Trends in Concrete Materials Specifications

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U.S. Army Corps of Engineers

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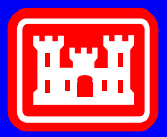

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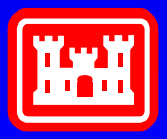
Hydraulic Cement

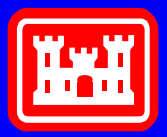
Hydraulic Cement
Portland Cement

- Type I – general purpose → Increasing strength
- Type II – mod SO_4, mod heat → Increasing heat
- Type III – high early
- Type IV – low heat → FAPP doesn't exist
- Type V – high SO_4



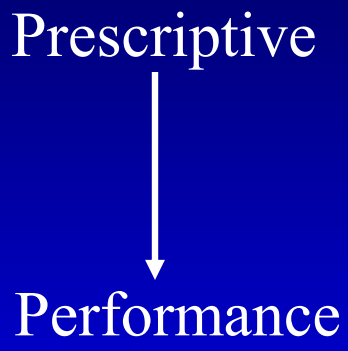
AASHTO – ASTM Harmonization

- Current Activity
- Develop a common PC spec
- Major revision of Type II
  - Limit on heat of hydration
  - Limit on fineness



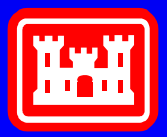
Hydraulic Cement P2P

- C 150 – Portland Cement
- C 595 – Blended Cement
- C 1157 – Hydraulic Cement



Major Industry Trends

- Strength
  - Increasing 1970 - 1995
- Fuel costs
  - Waste fuel initiatives
- Waste management
  - Dust recycling – high alkali levels
- CO_2 Emissions
  - Non PC additions



Additions

- Carbonate rock dust - 2004
- Slag – as a processing addition
- CKD - ???

Pozzolan

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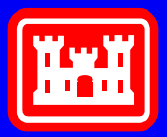
Major Industry Trends

- Increasing Class C
- “Spot Market” coal supplies
- SO_2 emissions
- Ash from alternative fuels
- Development of **Performance** stds



Slag

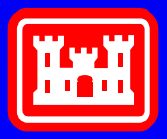
Industry Trends

- Increased marketing
- Shifting emphasis to finer materials
  - Grade 80 uncommon
  - Grades 100 & 120
- Name: GGBFS Slag Cement

Aggregate

Industry Trends

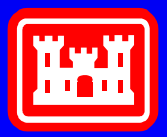
- ASR testing
  - Mortar bar → C 1260 – accel mortar ←
    C 1293 – concrete prism
- Manufactured Fine Aggregate
  - High fines concrete
  - Appendix to ASTM C 33



Admixtures

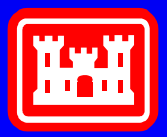
Industry Trends

- New Products, new versions of old products
  - SCC
  - Antiwashout
  - Antifreezing
  - Anticorrosion
- Cement – Admixture Interaction
  - Early stiffening
  - Delayed setting HRWRA
  - polycarboxylate

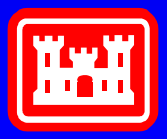


Repair Materials

- Historically: few or no spec's
- Rapid-strength-gaining cements
- Corps of Engineers – REMR
  - Focus on compatibility
    - Modulus
    - Thermal expansion
    - Volume stability



The End



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