Guidelines for the Practice of Building Enclosure Engineering

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Atlanta
• Recently constructed buildings in the coastal portions of BC suffered from premature deterioration of building enclosure
• Dominant factor was rain ingress at penetrations and interfaces between enclosure assemblies:
  • windows
  • doors
  • ducts
  • balcony/wall interfaces
  • roof/wall interfaces
  • inside and outside corners
• Accepted that:
  • Rainwater intrusion at interface details was the primary issue
  • Poor detailing often caused by inadequate attention during design as well as construction
  • Building enclosure was a specialized component of the building design, requiring specialized knowledge

• “Any architect or engineer involved in Letters of Assurance and the field review process must have the qualifications, or sub-contract the building envelope design and review to a qualified Building Envelope Specialist…”
Reaction – New Construction

• Requirement for third party warranty coverage against water penetration for five years

The City of Vancouver imposed
• Requirement for “rainscreen” cladding systems
• Requirement for Building Envelope Professionals to do design and field review.
Building Envelope Professional undertake design review, “enhanced field review” to evaluate compliance with section 5.4 Air Leakage, 5.5 Vapour Diffusion, and 5.6 Precipitation and

provide Letters of Assurance that the components and assemblies of the envelope substantially comply with the requirements of Part 5 of the VBBL and with the plans and specifications

The city developed a list of “Building Envelope Professionals”
Dictating who qualified to provide services attracted liability.

Building science and building enclosure performance were generally being addressed by engineering organizations but building enclosure design was traditionally and legally within the architect’s scope.

By dictating qualifications, the City was encroaching on the mandate of the professional governing bodies.
• MOA outlining the boundaries for engineering involvement in this traditionally architectural sphere,
• Recognized a designation, called the Building Envelope Professional (BEP) and outlined the role and scope of services to be provided,
• Jointly administered accreditation process:
  • minimum 5 years as a registered professional with one in BC
  • liability coverage
  • completion of Building Envelope Education Program delivered by the AIBC
The judge noted that the accreditation of individuals for building enclosure construction was an excellent concept and “…undoubtedly in the public interest…”

But AIBC and APEGBC lacked the jurisdiction to establish and regulate a specialty designation.

BEP designation had no legal standing.
Regardless of the Courts

• The need for specialists in building enclosure design was recognized (and effectively required) by industry, insurers and authorities having jurisdiction
• Building enclosure engineering firms have become a fixture in BC
• Both the AIBC and APEGBC have “Building Envelope Committees” dealing with practice issues
• We have more than a decade of regulatory experience to draw on
Building Enclosure Engineering is an evolving field of practice
Most practitioners were not schooled in the field
The practice requires a combination of knowledge from traditional engineering fields – and architectural and construction practice
Legislation changes allowed APEGBC and AIBC to create and accredit specialists. Is accreditation the best approach?
Is a practice guideline a prerequisite for an accreditation process?
Guidelines for Building Enclosure Engineering Services

Association of Professional Engineers and Geoscientists of British Columbia

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# TABLE OF CONTENTS

1 DEFINITIONS ........................................................................................................ 4

2 INTRODUCTION........................................................................................................ 8

2.1 Purpose of the Guidelines .............................................................................. 8

2.2 Scope of the Guidelines ................................................................................ 8

2.3 Compliance with these Guidelines ............................................................ 9

3 QUALIFICATIONS OF THE BUILDING ENCLOSURE ENGINEER .......... 10

3.1 Core Competencies ....................................................................................... 10

3.1.1 Building Codes and Standards .............................................................. 10

3.1.2 Theoretical and Technical Knowledge ................................................ 10

3.1.3 Construction Document Preparation and Design Review .................. 11

3.1.4 Investigation, Assessment and Testing ................................................ 12

3.1.5 Construction Field Services ................................................................. 12

3.2 Experience ...................................................................................................... 12

3.2.1 Application of Knowledge .................................................................... 12

3.2.2 Professional Qualifications .................................................................... 13

3.2.3 Professional Development ..................................................................... 13

3.2.4 Appropriate Reference Material .......................................................... 13

4 GUIDELINES FOR PROFESSIONAL PRACTICE .................................. 14

4.1 Construction Project Services ...................................................................... 14

4.1.1 Conceptual or Schematic Design Phase ............................................. 15

4.1.2 Design Development Phase ................................................................. 16

4.1.3 Construction Documents Phase .......................................................... 16

4.1.4 Construction Procurement Phase ....................................................... 17

4.1.5 Construction Phase .............................................................................. 17

4.1.6 Reporting ............................................................................................... 18

4.2 Other Technical Considerations for Elements of the Building Enclosure and BEE Services ................................................................. 18

4.2.1 Separation of Dissimilar Indoor Environments .................................. 18

4.2.2 Below-Grade Assemblies .................................................................... 19

4.2.3 Secondary Structural Elements ........................................................... 19

4.2.4 Snow and Ice Considerations .............................................................. 19

4.2.5 Acoustic Design .................................................................................... 20

4.2.6 Heat Transfer and Energy Use Assessment ....................................... 20

4.2.7 Durability ............................................................................................... 21

4.3 Other Services ............................................................................................... 21

4.3.1 Building Enclosure Condition Assessments ...................................... 21

4.3.2 Building Asset Management Planning .............................................. 22

4.3.3 Targeted Investigations ....................................................................... 23

4.3.4 Second Opinion Engagements ............................................................. 23

4.3.5 Warranty Reviews ............................................................................... 23

5 PROJECT ROLES AND RESPONSIBILITIES .......................................... 25

5.1 New Building Construction or Renovation Project ..................................... 25

5.2 Building Enclosure Rehabilitation or Renewals Project .......................... 26

5.2.1 Rehabilitation or Renewals Project with an Architect as the RPR ...... 26

5.2.2 Rehabilitation or Renewals Project with a BEE as the RPR ............. 27

5.3 Building Enclosure Repairs ......................................................................... 27

5.4 Other Projects ............................................................................................. 28

5.5 Supporting Registered Professional .......................................................... 30

5.6 Reliance on Others ..................................................................................... 30

5.7 Field Review Only ....................................................................................... 31

5.8 Multiple BEEs on One Project ................................................................... 31

5.9 Specialty Consulting Services Provided by Others ................................. 31

5.10 Selection of Consultants ........................................................................... 31

5.11 Other Types of Building Enclosure Accountability Documents ............ 32

5.12 Accountability Documents for Part 9 Buildings ....................................... 32

5.13 Professional Liability Insurance ............................................................... 32

5.14 Referral Fees .............................................................................................. 32

APPENDIX B – LIST OF ORGANIZATIONS AND DOCUMENTS RELATED TO THE PRACTICE OF BUILDING ENCLOSURE ENGINEERING ............................. 33
Purpose and Scope

• **Purpose** – Establish standards of practice that a BEE should follow as the basis in fulfilling their professional obligations.

• **Scope** – Practice of Building Enclosure Engineering on new and existing buildings and specifically performance aspects of buildings governed by Part 5 (Environmental Separation), 9 Small Buildings) or 10 (Energy performance section of BCBC).

Goes well beyond the limited scope mandated in the VBBL (design and construction review w.r.t. sections 5.4, 5.5 and 5.6)
Definitions

- **Maintenance** – …actions taken periodically to sustain a desired or required level of performance…
- **Rehabilitation** – …reconstruction of the building enclosure assemblies … to fulfill its originally intended functions.
- **Renewal** – …reconstruction or replacement of aged elements of the building enclosure
- **Renovation** – …improvements …related to changes in functional, performance or occupancy requirements rather than premature failure or the need for renewal.
- **Repair** – reconstruction or replacement of specific elements of the building enclosure so that it can fulfill its originally intended functions.
Based on the self governance model

Project experience. The Guidelines suggest:

- three years registration as a professional engineer with one year practicing in British Columbia,
- five years of documented building enclosure experience demonstrating core competencies,
- demonstrable effort to maintain knowledge
Core Competencies

- **Building Codes and Standards**
  - sections of Parts 5 and 9 associated with *condensation* control, *heat*, *air* and *moisture* transfer,
  - but also Parts 3 (Fire Protection), 4 (Structural Design) and 10 (Energy Efficiency) as they apply to the building enclosure design and performance.

- **Theoretical and Technical Knowledge**
  - properties and behavior of materials
  - building physics (heat, air, and moisture transport)
  - interaction of the building enclosure with other building systems
Core Competencies

- **Construction Document Preparation and Design Review**
  - continuity and placement of primary control layers
  - compatibility of adjacent enclosure assemblies
  - appropriate levels of detail for construction

- **Investigation, Assessment and Testing**
  - applicability and limitations of test protocols and standards
  - appropriate use and calibration of testing equipment and instruments

- **Construction Field Services**
  - compliance with construction documents and design intent
  - identifying potential for water penetration, condensation, air leakage and heat loss
- Organization by “phase of construction” works for most projects
- Acknowledges service not related to construction
- Focused on (but not limited to) moisture control in above grade-assemblies, as this has been the legislated focus in BC.
• **Establish the** scope and responsibilities to be addressed by BEE *relative to other professionals*

• With the design team, **establish the performance, functional, durability, aesthetic and cost requirements**

• **Define building enclosure design criteria** considering
  • location, intended use and occupancy,
  • interior and exterior environmental loads,
  • control of air leakage, vapour diffusion, condensation and precipitation.

• **Confirm appropriateness of** planned enclosure assemblies
• Review construction documents for enclosure assemblies and interface details between them
  • Confirm they can meet the established design criteria initially, and over the long-term with appropriate maintenance
  • Verify they adequately describe the building enclosure elements for construction

• Reporting
  • Results of review and recommendations
  • Implications and consequences of decisions contrary to provided advice
Construction Phase

- Field review for all enclosure elements that the BEE has reviewed or designed in earlier phases.
  - Construction meetings, as required
  - Review shop drawings and other submittals
  - Review reports provided by material and component manufacturers, as well as reports prepared by registered professionals who are reviewing building enclosure elements
Site Visits

- Sufficient **frequency** and **extent**, to confirm **substantial compliance** with the construction documents and code.
  - **mock-up and/or testing** of key building enclosure elements
  - Confirm that components and **materials used** are those **specified**
  - Continuity of thermal insulation, moisture, air and vapour **barriers**
  - Review **drainage paths**
  - Review the acceptability of the **moisture content** of wood products

- **Site visit reports** outlining observations and deficiencies directed to the applicable registered professional
If a BEE provides the service, he/she must be able to demonstrate their qualifications independently and additionally to those of a BEP.
5 PROJECT ROLES AND RESPONSIBILITIES ................................................................. 25

5.1 New Building Construction or Renovation Project ........................................ 25

5.2 Building Enclosure Rehabilitation or Renewals Project ............................... 26

5.2.1 Rehabilitation or Renewals Project with an Architect as the RPR ... 26

5.2.2 Rehabilitation or Renewals Project with a BEE as the RPR ................. 27

5.3 Building Enclosure Repairs ........................................................................... 27

5.4 Other Projects ............................................................................................... 28

5.5 Reliance on Others ...................................................................................... 30

5.6 Multiple BEEs on One Project .................................................................... 30

5.7 Specialty Consulting Services Provided by Others ..................................... 30

5.8 Selection of Consultants ............................................................................. 30

5.9 Other Types of Building Enclosure Accountability Documents ............... 31

5.10 Accountability Documents for Part 9 Buildings ......................................... 31

5.11 Professional Liability Insurance ................................................................ 31
Status of the Guidelines

- Draft
  - accepted by APEGBC Building Envelope Committee
  - A few changes requested by AIBC Envelope committee Committee
  - Requires review and acceptance by APEGBC
  - Not widely distributed but is not confidential
  - Can be made available to interested parties
Building Enclosure Engineering is a recognized specialty in BC – and becoming more so in other jurisdictions.

BC has worked through many of the regulatory and professional jurisdictional issues.

The **DRAFT Guidelines for the Practice of Building Enclosure Engineering** reflect more than a decade of practice experience.
Questions?

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