

➔ **WARREN KNOWLES, P.Eng., BEP**

**Expertise & Role**

Mr. Knowles is an engineer with a wide range of experience with the building enclosures of both new construction projects and existing buildings. His work has included the design of new building enclosures, as well as forensic investigation, rehabilitation, maintenance and renewals of existing building enclosure systems. His work in assessing premature building enclosure failures has led the preparation of expert reports, and other litigation support work including attendance and presentation at mediations.

Warren is currently working on a variety of building enclosure projects related to new construction and existing buildings, but has a particular focus on energy consumption and conservation in multi-unit residential buildings. He is leading a large research project that examines energy consumption and building enclosure thermal performance in high-rise buildings.

Warren has been with RDH since its inception in 1997. Prior to RDH he worked for five years with other consulting engineering firms based in Vancouver, Ottawa, and Toronto.

Warren is a shareholder and Principal of RDH and as such participates in the overall direction and management of the firm. Warren is responsible for managing operations for the Vancouver office of RDH.

**Education**

B.A.Sc., Civil Engineering, University of Toronto  
Building Envelope Professional (BEP), AIBC/APEGBC program

**Memberships**

- Member, Association of Professional Engineers & Geoscientists of British Columbia
- Member, BCBECC Building Research Consortium
- Member, Green Buildings Advisory Committee, City of Vancouver
- Member, ASHRAE
- Member, Construction Specifications Canada
- Member, BCIT Master's of Engineering / Master's of Applied Science in Building Science External Review Panel
- Past President, British Columbia Building Envelope Council
- Past Director, British Columbia Building Envelope Council Education Foundation
- Past Director, National Building Envelope Council

**Senior Building Science Specialist**



**Typical Projects**

**NEW CONSTRUCTION**

Warren has provided design and construction review, and verification for building enclosures on all common building types including residential, institutional and commercial buildings with many of the leading developers in British Columbia and the Pacific Northwest. Some examples include:

- ➔ Fairmont Pacific Rim Estates & Hotel, Vancouver, BC
- ➔ Areas 2, 4, and 5, Concord Pacific Development, Vancouver, BC
- ➔ Bella Mira, Issaquah, WA
- ➔ Vista Place, North Vancouver, BC
- ➔ Cruise Ship Terminal Expansion at Canada Place, Vancouver, BC
- ➔ South Bonson Community Centre, Pitt Meadows, BC



Fairmont Pacific Rim Estates & Hotel, Vancouver, BC

**BUILDING ENCLOSURE RENEWAL AND REHABILITATION**

Warren has been involved in the investigation of performance problems, design and construction review for renewal and rehabilitation programs, for numerous high-rise and low-rise buildings in British Columbia. Some examples include:

- ➔ Governor's Tower & Villas, Vancouver, BC
- ➔ Sheraton Guildford Hotel, Surrey, BC
- ➔ Shrum Chemistry Renew project, Simon Fraser University, Burnaby, BC
- ➔ La Mirage, Burnaby, BC
- ➔ Lakeside Terrace, Coquitlam, BC
- ➔ Park Plaza, Vancouver, BC
- ➔ Hamilton Hall, Simon Fraser University, Burnaby, BC

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**CONDITION ASSESSMENT AND INVESTIGATION**

Warren has led numerous building condition assessments and enclosure failure investigations. He has assessed buildings of all types, including early and mid-century masonry buildings, EIFS cladding, modern brick and masonry veneers, traditional stucco, metal, and wood siding. Also, Warren has investigated many curtainwall and other fenestration assemblies.

**RISK ASSESSMENT**

Warren has assessed risk of building enclosures on behalf of insurers, developers, and consultants. Some clients include:

- Willis Warranty Program (warranty provider)
- Intracorp Developments (developer)
- Walsh Construction (contractor)

**EXPERT SUPPORT**

Warren is regularly asked by clients to provide his expert opinion and recommendations as part of the process to resolve disputes and legal actions related to building enclosure performance related problems.

**Guideline & Research Projects**

Warren’s involvement in policy, guideline and research initiatives include:

- Energy Consumption and Conservation of Existing Buildings
- Building Enclosure Design Guide - Wood Frame Multi-unit Residential Buildings in BC (Homeowner Protection Office)
- Development of rehabilitation guides for consultants and property managers
- Development of a study of poured-in-place concrete wall performance
- Performance monitoring study of rainscreen wall assemblies in Metro Vancouver.
- Development of a national studies on window performance problems
- Development of a new, comprehensive Best Practice Guide - Windows

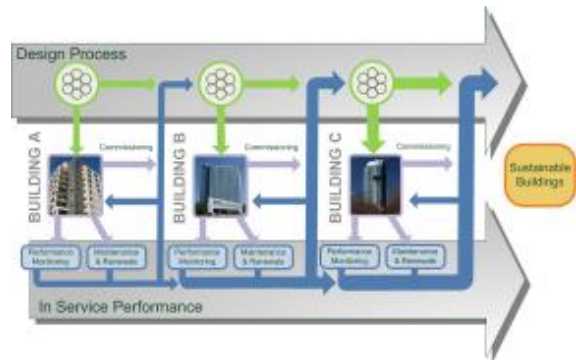


Research Study: Energy Consumption and Conservation of Existing Buildings

**Presentations**

Warren regularly presents at seminars and conferences, including:

- Building Envelope Research Symposium, CMHC/HPO High-Rise Study
- Window Details, SEABEC / AIA, Seattle
- CMHC Building Envelope Rehabilitation Guides, Presentations to BCBE, Property Managers, and Owners
- Energy Consumption and Conservation in Mid and High Rise Residential Buildings, NRC Code Consolidation Task Group
- Energy Consumption in Residential Buildings - Targeting Efficiency, CHBA Technical Research Committee
- High-Rise Residential Buildings: Energy Consumption Trends and Considerations for Deep Energy Retrofits, Ministry of Energy, Mines, and Petroleum Resources Forum



A New Paradigm for the Design of Sustainable Buildings

**Publications**

Warren has written and contributed to a number of conference publications. Recent publications include:

- “A New Paradigm for the Design of Sustainable Buildings,” BEST 2, 2010, Portland, OR
- “Towards Energy Efficient High-rise Residential Building Enclosures: Insight from Energy Bills and Enclosure Rehabilitations,” ICBEST 2010, Vancouver, BC
- “The Path towards Net Zero High-Rise Residential Buildings: Lessons Learned from Current Practice,” ASHRAE Buildings XI, 2010, Clearwater Beach, FL
- “Codes and Standards for Windows and Glazing in British Columbia,” ASHRAE Winter Conference, 2011, Las Vegas, NV (underway)