Recent Advances in ASR Test Methods and Understanding Mitigation Mechanisms, Part 1

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Proposed Test Method for Determining ASR Potential: The Concrete Cylinder Test (CCT)

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Outline

• Current Test Methods and their Pros and Cons
• Modifications to Concrete Prism Test (CPT)
• CPT vs CCT
• Accelerating CPT and CCT
• Ongoing Work

Current Testing Methods

• ASTM C 1260/C 1567
  – Pros
    • Relatively Rapid: 16 Days + Aggregate Processing Time
  – Cons
    • Too Aggressive?:
      – 1 N NaOH soak solution
      – Stored at 80°C
    • Cannot be used to determine influences of cement alkalinity
    • False positives for coarse aggregates
      – Work by UT Austin has found over 10 aggregate sources in TX that pass C 1260 but fail C 1293
Current Test Methods

- ASTM C 1293 “Concrete Prism Test”
  - Pros
    - More realistic than C 1260
  - Cons
    - 1 year evaluation for aggregates
    - 2 year evaluation for SCM’s
    - Leaching of alkalies during test
    - Non-Reactive Aggregate Issue
    - Accelerated Version of CPT

Modifications

Modification to ASTM C 1293

- Goals of these modifications:
  - Shorten Test Duration
  - Minimize/Prevent Leaching of Alkalies
  - Job Mix Approval Testing
- Modifications include:
  - Changing Specimen Type
  - Changing Specimen Storage
  - Provide means for adequate moisture to be in contact with specimen, but minimize/prevent leaching of alkalies

Specimen Type

Specimen Storage
Moisture

• Problem:
  – Mold restricts the amount of moisture getting to the specimens.

• Solution:
  – Line the mold with 2 layers of filter paper to allow water to wick between the mold and concrete.
  – Cast cylinder ¼" short to allow ponding of water on top.

Results

CPT vs. CCT

Accelerating CPT
Ongoing Work

• Continue evaluating CCT vs. CPT
• Correlate Lab testing to Field Exposure

Ongoing Work

• Non-Reactive Fine Aggregates

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Questions?

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