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CHOOSE A COMPANY WITH THE TECHNICAL EXPERIENCE AND COMMITMENT
TO SERVICE EXCELLENCE AND SUSTAINABILITY THAT YOU NEED TO BE SUCCESSFUL.

JUST ASK GOLDER

Golder Associates is a respected, employee-owned, global company providing consulting, design, and construction services in our specialist areas of earth, environment, and energy. From 160 offices worldwide, our nearly 7,000 employees work with clients to manage their environmental and engineering activities in a technically sound, economically viable, and socially responsible manner.

FORENSIC SERVICES



ENGINEERING EARTH'S DEVELOPMENT, PRESERVING EARTH'S INTEGRITY.

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FORENSIC SERVICES THAT STAND THE TEST OF TIME

Golder Associates Inc. is a leader in the use of non-destructive investigation techniques for forensic investigations and condition assessments. We offer state-of-the-art capabilities that facilitate rapid, thorough evaluations of buildings and infrastructure in need of remediation or repair. Our expertise extends from contemporary to historic structures and covers the full range of construction materials.

SERVICES:

- **Water infiltration studies** of walls, windows, parapets, roofs, doorways, storefronts, curtain walls, slabs, basements, foundations, bridge substructures, and tunnel lining systems.
- **Material degradation analysis** of stone, brick, mortar, stucco, EIFS, concrete, shotcrete, timber, engineered wood, steel, refractories, composite systems, and earthen architecture.
- **Structural evaluation** of unreinforced masonry, concrete masonry construction, reinforced concrete, cladding systems, piers, piling, timber framing, parking and bridge decks.
- **Condition assessments** of courthouses, government buildings, high-rise construction, bridges, tunnels, swimming pools, ice skating rinks, live fire training academies, houses of worship, waterfront facilities, schools, sports centers, manufacturing and research facilities, box stores, barns, multi- and single-family residences, monuments, memorials, and statues.

- **Forensic investigation** of unsuccessful construction methodologies and remediation treatments involving coatings, waterproofing materials, consolidants, and architectural and structural interventions.

- **Remediation recommendations, specifications, on-site training, and quality assurance** to ensure the success of your project.

EQUIPMENT:

- **Visual enhancement techniques** such as boroscopes and microscopes.
- **Infrared thermography** to map water infiltration through walls, windows, and roofs and to detect material decay.
- **Ground penetrating radar** to locate reinforcement in walls and slabs, measure cross-sectional thickness, and to detect changes in material integrity or type.
- **Ultrasonic technique** to determine the integrity and consistency of homogeneous materials and the characteristics of flaws.

- **Half cell corrosion potential** to evaluate the integrity of embedded reinforcing steel.
- **Impact echo (stress wave)** for the analysis of voids, delaminations, cracks, and thickness measurements.
- **Wood drill resistance** to accurately determine the current integrity and capacity of structural timber members and engineered wood components.
- **Stone/masonry/concrete drill resistance** to ascertain strength data, mortar continuity, depth of stone exfoliation, and penetration of chemical remediation treatments.
- **ANA flat jacks** allow for the in situ assessment of masonry construction including indirect shear, deformation, and stress measurements.
- **Rilem tubes, spray frames and moisture meters** are all techniques applicable to evaluating water infiltration and the current moisture levels in components.
- **Vibration monitors and crack and tilt meters** to monitor structures and mediate against any occurrences that might be detrimental.
- **Capital Planning/Asset Management Database** to provide readily accessible facility assessment data on the condition, remaining life expectancy, and replacement costs for portfolios of assets.

PROJECTS

Legislative Bldg (Washington State Capital), Olympia, WA
Client: Washington State Department of General Administration

We provided a forensic investigation to show how water was able to infiltrate the building, and evaluated deterioration issues with the sandstone cladding, cheneau band and parapet stone, mortar joints and interior finishes. We used a 60x field microscope to examine the stone surface and mortar joints, stone drill resistance technology and ultrasonics to quantify the extent of surface exfoliation, Rilem tubes to determine the rate of water uptake through the stone and mortar joints, ground penetrating radar to determine the location of mechanical attachments between the stone and concrete, and infrared thermography and moisture meters to detect water pathways and extent of water trapped in the wall. We subsequently recommended remediation and specifications for stone cleaning and repairs, mortar repointing, and installation of sealant and lead caps at skyfacing joints. We also provided QA during implementation.

Church of the Ascension, Pittsburgh, PA
Client: Church Vestry and Congregation

To evaluate the condition of this circa 1880's church, we employed nondestructive and minimally invasive techniques. Drill resistance was used to evaluate the exfoliation and delamination of the stone and, along with Windsor pin technology, to assess the condition of the mortar. Wood drill resistance helped ascertain the integrity of the timber stringers, cross-members, and framing. Ground penetrating radar was used to map the thickness of the rubble masonry infilled walls, as well as to locate mechanical thru-wall attachments. We provided specifications for the complete rebuilding of the uppermost portion of the church tower using appropriately sensitive techniques and materials. We also trained the masons how to dismantle and reconstruct the tower and how to prepare and install historic lime mortar.

Whatcom County Courthouse
Client: Whatcom County Facilities

Our work on this contemporary structure was necessitated by extensive water infiltration and material degradation issues. To evaluate the various components that comprise the building, an assortment of nondestructive techniques were employed. We used infrared thermography for the roof and windows and tested the brick panel walls to quantify the rate of water penetration. To verify that the structural components were built according to spec, we used ground penetrating radar to examine the slabs and ultrasonics to assess the envelope components. Once the data was evaluated, a targeted intrusive investigation was undertaken at 25 locations to compare the findings with the NDT data. We then recommended remediation that would mitigate against further material degradation and ongoing water infiltration issues.

