

## Non-Destructive Testing, Materials Testing & Conservation

In-situ NDT&E and materials laboratory testing are integrated into our diverse projects and are available as an independent resource to the broader community. We provide, in conformance with applicable listed standards, testing of existing building components and materials, including:

### Leak Investigation

Water Testing of exterior surfaces to determine primary and secondary sources of leaks:

- **Spray Bar: Water Penetration Resistance** of masonry using an exterior pressure-regulated spray rack and interior moisture detection (ASTM E2128).
- **Flood Test: Waterproofing Failure Detection** of roofing using a water source and interior moisture detection (ASTM D7053).
- **Leakage Mapping: Water Penetration Resistance** of fenestration using an exterior pressure-regulated hose nozzle and interior moisture detection (AAMA 511-08).

### Roofs, Waterproofing Membranes and Assemblies

- **Roof Moisture Survey** using **Infrared Thermography** and **Electrical Impedance** scanning (incorporating elements of ASTM C1153 and ASTM D7954).
- **Roof Membrane Integrity Mapping** and **Leak Detection** using a DC pinhole detector (ASTM D7877).
- **Deck Contour Mapping** to determine "pitch to drain" using a laser level system.
- **Withdrawal Resistance Verification** of roof fasteners (ANSI/SPRI FX-1).  
(Roof cuts and gravimetric testing required for full ASTM C1153 and ASTM D7954 compliance. Contour mapping requires roof cuts to reach deck. Roof repair may be required after withdrawal resistance verification testing.)

### Structural Investigation

Load-Carrying Capacity Parameters of concrete slab with reinforcing bar:

- **Depth/Thickness** of slab using impact-echo (ASTM C1383).
- **Compressive Strength** of concrete using rebound hammer (ASTM C805).
- **Reinforcing Bar Size/Spacing/Location & Depth of Cover** using covermeter (BS 1881-204).
- **Reinforcing Bar Spacing/Location** using ground penetrating radar (ASTM D6432).

### Corrosion Investigation

- **Delamination/Void Detection** in concrete using rotary percussion (ASTM D4580) for near-surface voids or impact-echo (ASTM C1383) for deep voids.
- **Chloride Ion Concentration** of concrete from drilling dust or core drilling (ASTM C1218).
- **Carbonation Average/Peak Depth** testing of concrete (as per PCA PL911).
- **Chemical Spot Testing** and **Microscopic Techniques** to diagnose deterioration of metals.

## Marking and Mapping

Core Clearance prior to drilling/coring/boring in concrete:

- **Rebar/Conduit Detection** using ground penetrating radar (ASTM D6432).

Characterization of building facades:

- **Detection of Concealed Ferrous Anchors/Wall Ties** using a pachometer (following ASTM D7046).

## Structural Health Monitoring

- **Remote Vibration Monitoring** of adjacent foundations during construction using geophones (TPPN 10/88 for landmarks and historic and other DOB-designated structures).
- **Crack Monitoring** of walls using telltales.
- **Remote Monitoring** of suspect parapets using proprietary wireless inclinometers.

## Construction Phase Services

Construction Administration testing:

- **Pull-Off Strength Measurement** using a portable adhesion tester (ASTM D4541).
- **Coating Thickness Measurement** of coatings on ferrous and non-ferrous metals using a non-destructive gage (ASTM E376).
- **Hardness Characterization** of mortar using rebound hammer (RILEM MS-D.7).

## Masonry, Stone, and Terra Cotta Investigation

Characterization of building facades:

- **Depth/Thickness** of masonry and/or stone using impact-echo (ASTM C1383).

Deficiency Detection in building facades:

- **Infrared Thermography** to detect patterns of differential heating, indicating potential voids or water retention (following ASTM C1060).
- **Detection of Corroded Ferrous Anchors/Wall Ties** using the mass magnetic probe technique (non-destructive).
- **Missing Grout Detection** in CMU using ground penetrating radar (ASTM D6432).
- **Delamination/Void Detection** in masonry and/or stone using impact-echo (ASTM C1383).
- **Visual Inspection of Internal Concealed Conditions** using a fiber optic borescope and high intensity light source.

Materials testing of samples:

- **Absorption** and/or **Saturation Coefficient** (ASTM C67) of brick.
- **Absorption** (ASTM C97) of dimension stone.
- **Water Vapor Transmission Rate** (ASTM E96) of stone.
- **Identification** of stone.

## Mortar Investigation

Deficiency Detection in building facades:

- **Surface Water Absorption** using a "RILEM Tube" (RILEM II.4).

Materials testing of samples:

- **Gravimetric Analysis** of mortar to characterize the mix and separate aggregate.

## Investigation of Cladding Systems

Deficiency Detection and Characterization of construction:

- **Infrared Thermography** to detect patterns of differential heating, indicating potential voids or water retention (ASTM C1060).
- **Visual Inspection of Internal Concealed Conditions** using a fiber optic borescope and high intensity light source.
- **Patch Detection** using an ultraviolet lamp to create fluorescent patterns.
- **Detection of Concealed Ferrous Anchors/Wall Ties** using a pachometer (following ASTM D7046).

Materials testing of samples:

- **Gravimetric Analysis** and wet-chemical techniques of stucco to characterize mixes and aggregates.

## Conservation Services

Materials testing of samples:

- **Mortar Replication** and/or **Sand Selection**.
- **Stucco Replication** and/or **Sand Selection**.
- **Characterization** of plaster.
- **Identification and Quantification** of salts.

Coatings and Consolidation Testing (before and after treatment):

- **Water Vapor Transmission Rate** (ASTM E96).
- **Absorption** (ASTM C67) of stone.
- **Microscopic Examination and Identification** of painted, clear, and metallic finishes.
- **Color Matching** of paint to Munsell and commercial systems.

## Cleaning Services

Cleaning / Coatings Removal in-situ:

- **Removal Tests** for paint, graffiti and coatings.
- **Specification and Monitoring of Cleaning** of sample portions of the building facade in order to identify the most appropriate cleaning method consistent with minimal abrasion and environmental impact.