Technical Advice Note 3

Factors Affecting Concrete Performance

Design Suitability	Insufficient Consideration at design stage. Poor structural design e.g.: long, slender beams Incorrect loading calculations Inadequate provision for movement expansion joints Incorrect use of reinforcement e.g.: wrong size bars or overall design
Mix Design	Incorrect cement specified Wrong type or grading of aggregates Incorrect water/cement ratios
Workmanship	Failure to observe design details Incorrect batching and mixing / inconsistent mixing Incorrect water/cement ratio Inadequate compaction/vibration Poor shuttering or formwork Incorrect use of reinforcement Allowing corrosion promoting chemicals into the mixing/placement process Inadequate cover to steel reinforcement Insufficient curing
Environmental	Excessive mechanical stresses – overloading/subsidence/unanticipated movement Excessive temperature changes during placement and during design life Frost attack – freeze/thaw action causing surface damage Physical damage such as collision or impact damage, explosion abrasive wear Damage from plants and micro organisms, algae, lichen etc Chemical attack from acids, chemical spillages, acid rain, seawater (salts) Carbonation attack Chloride attack Alkali Silica Reaction (ASR), Electric fields (causing electrochemical reaction) Shrinkage (plastic or drying shrinkage) / Reactive ironstone etc.

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