Fly Ash IN CONTROLLED LOW STRENGTH MATERIAL

Controlled Low Strength Material (CLSM), an easy-to-place, flowable material consisting of fly ash, cement, sand, water, and 8-25% entrained air, is a slurry when placed and a low-strength engineered material when hardened. It is self-leveling, so it requires no compaction or vibration. The compressive strength can be designed to range from 0.35 MPa (50 psi) to 8 MPa (1,200 psi). With compressive strengths of less than 1 MPa (150 psi), CLSM can be readily excavated.

CLSM provides engineers, contractors and builders with a highly versatile, easy-to-use, low-cost material for projects including:
- Sewer and utility backfill
- Building excavations
- Foundation sub-base
- Temporary slabs
- Bridge abutment backfill
- Abandoned manhole fill
- Underground tank backfill
- Filling voids under concrete slabs
- Pipe bedding
- Culvert backfill
- Abandoned tank fill
- Retaining wall backfill
- Road base
- Slope stabilization
- Soil erosion protection
(Some of these are specialty applications and may require additional engineering consideration.)

Cost Considerations
When used appropriately, CLSM is very cost competitive, and may reduce project time with fast and easy placement of materials, less equipment, and fewer people.

For more information or answers to questions about the use of fly ash in specific applications, contact your nearest Boral Resources Technical Sales Representative or call 1-770-684-0102
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Environmental Advantages
Using CLSM will increase utilization of coal combustion products from coal-fired power plants, which preserves landfill space and saves natural resources for future use. Incorporating fly ash in a concrete mix design also enables cement and concrete producers to reduce the greenhouse gas emissions associated with the manufacture of portland cement and concrete.

Advantages of Controlled Low Strength Material
- Easy to place by chute, conveyor, pump or bucket
- Self-leveling; does not require compaction
- Less labor-intensive than conventional backfill methods
- Allows for faster placement
- Eliminates excavation for underground backfill (i.e., abandoned sewer pipes, viaducts, etc.)
- Versatile mix designs adjust to meet specific project requirements
- More durable than compacted soil or granular fill
- Less permeable and more erosion-resistant than compacted soil or granular fill
- Excavatable using conventional equipment
- Requires less field inspection than soil backfills
- Rapid bearing strength allows faster return of traffic loads
- No voids are formed during placement or around embedded structures or components
- Reduced settlement and rutting under loading
- Allows narrower trenches because compaction equipment is not necessary
- Improved worker safety, since placement can be accomplished without entering trenches
- All-weather placement with proper site preparation
- Reduced equipment needs – no front-end loaders, rollers, or tampers
- No on-site storage of backfill materials necessary