

Sang-yun Lee, Ph.D., P.E.

Principal Petrographer & Materials Consultant

Dr. Lee has extensive experience in materials evaluation in microscopical, petrographic, chemical, physical and field investigations of various construction and geological materials. Dr. Lee leads projects that document quality and composition of cementitious and geological construction materials in regard to performance problems, causes of distress and failure, quality assurance and assistance in renovation. His expertise includes: petrographic and microscopical examination; SEM-EDS analysis; masonry and stucco examination; concrete and aggregate petrography; flooring and coating system evaluation; and litigation support.



Representative Project Experience

Concrete Quality and Condition Evaluation Support

- Performed petrographic examination of concrete samples from an embassy building to evaluate concrete placement and consolidation problems, and assess overall concrete quality and condition.

Aggregate Petrography

- Performed petrographic examination of aggregates (ASTM C295) as a part of preconstruction evaluation of materials for pier construction project in Hawaii.

Air-Void System Analysis

- Part of a team that developed a computerized linear-traverse/point-count device meeting the requirements of ASTM C457.

Materials Characterization and SEM/EDS

- Performed laboratory tests of Chrome Ore Processing Residue (COPR) samples. Tests included optical microscopy, SEM/EDS, and X-Ray Diffraction to characterize the COPR materials.

Fire Damage of Concrete

- Investigated fire damaged concrete bridge located near Brownstone, Illinois. Performed laboratory analysis, determined the extent of the damage, and provided condition assessment support for the repair of the damaged concrete.

Flooring Systems

- Investigated terrazzo floor distress in an elementary school in Minnesota. Performed field investigation and laboratory analysis (petrographic examination) for the collected samples to determine the cause of the terrazzo distress.

Deterioration Investigations

- Investigated distressed (scaled) concrete sidewalk and driveway apron in a commercial area in Quakertown, Pennsylvania. Performed petrographic examination, air-void system analysis, and chemical analysis to determine cause of reported concrete surface distress.

Academic Credentials

Ph.D. in Geology (Petrology)
Texas Tech University, 1999

M.S. in Civil Engineering (Materials)
Texas Tech University, 2001
B.S. in Geology

Kyungpook National University,
Taegu, South Korea, 1995

Licensur & Certifications

Professional Engineer:
Texas

Licensed Professional Geologist:
Indiana

Professional Affiliations

American Concrete Institute

ASTM International

State Microscopical Society of IL

The Society of Concrete
Petrographers

Contact Information

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Airfield Runway & Pavement Experience

Evaluation of Concrete Pavement Distress for Kansas DOT, Multiple Counties, KS

- Petrographic examination of cores taken from concrete pavements in various counties in Kansas.

Materials Testing for Hickam Air Force Base, Honolulu, HI

- Tested nine coarse aggregates and one fine aggregate from different sources in accordance with the ACOE sequential testing procedures for Hickam AFB/F22 Western Keyhole.

Evaluation of Concrete Pavement Distress at Great Falls International Airport, Great Falls, MT

- Petrographic examination of concrete cores taken from concrete airport pavement to determine cause of concrete distress and construction defects.

Evaluation of Concrete from Seals and Footings Newly Constructed Bridge Over the Savannah River, Savannah, GA

- Evaluated the root cause of large cracks that formed in newly constructed large-scale underwater bents built to support a new bridge.

Qualification Tests of Aggregates from HRP Quarry, Mangilao, Guam

- Three coarse aggregates and two fine aggregates were testing for ASTM C33 qualification for general use in concrete.

Structural Assessment Experience

Caven Point Marine Terminal, Jersey City, NJ

- Principal Petrographer responsible for performing a petrographic analysis (ASTM C856) on two concrete cores that were reportedly taken from a formed concrete surface exhibiting a visible interface (lift line). The lift line was found to actually be a pour line, and the concrete was found to be in generally good condition.

U.S. 378 Bridge over Savannah River, Atlanta, GA

- As a part of engineering evaluation team, Dr. Lee has performed petrographic examination (ASTM C856) of cores taken from various locations of concrete footings and seals exhibiting distress (cracking). Results of petrographic examination confirmed DEF (delayed ettringite formation) as the cause of the distress. Thermal modeling and engineering review of the project documents performed by the evaluation team has further confirmed this finding.

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Structural Assessment Experience (Continued)

FedEx Freight New Dock, Shop, & Yard Expansion, Des Moines, IA

- As the Principal Petrographer, Dr. Lee performed a petrographic analysis (ASTM C856) on four concrete cores that were obtained from a loading dock slab that was exhibiting numerous small popouts. Testing showed that oblong argillaceous particles within the fine aggregate were causing the reported concrete surface popouts.

Fullen Dock Aggregate Slab Delamination, Memphis, TN

- Principal Petrographer responsible for performing a petrographic analysis (ASTM C856) on a concrete core that was showing signs of delamination. Testing showed that the delamination was attributed to trowel finishing, which distorted, coalesced, and concentrated entrained air-voids below the surface.

Naval Air Station Runway, Oceana, VA

- As the Principal Petrographer, Dr. Lee performed a petrographic analysis (ASTM C856) on thirty (30) cores that were showing localized surface distress (craze cracking, scaling, and spalling) to evaluate their general condition & characteristics. The cores that showed distress contained poor quality mortar and a softer/weaker surface paste zone.

Pier R-3 Structural Repairs, NWS Yorktown, VA

- Dr. Lee was the Principal Petrographer responsible for performing a petrographic analysis (ASTM C856) on ten (10) concrete cores to evaluate general concrete quality and condition. A few of the cores were affected by ASR, causing fine and microcracks in the cores, and others revealed evidence of chloride penetration, but was not consistent across all the cores. Repair and maintenance measurements were suggested to the client.