High Volume Fly Ash Flowable Fill

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ABSTRACT

Flowable fill, also known as Controlled Low Strength Material (CLSM), is used in place of ordinary geotechnical (structural) fill in construction applications. Due to the addition of air quality controls on coal-fired power plants, fly ash characteristics have an increasing amount of free carbon, ammonia, and/or lime residue. This results in more fly ash being disposed in landfill than being beneficially used.

The objective of this project was to produce a cost effective flowable fill with maximum amount of variable quality fly ash, minimum amount of Portland cement, and no sand. A second objective was to determine the effects of potential fly ash contaminants on the engineering properties of flowable fill.

Small amounts of Portland cement and water were mixed with the following types of fly ash:

- Less than 15% carbon content
- Greater than 30% carbon content
- Ammoniated fly ash
- Circulating fluidized bed ash.

A fly ash with less than 2% carbon content satisfying the requirements of ASTM C618 was used as a control.

The flowable fill mixes were tested for plastic and hardened state characteristics, including flow, unconfined compressive strengths at 1, 3, 7, 28, and 56 days, California Bearing Ratio (CBR) at 1, 3, and 7 days, and triaxial compression at 1 and 3 days.

The flowable fill mixtures that satisfied geotechnical requirements were then tested for environmental characteristics (SPLP and TCLP). The results indicate that high volumes

of these types of ash can be successfully used in flowable fill applications.