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Infrared testing for energy efficiency, LEED certification, and better buildings

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Infrared testing of building envelope performance is becoming essential to the proper management of today's commercial and institutional structures. Some of the factors driving this trend include rising energy costs, proliferating regulations, escalating litigation, and growing occupant health concerns. The recognition that energy efficient "green" buildings are more profitable and marketable is also focusing the attention of facility managers and owners on the need to improve the thermal and weather performance of their buildings. Infrared building envelope analysis is the most informative and cost-effective tool for the job.

The U.S. Green Building Council's LEED rating system also recognizes the value of infrared building envelope testing. Building owners can earn LEED "innovation credits" by conducting biannual scans of existing buildings and taking action to "remedy identified issues".(1) The CB Richard Ellis team recently received a LEED innovation credit for our testing of a 37-story 1.1 million s/f office building at One Beacon St. in Boston, which has earned the coveted LEED Silver certification.

Experts tell us that commercial buildings and industrial facilities account for 45% of greenhouse gas emissions in the United States. EPA estimates that a modest 10% improvement in the efficiency of our commercial and industrial facilities could save us $20 billion a year. The Building Owners and Managers Association (BOMA) reports that energy accounts for "30% of a typical building's total costs" and is "the single largest and most controllable operating cost in an office building." Significant profits and business advantages are available to managers and owners who are ready to improve their energy performance.

Accurate assessment of current energy performance is the critical first step in any successful plan to reduce costs and improve a building's energy efficiency. Without a "big picture" understanding of the issues you're trying to correct, repairs and retrofits can produce disappointing results, or even make the situation worse. Furthermore, if decision makers don't understand the full scope of the problem, it can be difficult to access the finances and resources necessary to execute an effective plan.

Recently we were asked to perform building envelope testing on a large hospital. The facility had been built in several stages over six decades, employing a variety of construction techniques. The facility managers assumed the older portions of the building would demonstrate the poorest thermal performance and require the most extensive repairs.

However, infrared analysis revealed that in some cases the opposite was true. Some thirty-year-old sections of the building were found to exhibit minimal energy losses, while newer portions suffered from significant air leakage problems. The testing was extremely helpful in identifying and prioritizing the facility's real problems and developing an action plan for cost-effective retrofits.

Infrared building envelope analysis is also ideal for resolving specific issues, such as moisture and mold damage, frozen pipes, ice dams, and occupant comfort complaints. Whether the problems

arise in the context of a post-construction dispute or result from long-term changes in a building's performance, infrared testing can pinpoint the underlying causes for cost-effective repairs.

A Canadian government study of the best way to address "thermal comfort problems" in office buildings concluded that, "detection, verification, remediation and commissioning of solutions are easily and effectively carried out with the assistance of infrared radiometers and proper inspection and analysis procedures." The study also noted that infrared thermography, "provided project managers...with visual proof of the magnitude of the problem".(2) In our experience, this feature encourages disputing parties to accept responsibility for mistakes. It also supports better decision-making by those responsible for funding needed repairs.

Infrared building envelope analysis is your best guide to planning cost-effective energy efficiency improvements for your facility -- and it can help your project earn the USGBC's LEED certification. Building envelope testing is also an ideal tool for identifying and documenting the underlying causes of common performance problems. It will play an increasingly important role in the design, construction, and maintenance of trouble-free and energy-efficient facilities.

(1.) LEED Reference Guide for Green Building Operations and Maintenance, 2009 Edition.

(2.) The use of infrared thermography in detection, remediation and commissioning of thermal comfort problems in office buildings, by Antonio Colantonio, Public Works and Government Services Canada, Technology Directorate.

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