous paving systems to approach natural ground cover in lessened heat absorption.

FLY ASH IN PERVIOUS CONCRETE

Fly ash can replace a portion of portland cement (up to 20%) in pervious concrete. It provides improved placing and finishing characteristics including improved workability of the low slump
mix. This is a major benefit, particularly when surface texture and design concerns are of high priority. Because of its ability to enhance concrete products, fly ash has become a necessity in pervious concrete technology.

Not only does it create a better final product, using fly ash in pervious concrete is an environmentally prudent way to control the pollution. Fly ash, otherwise slated for landfills, is used as a supplementary cementing material to enhance the overall performance of the pervious concrete. When fly ash is used, the use of landfill space is drastically reduced, and by replacing a portion of cement in concrete with fly ash, CO2 emissions created during cement production are greatly reduced, lessening the negative impact on our atmosphere.

MATERIALS AND MIX DESIGN

Pervious pavement can handle "100-year storms" easily if properly designed. Specific concrete mix design and qualified permeable concrete contractors are essential for a successful project. The Southern California Ready Mix Concrete Association has provided the following guidelines and recommendations for pervious concrete mix designs:

	Per Cubic Yard
Compacted Voids	Minimum 10%
Cement	At least 580 lbs
ASTM C-618 Fly Ash	50-116 lbs
Total Cementitious Materials	630-696 lbs
Aggregate	27 cubic feet

Mix water included should make the cement paste display a wet metallic sheen without causing the paste to flow from the aggregate. Insufficient or high water content can be detrimental to the final quality of the concrete.

For more information or answers to questions about the use of fly ash in specific applications, contact your nearest Eco Material Technologies Technical Sales Representative or call 1-770-684-0102.

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