



Laboratory Testing Services

Full-service soil and materials testing laboratories are maintained at several of our office locations. Trained technicians conduct tests in accordance with the American Standards for Testing and Materials (ASTM), the California Department of Transportation (Caltrans), the American Association of State Highway and Transportation Officials (AASHTO), and other applicable laboratory methods and standards.

The Earth Systems group of companies participates in and are approved and/or accredited by:

- the Division of the State Architect (DSA) Laboratory Evaluation and Acceptance (LEA) Program,
- the Proficiency Sample and Laboratory Inspection Programs of the Cement and Concrete Reference Laboratory (CCRL) (a National Institute of Standards and Technology research associate program),
- the Caltrans Reference Sample Program,
- the AASHTO Materials Reference Laboratory (AMRL) Proficiency Testing and Accreditation Programs, and
- the United States Army Corp of Engineers (project specific basis).

Additionally, several of our Southern California laboratories are approved testing laboratories by the City of Los Angeles.

Soils and Materials

Our laboratories are equipped to provide testing for the following materials:

- Soil
- Concrete
- Asphalt Concrete
- Aggregate Base
- Masonry
- Reinforcing and Structural Steel
- High Strength Bolts
- Miscellaneous Materials



SOIL

Atterberg Limits
California Bearing Ratio (CBR)
Cement Stabilization of Soils
Collapse Potential
Density and Moisture Content
Direct Shear
Expansion Index
Hydroconsolidation
Lime Stabilization
Maximum Density/Optimum Moisture
One Dimensional Consolidation
Permeability (Hydraulic Conductivity)
Plasticity Index
Resistance "R" Value
Sand Equivalent
Sieve and Hydrometer Analysis
Soil Corrosivity Analysis and Testing
Specific Gravity
Swell
Triaxial Compression of Cohesive Soils
Unconfined Compression



CONCRETE

Concrete Aggregate

Abrasion, L.A. Rattler

Absorption

Clay Lumps and Friable Particles in Aggregate

Cleanliness Value of Coarse Aggregate

Crushed Particles

Durability Index

Flat and Elongated Particles in Aggregate

Sand Equivalent

Sieve Analysis

Soundness, Sodium Sulfate or Magnesium Sulfate

Specific Gravity

Unit Weight

Cylinders, Beams, and Cores

Compressive Strength Gunite Samples

Compressive Strength of Cast Cylinders

Compressive Strength of Cored Samples

Compressive Strength of Lightweight Concrete

Flexure Strength

Flexure Toughness of Fiber Reinforced Concrete

Modulus of Elasticity

Splitting Tensile of Cast Cylinders

Unit Weight of Hardened Concrete

Unit Weight of Lightweight Concrete

Additional Services Related to Concrete

- Concrete mix designs and mix design evaluations
- Roller compacted concrete design and quality control
- Forensic studies and evaluation of distressed concrete materials
- Non-destructive testing of concrete structures
- Non-destructive testing to determine reinforcing steel size and spacing



ASPHALT CONCRETE

Asphalt Content by Ignition Method

Asphalt Content by Nuclear Gauge

Asphalt Content by Solvent Extraction

Bulk Specific Gravity of Compacted Specimens and Core Samples

Compaction of Laboratory Samples (California Kneading Compactor and Marshall Method)

Maximum Density

Moisture Content

Stability and Flow, Marshall Apparatus

Stability, Hveem Apparatus

Theoretical Maximum Specific Gravity (Rice method)

Asphalt Aggregate

Abrasion, L.A. Rattler

Centrifuge Kerosene Equivalent

Clay Lumps and Friable Particles in Aggregate

Cleanness Value of Coarse Aggregate

Crushed Particles

Durability Index

Flat and Elongated Particles in Aggregate

Organic Impurities in Fine Aggregate

Sand Equivalent

Sieve Analysis

Soundness, Sodium Sulfate or Magnesium Sulfate

Specific Gravity (coarse and fine)

Unit Weight of Aggregate



AGGREGATE BASE

Abrasion, L.A. Rattler
Crushed Particles
Durability Index
Plasticity Index
Resistance "R" Value
Sand Equivalent
Sieve Analysis



MASONRY

Concrete Masonry Units

Absorption
Compressive Strength
Compressive Strength of Masonry Cores
Face Shell Shear on Masonry Cores
Moisture Content
Shrinkage
Specific Gravity and Unit Weight

Mortar and Grout

Compressive Strength of Grout Samples
Compressive Strength of Mortar Cylinders

Masonry Prisms

Compressive Strength of Grouted Prisms

Brick/Paving Units

Absorption and Saturation Coefficient
Compression Strength
Efflorescence
Modules of Rupture
In-Situ Shear on Brick



REINFORCING AND STRUCTURAL STEEL

Pipe Flattening

Structural Steel Bend

Structural Steel Machining

Structural Steel Tensile

Tensile and Bend of Reinforcing Steel

Welded Specimens

Face Bend

Free Bend (reinforcing steel)

Nick Break (reinforcing steel)

Root Bend

Side Bend



HIGH STRENGTH BOLTS

Bolt Ultimate Load

Nut Rockwell Hardness

Proof Loading, Bolt or Nut

Washer (carburized and non-carburized) Rockwell Hardness



MISCELLANEOUS MATERIALS

Roofing Tile

Absorption

Breaking Strength, Flexure

Fire-proofing Insulation

Oven Dry Density



MOBILE ASPHALT LABORATORY

The Earth Systems group of companies can provide full service, remote-location asphalt testing from a fully-equipped mobile asphalt laboratory. The mobile lab is self-contained with a portable generator, water supply, and wastewater holding tank. Tests that can be provided include:

- Marshall flow and stability
- Maximum theoretical specific gravity
- In-place density/percent relative compaction
- Sieve analysis
- Oil content by extraction
- Specific gravity - aggregate and core samples
- Core sampling

In addition to the laboratory, our personnel are fully trained in asphalt placement techniques, sampling procedures and reporting. We have provided full time contract compliance testing, with the ability to give in-place density, theoretical maximum density, percent relative compaction, oil content and gradations at the site. This allows for rapid correction of deficiencies.