

Katse Dam

The fly ash solution for Katse Dam

The mighty Katse Dam was the focal point of the first phase of the Lesotho Highlands Water Project (LHWP). Requiring over 2,4 million cubic metres of fly ash concrete for its construction, the 185 metres high, double curvature arch dam was the highest dam in Africa for over a decade. The main objectives of the LHWP were to supplement the water supply to South Africa and to provide Lesotho with hydroelectricity. Water was to be stored in five dams high in the Lesotho Highlands and then gravity flow through tunnels beneath the Maluti Mountains into the Vaal River system, to reach the commercial and industrial heart of South Africa.

The criteria for the concrete design was summed up by the consultants as a mix that was easy to place, was as impervious as possible and which reached the required 24MPa strength after 90 days without generating excessive heat. Extensive laboratory and field work trials were carried out by the technical teams of Ash Resources to assess

the optimum concrete mixes for the dam and associated tunnels and structures. The outcome was the decision to base all of the project's concrete structures on 70% Ordinary Portland Cement and 30% DuraPozz® classified fly ash.

When construction started in 1991, the LHWP was the largest and most complex construction project of its type in the world. Ash Resources supplied over 250 000 tons of DuraPozz® from its Lethabo plant. Block rail trains delivered the fly ash to Ficksburg, near the Lesotho border, from where it was trucked to the different sites. The challenging logistics involved a 300km, 12 hour, round trip over a 3090m high mountain pass.

The construction of Katse Dam and the associated structural elements of LHWP Phase 1 demonstrated emphatically that high quality classified fly ash was not only economical but a versatile technical solution for a wide variety of concrete applications.

DuraPozz® : the effective all-round solution

Katse Dam:

- 185m high and required 2,4 million cubic metres of concrete
- 30% DuraPozz® reduced heat of hydration and compensated for the harsh crushed dolerite aggregate to produce a pumpable mix

Intake Tower:

- 98m high with up to 6,0m thick walls. Required 33 000 cubic metres of concrete
- 40% DuraPozz® mix to reduce heat of hydration and improve pumpability

Hydroelectric power station:

- DuraPozz reduced heat of hydration. Also produced a high durability finished concrete to withstand abrasion and soft Lesotho water

Precast tunnel lining segments:

- 83 000 segments cast in wide extremes of ambient temperature DuraPozz® mix had good response to heat curing

Wet shotcrete for drill-and-blast tunnel sections:

- DuraPozz® mix gave minimum rebound and improved adhesion

Backfill grout for tunnel linings:

- Good flowability from DuraPozz® mix

The 185m high Katse dam required over 2,4 million cubic metres of fly ash concrete for its construction



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