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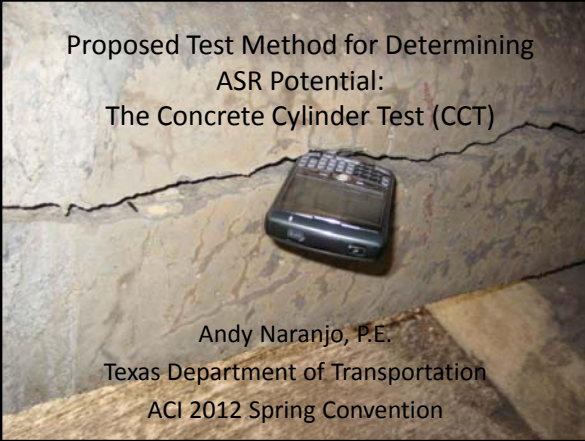
**Recent Advances in ASR Test Methods and Understanding Mitigation Mechanisms, Part 1**

ACI Spring 2012 Convention  
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Proposed Test Method for Determining ASR Potential:  
The Concrete Cylinder Test (CCT)




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ACI 2012 Spring Convention

**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 Test Methods**

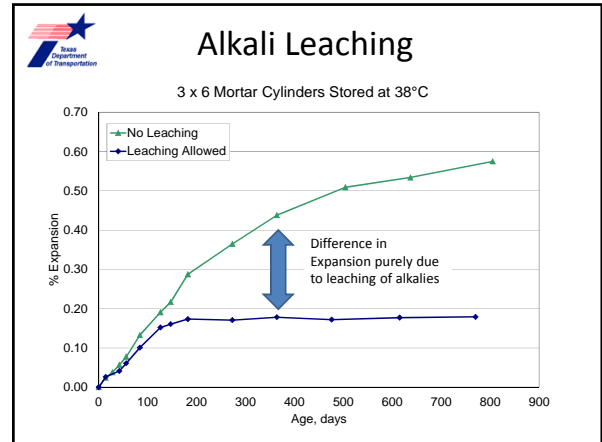


**Current Testing Methods**

- 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**

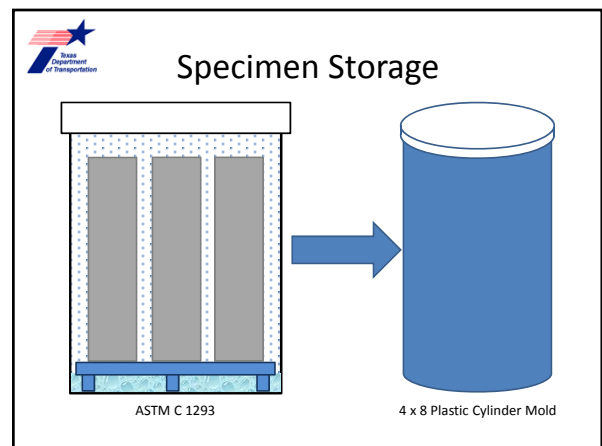
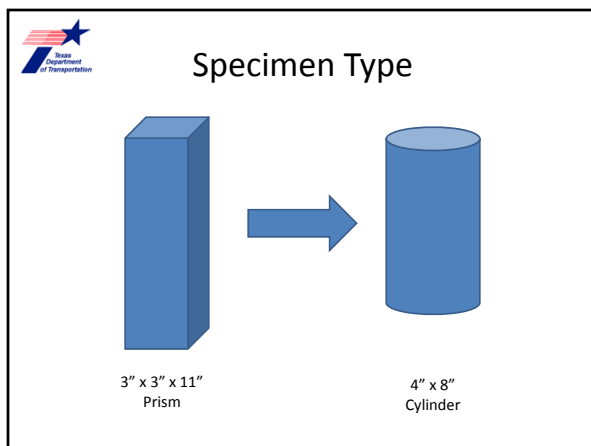
- ASTM C 1293 "Concrete Prism Test"
  - Pros
    - More realistic than C 1260
  - Cons
    - 1 year evaluation for aggregates
    - 2 year evaluation for SCM's
    - Leaching of alkalis during test
    - Non-Reactive Aggregate Issue
    - Accelerated Version of CPT

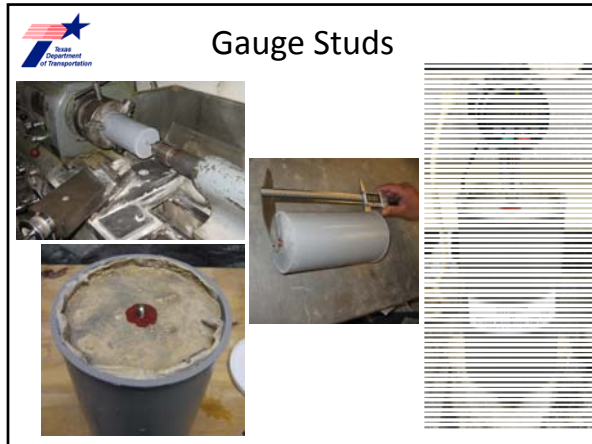


**Modifications**

**Modification to ASTM C 1293**


- Goals of these modifications:
  - Shorten Test Duration
  - Minimize/Prevent Leaching of Alkalis
  - 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 alkalis



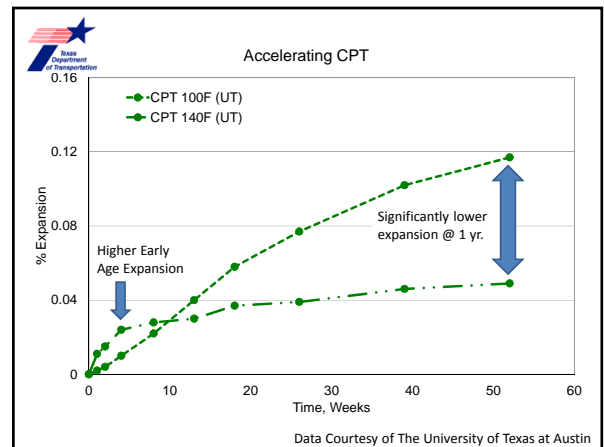
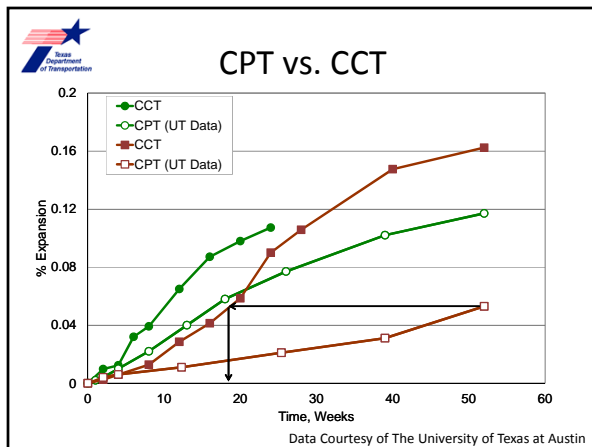


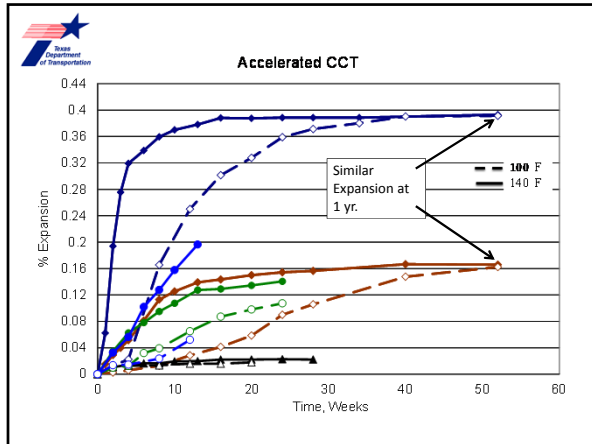
**Moisture**

- 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**



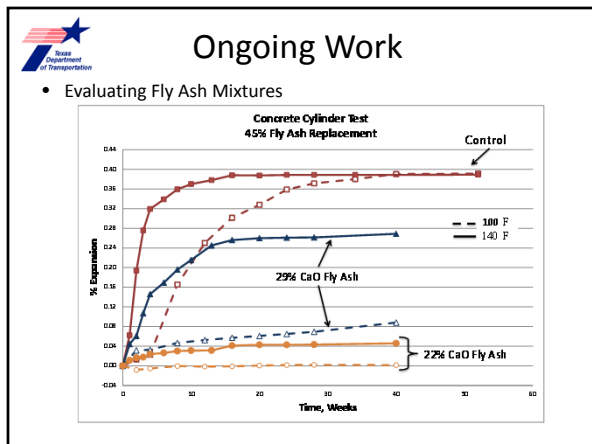
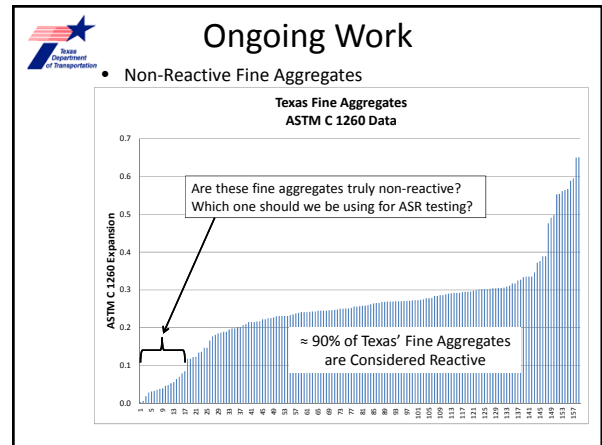


Ongoing Work

Ongoing Work

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

The diagram shows a laboratory test setup on the left, which transitions via a blue arrow to a field exposure setup on the right, represented by a concrete cube on gravel.



Acknowledgements

- The University of Texas at Austin
  - Construction Materials Research Group
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- TxDOT Cement Lab Technicians & Chemists

Questions?

