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Assessing the Setting Behavior of Ultra-High Performance Concrete

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Lab Overview
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Lab Capabilities
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Research Projects
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Turner-Fairbank
Highway Research Center

TFHRC Concrete Materials Laboratory

Vision:

- Provide infrastructure owners with the ability to evaluate novel materials.
- Identify the applicability of traditional concrete test methods to novel materials.

U.S. Department of Transportation
Federal Highway Administration

How is the TFHRC Concrete Laboratory going to make that vision a reality?

Evaluate novel materials, including:

Blended cements

Portland Limestone Cement (PLC)

- Physical Characterization
- Microstructural Characterization
- Variability
- Reactivity
- Correlate Characteristics

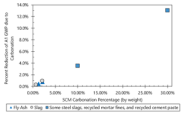
Given the recent large-scale, widespread production of PLC in the United States, we are investigating the variability of PLC's physical characteristics, microstructural characteristics, and reactivity from around the country. Similar guidance on other blended cements will also be developed.

Calcined Clay-Type I Cement-Limestone Cements (CC-I-L)

- Physical Characterization
- Microstructural Characterization
- Mechanical Performance
- Durability Performance
- Volume Stability

The characteristics, mechanical performance, durability performance, and volume stability of CC-I-L are tested to determine whether the current bridge design equations can be used with CC-I-L and PLC.

Supplementary Cementitious Materials (SCMs)



SCMs

- Carbon Uptake Measurements
- Microstructural Characterization
- Reactivity
- Durability Performance

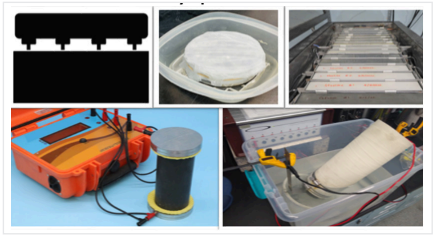
We are investigating emerging SCMs, including carbon-enriched SCMs, microstructural characteristics, reactivity, and durability performance within concretes.

Evaluate novel materials using:

Microstructural characterization

Mechanical performance

Durability performance



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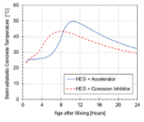
High-early-strength (HES) Concrete



High-Early-Strength Concrete

- Impact of Admixtures on Resistivity
- Applying Maturity
- Applying AASHTO R 101
- Use of PLCs

Work toward improving durability of high-early-strength (HES) concrete by using performance-engineered mixture design concepts and tests and maintaining mechanical performance.

Admixtures

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Admixtures

- Strength-Enhancing
- Impact on Electrical Durability
- Colloidal Silica
- Interactions with New Cements

Investigate interactions between admixtures and new cements, and determine admixture impacts on electrical durability tests.

Provide a framework for infrastructure owners to test novel materials.

- What tests to perform for novel materials characterization and performance:
  - Existing tests to use.
  - New tests to perform.
  - Existing tests to modify.
- How to test novel materials.