THE ASHFORD FORMULA AND FLY ASH

Fly ash is often used in concrete as a partial substitute for cement. It is a by-product of the burning of coal in electric power plants. It is used in concrete primarily to lower costs, but certainly has other benefits such as late-strength gain, improved workability, reduced bleeding, easier pumping, and reduced heat of hydration. The cost savings of using fly ash are generally between $2.00 and $4.00 per cubic yard.

The use of fly ash may reduce early strength and result in longer setting times, so its use in winter should be undertaken with caution. Be aware that a good, tight finish, especially in cold temperatures, is very difficult to achieve with concrete that contains fly ash. In these instances, more of The Ashford Formula may be required because of the increased porosity of the concrete.

There are two broad categories of fly ash designated Class F and Class C. As the cement in the concrete begins to hydrate, both types of fly ash slowly react with calcium hydroxide to form new cementing compounds. However, Class F fly ash, derived from bituminous coals in the central and eastern parts of the country, has no cementitious properties of its own. On the other hand, Class C fly ash contains more lime, and has cementitious properties of its own--independent of the hydration process. Class C fly ash comes from sub-bituminous or lignite coals found primarily in the western United States.

Fly ash is added to the concrete as a percentage of total cementitious material. This is defined as the total amount of cement and fly ash. For example, a typical concrete mix with 10% fly ash would contain 529 lbs. of cement and about 60 lbs. of fly ash. In this instance, the total cementitious material weighs 589 lbs.

The Ashford Formula may be used on concrete containing fly ash. However, we generally recommend the total amount of fly ash, as a percentage of cementitious materials, not exceed 15%. Keeping in mind that The Ashford Formula reacts with the alkalis in portland cement, when replaced with fly ash, the material with which The Ashford Formula can chemically react will be reduced.

If concrete containing fly ash were to be treated with The Ashford Formula, it would be preferable to use Class C fly ash since it possesses cementitious properties of its own. Nonetheless, since most batch plants rarely distinguish between the two classes of fly ash, the recommendation of not to exceed 10% of either type is more appropriate.